Creativity, altered states of consciousness and anomalous cognition: The role of epistemological flexibility in the creative process

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ABSTRACT

In this PhD research a question is posed that concerns 'varieties of creativity' that have infrequently been explored empirically, although often described anecdotally. This question being: is, and if so, how, is creativity related to altered states of consciousness (ASCs) and parapsychological experiences? This thesis systematically explores the relationship between multiple dimensions of creativity and: personality traits characterised by an openness to intrapersonal experience and a fluid cognitive-style; specific altered states of consciousness and anomalous experiences (such as mystical experiences and subjective paranormal experiences); and anomalous cognition. The common thread is conceived as an examination of the extent to which creativity might involve 'epistemological flexibility' – that is, involves shifts into, and between, different 'ways of knowing'. As such, a major part of this thesis was the psychometric development of a new self-report instrument, the Creative Cognition Inventory, which measures the reported use of different epistemological resources (such as intuition, dreams and rational logic) in the creative process.

Creativity is defined in terms of a process, participated in at the person-level, which leads to a novel and adaptive product or performance. Drawing upon models of the creative process and person, it is suggested that a biphasic process is common to most theories of creativity, and that individuals with particular traits have been hypothesised to engage in this with more facility. Models that have explored cognitive, affective and perceptual 'looseness' as facilitating novelty are examined. As altered states of consciousness involve subjective shifts in these same dimensions, it is proposed that creativity and ASCs may be experientially related, either directly, or in terms of an overarching trait, such as 'boundary-thinness' or 'transliminality', which propitiates both.

A multi-dimensional approach was taken to creativity measurement, accepting its complexity as a componential construct that might consist of multiple creativities. In Study One, the benefits of a multi-dimensional approach to creativity measurement were evident, refuting earlier work that had used only cognitive estimates of creativity and found no relationship with either boundary-thinness or transliminality. These constructs are experiential-traits that assess ones degree of intrapersonal openness, cognitive fluidity and sensitivity, and are associated with a proclivity to have unusual experiences. In Study One, they were found to be significantly correlated with both domain general measures of creativity (creative personality) and domain specific measures (emotional creativity and involvement in the arts). The sample for Study One consisted of 65 psychology undergraduates (49 females; 16 males).

A second study assessed the degree to which different dimensions of creativity were related to different experiences of consciousness. 211 participants were recruited from the general population through opportunity sampling (108 females; 101 males). The sample included professional artists (n = 36) and scientists (n = 27). Competing models of a relationship between creativity and ASC-proclivity were assessed: cognitive expansion; affective openness; and motivational impetus. This study provided numerous insights into the experiences of consciousness that might be related to varieties of creativity. The key findings were that emotional creativity was most robustly associated with ASCs; artistic creative-personality was associated with 'positive' ASCs, including those along an oneiric continuum (e.g. hypnagogia and hallucinations), and those along an affective expansion continuum (e.g. dissociation and positive mystical experiences). Further, original and flexible cognition appeared to be associated with states along an oneiric continuum. Thus, Study Two found support for the affective and cognitive models, yet within different ranges of experience. This 'model' helps to clarify, by using heterogeneous, rather than homogenous constructs of 'unusual experiences', specific processes by which ASCs and creativity may be related and as such deserves further exploration.

The final piece of research developed a novel protocol for recording impressions thought by participants to involve extrasensory perception (ESP) and associated states of consciousness in daily life, using experience-sampling methodology. As success in ESP experiments has consistently been reported amongst visual artists, the above models were used to explore what aspects of the creativity complex might be associated with ESP-performance. As only emotional creativity related to the reporting of parapsychological experiences in Study Two, the affective openness model was expected to predict ESP-performance. Further, a carefully matched control group (n = 15) was used against which to compare success of artists (n = 15). Artists did not demonstrate a superior ESP effect in this study, although they did perform at a level commensurate with previous research. The affective openness hypothesis for ESP performance was rejected. Rather, it was questioned whether previous studies had not adequately matched controls or that the 'take-home' methodology, perhaps increasing relaxation and control for the participants, increased performance levels for the non-artists.

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Throughout conducting the doctoral research described in this thesis, I have been assisted by different people at different times, and as my PhD was conducted on a part-time basis, it has been a part of my life for a long period of time. As such, writing this thesis has almost been like synthesising past identities or different authors, leading me to sympathise with Alice who mused "I know who I *was* when I got up this morning, but I think I must have changed several times since then" (Carroll, 1973, p. 66). I would like to thank various persons for assisting me in various ways along the route of this particular adventure, helping me grow or shrink, explore or focus, relax or 'get a grip' as appropriate: my parents, Jean and John, for always being there to listen to me, my sister, Georgina, and partner, Lee, likewise, (and for their contacts with artists!), Christine Simmonds for inspiring conversations, David Luke for his enthusiasm and helpfulness and Simon Sherwood for the prolonged use of his 1997 PA Proceedings. I should like to thank my supervisors Chris Roe and Deborah Delanoy for their wise words and for giving me opportunities to test myself along the way, with space to explore and guidance when required.

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CHAPTER ONE

Introduction

The overarching aim of this thesis was in some small way to develop understanding of the relationship between creativity and both altered states of consciousness and anomalous cognition. This interest was initially sparked through personal experiences of 'flow states' (described in Section 5.4.6) whilst painting, as a student on the 'Consciousness and Transpersonal Psychology' masters degree course at Liverpool JM University; which led to a masters thesis with a phenomenological approach that asked artists to describe any altered states experienced during the creative process (Holt, 2000). Seeking further elucidation, the approach taken in the current thesis has moved from the idiographic to the nomothetic, and the following chapters include two psychometric studies that explore the relationship between creativity and both experiential-trait measures of 'boundary-permeability' and reports of altered states of consciousness (ASCs), and one quasi-experimental study focusing on creativity and anomalous cognition. These three studies will be summarised subsequently and key terms defined.

The data from the masters study helped in the development of a scale enquiring about the employment of different 'epistemologies' in the creative process, which is used in this thesis – the Creative Cognition Inventory (CCI, described in *Chapter Three*). The following quotes are descriptions of experiences of inspiration and loss of self-awareness that occurred during the creative process, by participants of Study Two of the current thesis. These illustrate a range of 'creativity experiences' that involve shifts in states of consciousness, describing both varieties of absorption in process and the emergence of novel ideas in 'borderland states' (Glicksohn, 1989). It was anecdotal reports like these that fuelled me to pursue the current thesis, seeking to understand, for example, whether such experiences are related to creativity in general, to particular traits, or to particular trait–domain-involvement configurations.

> Sometimes I lose myself completely in what I write and end up writing 'blind' without knowing what a piece is about until it's complete! Sometimes I don't know what an essay or a piece of poetry is really about until later analysis. When I mentally act out scenes, I often get astonished by how much time has gone by while I was 'creating'. I sometimes have felt almost as though someone else was writing through me. [female, aged under 20, psychology undergraduate student].

> When I used to draw and paint, this would often happen – particularly when using colour, it would seem as if I was dreaming in a sea of purple or magenta etc. – in a *very pleasant* way. A sense of being as one with the nature of what we perceive as part of the process of living. Colour would induce a really luxuriant sensual experience – almost indulgently so! Also, the sense of time became altered, sometimes I would be 'lost' in the moment. [female, aged 51-60, dyslexia support tutor].

I once had a problem that was very complex and the answer to coming up with a solution baffled me... until I had a dream and in the dream came the solution. I put it into practice and it worked! [male, aged 61-70, retired].

The only way I have seen of accurately portraying the way inspiration occurs is in the film 'Topsy Turvy' by Mike Leigh. Actor Jim Broadbent plays W. S. Gilbert and is inspired to write 'The Mikado'. ... There is a knowledge that comes over his eyes, and that is what it is like. One moment you don't know something, the next you do, and it is the time in between that is inspiration. I cannot explain how it happens. I tend to have them most when I am just waking or just falling asleep, tentative links in things are explored by my subconscious and I find ideas that are unavailable to me when I am fully awake. [female, aged below 20, illustration and animation student].

> ... in discussion of research, suddenly realising the significance of some results. The effect was as though someone turned the volume down, I could no longer hear what was being said, but was lost in considering the consequences of my insight. [male, aged 51-60, Chemistry Professor].

The specific research aim of this thesis was to explore whether different dimensions of creativity, or 'varieties of creativity', might be identified that relate differentially to different 'frames of consciousness' (Stevens, 1996) – in particular to experiences of altered states of consciousness and anomalous cognition. It was hoped that by recognising the complexity of the creativity construct, relationships that might have been obfuscated, by the isolated use of single measures of creativity in previous research, might emerge. In this vein, my doctoral research, in turn, explored the relationship between creativity and: boundary-permeability, altered states of consciousness, subjective parapsychological experiences and anomalous cognition. These terms will be briefly defined below.

In Section 2.2 creativity, at its core, is defined as 'adaptive novelty' (Boden, 1996; Eysenck, 1996; Feist, 1999; Lubart, 2000-2001; Martindale, 1995; Perkins, 1996). This holds that creativity is a process whereby something new emerges, which is original but also useful or valuable. The different contexts in which adaptive novelty has been researched are considered in terms of four interacting components: the 'creative person' (personality and behaviour) who participates in a 'creative process' (subjective experiences and cognitive models) within a particular 'creative participation' (environment and culture) which leads to a 'creative product' (novel and adaptive product or performance). Complexity is enabled in this model – there may be different types of creative product that might involve different creative processes and different types of creative person, thriving in different 'creative participations' – thus, theoretically, there may be multiple creativities.

In Section 4.1 'boundary-permeability' is described as a personality-experiential construct or cognitive-style which involves a fluid and open mental organization and identifies "individuals who are apt to report a host of unusual experiences" (Levin, Gilmartin, & Lamontanaro, 1998, p.

35). The term boundary-permeability is used to collectively describe two related constructs: boundary-thinness, an interest in and access to diverse internal states, sensitivity and open-mindedness (Hartmann, 1991) and transliminality, the fluid occurrence of "psychological material crossing thresholds into or out of consciousness" (Thalbourne, 2000a, p. 193).

In Section 5.3 an altered state of consciousness (ASC) is defined as a stable configuration of the cognitive-perceptual-affective structures of consciousness that markedly differs from 'ordinary' or baseline core states of consciousness ('normal' dreaming sleep, non-dreaming sleep, and the 'normal' waking state) according to subjective experience and/or objectively observable correlates. Examples of ASCs considered in this thesis are flow states, mystical experiences, hallucinations, lucid dreaming and hypnagogia.

In Section 7.2 'psi' and 'anomalous cognition' are defined as umbrella terms for a range of parapsychological phenomena including ESP (extrasensory perception). This thesis focuses on ESP, which is defined as an event where it appears that information is obtained 'directly', "without either the mediation of the recognized human senses or the processes of logical inference" (Irwin, 1999, p. 6) about some external event or influence to which the information pertains (Thalbourne, 1982). In Section 7.3 subjective parapsychological experiences (SPEs) are defined as those which appear to a percipient to involve psi (Targ, Schlitz & Irwin, 2000).

As a conceptual thread, the three studies described in this thesis have in common that they each examine the relationship between multiple aspects of creativity and anomalous experiences or epistemological flexibility – firstly in terms of trait, then experience, and finally performance. The series of studies begins by exploring the extent to which creativity is related to *traits* that are characterised by a proclivity to have unusual experiences, fluid and imaginative cognitive styles and hypersensitivity or 'skinlessness' (Claridge, Pryor & Watkins, 1998); where the boundaries of self, awareness, and the contents of consciousness – affect, perception and cognition – may blur and shift. The second study proceeds to explore whether creativity is associated with specific types of *experience*, such as mystical experiences and SPEs. The final study explores in more detail the links between creativity, SPEs and ASCs. This study tests whether professional artists perform well on an ESP task, and assesses whether particular states of consciousness and particular dimensions of creativity predict performance on this ESP task. Claridge, Pryor and Watkins (1998, p. 220) note, in their analysis of ten 'psychotic authors', a tendency amongst them to profess interest in and experience of the paranormal. They ask of these SPEs: "How far, for example, are we justified in dismissing them as merely irrational? Or can we allow the possibility, like the subjects themselves, that they are genuine paranormal experiences?" The

final study of the thesis does not attempt to answer this question, but rather, to advance research that has explored the links between creativity and ESP that may inform opinions upon this question. It further relates the outcomes to existing models of creativity, psi, and ASC-proclivity, discussed below. The following paragraphs will make this journey clearer by describing the steps taken along the way, chapter by chapter.

Chapter Two focuses on mainstream creativity research, with the aim of defining creativity and considering pluralistic operational definitions of and ways of measuring creativity. After recognising the complexity of the construct, the 'creative process' and the 'creative person' are considered in more detail – as this thesis focuses on subjective, experiential (e.g. reports of ASCs) and person-level data (using aggregated scores on psychometric measures and performance scores). Models of the creative process are considered generally, in terms of a seeming consensus that describes a bi-phasic dialectic between structured, goal-oriented and loose, unstructured cognitive processes, which in turn enable adaptivity and novelty. It is hypothesised that, experientially, the loose, unstructured processes *might* involve ASCs, or alternatively, that, if creative people tend to shift adaptively into loose unstructured states, they might have a general propensity to shift into ASCs. As such, models of cognitive, affective and perceptual 'looseness' in the creative process are examined as potential theoretical underpinnings for any relationship between creativity and unusual experiences (e.g. Flowers & Garbin, 1989; Martindale, 1989; Russ, 2001). From this idea arises the term 'epistemological flexibility' – to illustrate how creativity, ASCs and anomalous cognition might all be linked by shifts into and between different 'ways of knowing' (Clarke, 2005).

Next, research exploring the attributes of the creative person is summarised, with a brief consideration of how these might differ according to domains of involvement (the arts versus the sciences). Further, a specific model that describes creativity as 'controllable oddness' is discussed – where the profile of the creative person is described as a paradoxical fusion of psychopathology and mental health, which is hypothesised to enable unusual ideas to be usefully developed into creative products (Barron, 1993). This model is applied in Chapter Six, where it is tested whether creativity is predicted by both ASC proclivity and psychological resilience or ego-strength.

After summarising a vast amount of literature, and delineating models that might be extended to include altered states of consciousness and anomalous experiences/cognition, Chapter Two moves on to a consideration of how creativity might be measured. In essence, this briefly reviews measures that have derived from models of the creative process (divergent thinking and remoteness-of-associations), creative personality scales, and scales assessing interest and

involvement in behaviour that is deemed to be creative. It is argued that creativity measurement needs to be multi-dimensional in order to attempt to assess aspects of this multi-faceted construct, and at best, all of these measures are but partial indicators of creativity.

Chapter Three details the psychometric development and properties of a new tool, entitled the Creative Cognition Inventory (CCI). The CCI was developed to measure the reported use of a range of epistemologies in the creative process that might pertain to different states of consciousness (such as inspiration, dream ideation, rational thinking, channelling, affective content, fantasy and fluid, associative cognition). The internal consistency, construct validity and factor structure of the CCI is assessed, prior to its use in subsequent empirical studies.

Chapter Four presents the first empirical study of the thesis – this was psychometric and correlational. It tests whether dimensions of creativity are associated with experiential-trait measures of boundary-permeability. This was hypothesised despite previous research finding no significant relationships between measures of creative-cognition (divergent-thinking and remoteness-of-associations) and boundary permeability, as I suggested that the use of different measures of creativity, which had not previously been related to boundary-permeability, might reveal a positive relationship (creative personality, involvement in artistic domains, self-perceived creativity and emotional creativity).

In Chapter Five literature is reviewed that has explored the relationship between creativity and: general ASCs proclivity; dreams; lucid dreams; hypnagogia and hypnopompia; daydreams and imaginative fantasy; the 'flow state'; and mystical experiences. This literature provides general support for a relationship between creativity and ASCs, while leaving many questions unanswered. In particular, it was argued, that due to diverse creativity and ASC measures used, in a piece-meal fashion, it is not clear whether creativity is related to ASC proclivity in general, or whether this was restricted to involvement in particular domains; or whether certain dimensions of creativity might be related to particular ASCs.

Models of a potential creativity-ASC relationship are also reviewed in Chapter Five. These, in part, extend upon the creativity models explored in Chapter Two, are not necessarily distinct from each other, and suggest that any links may be explained by: '*cognitive expansion*' (e.g. Martindale, 1989), where ASCs and loose, associative creative cognition are thought to share in common hypofrontality (with reduced linear cognition, planning and self-consciousness) (Dietrich, 2003); '*boundary-permeability*' – where both ASCs and creativity are different outcomes of intrapersonal sensitivity, but not necessarily directly linked with each other; *emotional openness* (Taft & Gilchrist, 1970) which may lead to expansive states of being,

characterised by strong shifts in affect (Schuldberg, 1994), e.g. peak experiences and positive mystical experiences, and may facilitate creative cognition (Isen, 1999; Getz & Lubart, 1999) and expression (Averill, 2005); *motivation* (O'Reilly, Dunbar & Bentall, 2001) where a proclivity to have unusual experiences may lead to a desire to express and understand them, which due to their idiosyncratic and subjective nature, are most profitably expressed through the arts, hence any relationship between creativity and ASCs is constrained by domain involvement; and finally, it may be the case that certain forms of creativity are neither facilitated by nor associated with altered states of consciousness (Weisberg, 1989).

These issues were explored empirically in Chapter Six, which presents a study that correlates multiple dimensions of creativity with multiple dimensions of ASCs and anomalous experience. A principal components analysis was conducted on several creativity measures in an attempt to uncover 'varieties of creativity' (emotional creativity, involvement in visual art, performance arts, domestic crafts, artistic writing, academic writing, music and science, creative personality, remoteness of verbal-associations, figural divergent-thinking, self-perceived creativity and the importance of creative practice in one's life). In addition, ego-strength was examined as a potential mediating variable (as discussed above), and the CCI was used to test whether particular states and techniques were reported to be *employed* in the creative process (e.g. daydreaming, meditation, 'channelling'). Chapter Five closes by evaluating competing models of the creativity-ASC relationship in light of its findings.

SPEs and ESP have been reported to commonly arise in ASCs (Alvarado, 1998; Braud, 2002). Further, a number of authors (e.g. Murphy, 1966; Krippner, 1962-63) have suggested that creativity and ESP may be linked by a tendency to enter ASCs. The next part of the thesis focuses upon the putative relationship between creativity and anomalous cognition. In Chapter Seven the occurrence of ESP is presented as a viable working hypothesis. Subsequently, the literature exploring the relationship between creativity and both SPEs and ESP is reviewed, leading to a critique of the research. The main implications of this chapter are that while artistic involvement appears to be associated with success in ESP experiments, it is as yet, not known why this might be, even though it is commonly claimed to be due to creativity. Several possible alternatives, or confounding variables, are considered, based on the literature: experimenter effects, belief-in-the-paranormal, self-confidence, extraversion, and the ability to shift easily into or between states of consciousness.

This naturally leads into Chapter Eight, in which the third empirical study is presented, which seeks to answer some of the questions raised in Chapter Seven. Specifically, it is questioned

whether particular types of creative functioning might be associated with awareness of psi-mediated information. Thus study also tested a new protocol that was conceived whilst listening to Mihaly Csikszentmihalyi give a keynote speech at a Positive Psychology conference in July 2004. In this he detailed the use of experience sampling methodology (ESM) to study happiness in everyday life, through repeated 'beeps', emitted at random times (from e.g. a wrist watch), that signalled participants to complete questionnaires about their current mood and context. Using ESM in a quasi-experimental free-response ESP design, I acted as both the experimenter and 'sender' of ESP information. Participants recorded any 'ESP-impressions' (and associated states of consciousness, based on the Phenomenology of Consciousness Inventory, PCI, Pekala, 1991) on a palmtop-computer, over a 24-hour period, as they went about their 'everyday life'. I hoped that this protocol would avoid potential demand characteristics associated with free-response laboratory tasks that might give an advantage to artists or particular personality types, e.g. those who are most comfortable with performing, in terms of free-associating aloud, for strangers. Based on the outcomes of previous research (e.g. Moss, 1969) it was hypothesised that artists would perform better than non-artists on this task. The components of creativity that emerged from Chapter Six (although preliminary) were used as potential predictors of ESP-performance, partialling out the effects of the potential confounding variables described above. Further, the scores on the PCI (e.g. amount of imagery) were compared to psi-performance.

In some respects this experience sampling study has parallels with early ESP research. Both Barrett (1911) and Parker (2004) described a series of ESP trials by two 'aristocratic ladies', Hermione Ramsden and Clarissa Miles, an artist, in 1905. Clarissa would send ESP messages, from various locations in Europe, to Hermione, in the UK. Barrett (p. 97-8) describes the procedure:

> Miss Miles, at the time of each experiment, noted in a book kept for the purpose the idea or image that she wished to convey, while Miss Ramsden wrote down each day the impressions that had come into her mind, and sent the record to Miss Miles before knowing what she (Miss M.) had attempted on her side. Miss Miles then pasted the record into her book, opposite her own notes.

Parker describes both ladies as being artistically inclined, Hermione as often experiencing her psi-impressions in hypnopompic and hypnagogic states, and Clarissa as being fantasy-prone, entering absorbed, imagistic states. Such characteristics and states, he suggests, are thought to facilitate success on ESP tasks today (e.g. Braud, 2002; Morris, Summers & Yim, 2003). The final study of the thesis has some parallels with that of Miles and Ramsden, however it experimentally tests whether being 'artistic' impacts upon psi-performance, and whether

particular dimensions of conscious experience, creativity and styles of creative-cognition are related to psi-performance. Further, it takes advantage of current technologies that increase the facility of recording data (e.g. of verbal reports and the responses to experience-sampling questionnaires) whilst securing against fraud (e.g. storing data as inaccessible 'hidden files'). In addition, the current study has applied the procedures accrued through years of experimentation in the field, such as the adequate randomisation of target material, judging procedures and probability analyses. As such, the final study may be described as one that takes the laboratory into the field, enabling spontaneity, where impressions may be recorded as they arise in naturally occurring states of consciousness. Further, details about these states can be recorded, for the first time.

The final chapter presents the interpretations, implications of and reflections upon this series of studies and considers possible avenues for future research.

This research touches upon many different research areas, which it is beyond the scope of the thesis to consider in detail, for example: creativity and mental illness; creativity and genius; the nature of consciousness; and a broader understanding of ASCs and their triggers, such as hallucinogenic drugs, meditation, fasting, nature, art, trauma or psychosis. The focus of this thesis is rather upon the extent to which experiences of ASCs and anomalous cognition in everyday life might be related to creativity, irrespective of the trigger for the experience. Further, the participants in the empirical studies are drawn from a variety of walks of life, exploring creativity and consciousness amongst people from a broad range of professions and ages, rather than amongst culturally eminent creatives. Thus, creativity is defined at the 'psychological' rather than the 'historical' level (Boden, 1996). The aim is to consider how shifts into different experiences of consciousness, explored by the likes of White (1993), Hardy (1966) and James (1902), including lucid dreams, mystical experiences, flow states, daydreams, hallucinations and paranormal experiences might be linked theoretically and empirically to different dimensions of creativity (affective, behavioural, cognitive and trait) in order to understand more about the nature of the creative process or processes.

CHAPTER TWO

The creativity construct: What is creativity and how can it be measured?

Within Western psychology, creativity has been characterised as one of the most complex psychological constructs (Runco & Sakamoto, 1999), a heterogeneous, poly-faceted concept (Levin, Galin, & Zywiak, 1991). The postulate that creativity is a multi-dimensional, multi-phasic, multi-state, contextually dependent dynamic is explored in this chapter. The primary aims are to define creativity and to assess models of creativity that may be pertinent to understanding any relationship between creativity and both altered states of consciousness (ASCs) and anomalous cognition, in preparation for future chapters that assess these potential links directly and in detail.

The common denominator of creativity will be defined as *adaptive novelty*. However, in order to contextualise different operational definitions of creativity that appear in the literature reviews of subsequent chapters, the construct of creativity will be evaluated, considering the pluralistic definitions that abound. The author has sought to integrate diverse perspectives/dimensions through a 'quadrant model' of creativity, which is based on the distinctions made between the creative process, product, participation/'press' and person (e.g. Roche, 1960). Further, this quadrant model delineates the contexts in which adaptive novelty might arise and illustrates that multiple creativities might emerge from the interaction of selective subcomponents of each quadrant. This section will not focus on methodological details or the results of specific studies, but on conceptual trends in creativity research – a comprehensive overview of such a massive research area being beyond the scope of this thesis.

Empirical work seeking to understand the creative process and the creative person will be reviewed in more detail, commensurate with the focus on experiential variables throughout this thesis.[1] After general summaries of conceptual trends in each area, models that might help to explain any relationship between creativity and altered states/anomalous cognition will be reviewed. This will focus on models of the creative process that implicate cognitive, affective and perceptual 'looseness' in the generation of novelty – which may indicate a propensity to unusual cognitive, emotional or perceptual experiences. In addition, the notion that the creative person is able to integrate and apply unusual experiences adaptively, having a profile of 'controllable oddness' will be introduced.

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[1] Such as the experiential-trait measure of 'boundary thinness' in Chapter Four, experiences of altered states of consciousness in Chapter Six and reports of subjective paranormal experiences in Chapter Seven.

The final section of the current chapter appraises attempts to measure creativity, evaluating major psychometric paradigms (e.g. divergent-thinking and creative personality) plus more recent developments (e.g. emotional creativity) – setting the scene for the multi-dimensional measurement of creativity adopted in the empirical chapters of this thesis.

2.1 Definitions of creativity: The 'semantic fog'

Dacet and Madus (1969, cited by Treffinger, 1987, p. 105) argue that creativity is so complex that it "mitigates against a universally acceptable definition". One may sympathise with this viewpoint when surveying apparently conflicting definitions of creativity, as illustrated by the following examples.

> Creativity is defined as intelligent, goal-directed search within a culturally defined domain for novel solutions to more or less well defined problems, resulting in the generation of a novel product (Nielson, 1996, p. n/a).
>
> ... creativity appears to be the same tendency which we discover so deeply as the curative force in psychotherapy – man's tendency to actualise himself, to become his potentialities. ... the urge to expand, extend, develop, mature, the tendency to express and activate all the capacities of the organism, to the extent that such activation enhances ... the self (Rogers, 1959, p. 76).
>
> ... creative thinking, [is] defined as the thought processes involved in producing work of acknowledged greatness in art or science (Weisberg, 1989, p. 148).
>
> ... creativity refers to the abilities that are most characteristic of creative people. Creative abilities determine whether the individual has the power to exhibit creative behavior to a noteworthy degree. ... In other words, the psychologist's problem is that of creative personality (Guilford, 1950, p.33).

Treffinger, Renzulli and Feldusen (1971) use the metaphor of a 'semantic fog' to describe the nebulous, vast array of conceptual approaches and definitions that hovers around creativity research. Key areas of contention contributing to this 'fogginess' are whether: creativity occurs at a cultural or individual level; creativity is domain-specific or generic; creativity has to result in an enduring object or represented idea. However, within this fogginess there appears to reside a common thread.

2.2 'Adaptive novelty': The common denominator?

> ... the novelty of a product is clearly only a necessary condition of its creativity, not a sufficient condition: for the madman who, in Russell's apt phrase, believes himself to be a poached egg may very well be uttering a novel thought, but few of us, I imagine, would want to say that he was producing a creative one. (Briskman, 1980, cited in Isaksen, 1987, p. 13.)

Common to most definitions of creativity is the prerequisite of 'adaptive novelty' (e.g. Boden, 1996; Eysenck, 1996; Feist, 1999; Lubart, 2000-2001; Martindale, 1995; Perkins, 1996). This holds that creativity is a process whereby something new emerges, which is original but also

useful, valuable or adaptive. This adaptive novelty may be defined within diverse contextual parameters, for example: at the individual versus the cultural level, distinguishing between everyday or psychological creativity and eminent or historical creativity (Boden, 1996; Maslow, 1971; Richards, 1990); or within object-subject terms as creativity that results in a concrete, enduring product or an intellectual, emotional or behavioural transient event or performance (Averill, 1999; Taft & Gilchrist, 1970).

Novelty occurs when existing sub-components are combined in an unusual and new way (e.g. Koestler, 1976; Martindale, 1995; Mednick, 1962). Through manipulating familiar elements, novel syntheses may emerge. Through working with the existing elements of colour, texture and form, an artist may create a novel visual juxtaposition. Through working with existing symbols and principles, a mathematician may create a novel equation. Novelty does not emerge *ex nihilo*, rather something always comes from something, a view propounded by Aristotle (Kneller, 1965; Arieti, 1976). For example, Boden (1996) argues that novelty arises out of the transformation of conceptual spaces through exploration of and amendments made to their constraints.

The perception of novelty differs between contexts. What is a novel combination in one context may be a common, well known principle in another. For example, as a youth, the Indian mathematician Ramanujan independently reproduced the principles of Euclidean geometry, a novel act in his psychological and perhaps social world, but not a novel act in the international domain of mathematical knowledge (Eysenck, 1995). Novelty may arise in a series of contexts, from the solely individual to the global cultural. Novelty in the cultural sphere is that which is either accepted or rejected as such by social and peer based processes controlling the output and flow of cultural products. (Novelty arising in a cultural sphere does not equate with novelty arising in a collective sphere, as the collective includes all individual experiences). Novelty arising at an individual level is the most fundamental requirement for the novelty criterion of creativity, in that it is required across all contexts.[2]

Sternberg (1988) points out that the way that novelty is 'coped with' is important for creativity. Creativity in any sphere must be useful, valuable or adaptive in order to distinguish creative thinking from merely original and/or psychopathological thinking (Feist, 1999) – "the utility criterion is meant to rule out ideas that are novel but wrong or silly" (Martindale, 1995, p. 250). Hence, creativity is in the service of something, purposeful, intentional. How is it

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[2] One may also note the argument that novelty does not equal originality. Something either is novel or is not novel in a certain sphere, whereas there may be degrees of originality. For example, consider the assessment of originality when comparing the remoteness-of-associations to a verbal stimulus. Eysenck (1995) gives the example of the word 'command', where the most common response was 'order' and an uncommon response 'stern'. By calculating ratios of occurrence, responses may be graded in terms of being more or less original. However, one may not actually call any of these responses 'novel' as they are all familiar words within a particular culture and language.

decided if novelty is adaptive or valuable? This very question emphasises that creativity is embedded in the reflective sphere of consciousness, where a novel product or performance is considered, evaluated and deemed by the perpetrator, or by others, to be of use, or otherwise. Value and adaptivity may be assessed according to different criteria, based on the purpose of the creative act and on the intentions of the potential creator. An act may be defined as creative, therefore, if it has practical and positive repercussions, novelty that generates something that is seen as valuable. This adaptive 'something' may exist on one, or more, of many levels, from the personal value resonating from the song-writing of a musician seeking only to express emotions in the context of self-growth, to the value of an innovative medical paper, receiving positive peer reviews, and having practical health ramifications for many. This issue taps in to the distinction between creativity as a publicly observable, product based, culturally driven act (Gardner, 1996), and creativity as a form of self-actualisation and intrapersonal transformation (Maslow, 1971; Rogers, 1959).

The following quote can be taken as a summary of, and one resolution to, the above discussion, by answering the question, "what then, is creativity?" at its most basic level, across all contexts. Welsch (1980, cited in Isaksen, 1987, p. 9) reviewed twenty-two definitions of creativity, finding elements of both agreement and disagreement, concluding that:

> **Creativity is the process of generating unique products by transformation of existing products. These products, tangible and intangible, must be unique only to the creator, and must meet the criteria of purpose and value established by the creator.**

2.3 The quadrant model of creativity: Contexts in which 'adaptive novelty' might arise

A plethora of methodological approaches have been taken to investigate adaptive novelty. This section will provide a framework for conceptualising these approaches, recognising both their distinctiveness and collective value as parts of an interacting system. In an overview of creativity research, Simonton (2000) describes four fronts: the cognitive processes involved in the creative act; the distinctive characteristics of the creative person; the development and manifestation of creativity across the individual life span; and the social environments most strongly associated with creative activity. A similar way of conceptualising strands of creativity research has been to demarcate the person, process, product, and press (Mooney, 1963; Roche, 1960; Rhodes, 1961). These strands are conceptually unique, but practically intertwined: *the process* (cognitive processes, states of consciousness, affect, knowledge, perception); *the person* (personality, intellect, traits, attitudes, values, motivation, physiology); *the press* (the relationship between people and the environment, the situational

Figure 2.1 **The quadrant model of creativity**[3]

	Interior	Exterior	
Individual	**The creative process** The mechanisms of creativity, the psychological and experiential nature of being creative	**The creative person** Creative behaviour, the creative personality, the creative brain	*The Individual: Psychological creativity, transformation of 'self'*
Collective	**The creative participation** Cultural influence, exchange of ideas, memes, social and peer assessment	**The creative product or performance** Fields and domains of knowledge, the fruition of adaptive novelty	*The Collective: Cultural creativity, transformation of 'culture'*
	The Interior: The internal, subjective, directly experienced 'creative environment'	*The Exterior: The external, objective, observable creative environment*	

context, communication); *the product* (artefacts, performances or outcomes of the creative process, which may be specific to a particular discipline or domain). The current author has further developed this descriptive model of the 'four P's of creativity' by applying it to Wilber's (1997) Quadrant Model of Consciousness, as depicted in *Figure 2.1*. Rather than considering each 'quadrant'/'p' solely as a distinct research area, their interconnection and mutually determined nature is emphasised. Such a perspective follows the advice of Montuori and Purser (1996) who place emphasis on the importance of being aware of all the dynamics that play a part in creativity, and the corresponding danger of reductionism of any sort, arguing for a contextual position that considers the interaction between different levels of enquiry (the psychological, biological and the social). Indeed, most models of creative productivity postulate that it emerges from an interaction between cognition, personality and environmental variables (e.g. Eysenck, 1995; Martindale, 1989; Sternberg, 1988; Ward, Smith & Finke, 1999; Woodman & Schoenfeldt, 1989). Where, most simply: domain-general creative cognition arises in a matrix of attitudinal and personality variables; and is applied through innate or learned skills in a particular domain; which can be a long and sedulous

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[3] Wilber (1997) argues that all levels of enquiry fall into one of four quadrants, related to different ways of acquiring knowledge. A single context may be explored, but all are ultimately interconnected and mutually determining. *Figure 2.1* illustrates different parts of the whole web of creativity that are focused upon in these quadrants. As can be seen, the quadrant model accounts for two basic dichotomies, that between the 'individual' and the 'collective' and that between the 'interior' and the 'exterior'. At a higher level of integration, Wilber regards these dualisms as false dichotomies, being human constructs emerging from the experiential, culturally endorsed distinctions between 'me' and 'not-me', the subjective and the objective. For a more detailed explication, please refer to *Appendix 2.1*.

process, requiring motivation and self-confidence or ambition; and this entire process is facilitated or hindered by situational factors, past and present (e.g. Martindale, 1989; Eysenck, 1993). Thus, Runco (2006) describes creativity as a symphony.

The current author suggests that selective subcomponents from each quadrant interact in the creative process, for example, different domains of creative involvement (e.g. the arts and the sciences) might require specific cognitive processes for optimal performance, or be related to particular person-level variables. This may lead to multiple creativities, a view recently advocated by Sternberg (2005). In the following sections the nature of the creative process and creative person will be considered, with particular attention being given to models and subcomponents (e.g. different types of cognition and personality structures) that might help to understand 'creativities' that might involve or be related to unusual experiences. Throughout this thesis, the focus is upon the correlates and attributes of the individual quadrants. This, however, is done with awareness that in practice the individual quadrants are not separate from the collective quadrants.

2.4 The creative process

This section will focus on the interior and individual quadrant of creativity. Current understanding about the phases of the creative process will be summarised and I will argue that this broadly supports a bi-phasic process. Following this, potential mechanisms that have been postulated to enable novelty will be evaluated, with a consideration of cognitive, cognitive-affective and perceptual models of the creative process.

The creative process has been defined as the "sequences of thoughts and actions that lead to a novel, adaptive production" (Lubart, 2000-2001, p. 295). Stage models of the creative process have attempted to identify experiential sequences that reliably contribute to adaptive novelty – which have often described a multi-phasic and potentially multi-state phenomenon. The most commonly cited stage model was expounded by Wallas (1926) and includes four phases: preparation; incubation; illumination; and verification. Wallas developed this model through the analysis of introspective reports of eminent creative achievers, such as Poincaré and Helmholtz. From these he posited the following pattern: the creator will immerse themselves in the details of a problem, analysing and drawing upon knowledge and experience (preparation), until, after a period of struggling and juggling with information they will rest, letting the search for a solution take a low priority in conscious awareness (incubation), until a moment when a potential solution, unexpectedly and vividly, enters awareness (illumination), leading, finally, to the testing of the appropriateness of this potential solution and its practical development or production (verification). Not all subsequent

empirical research supported this four-stage model (see Lubart, 2000-2001 for a review). It has been suggested that the model be extended to include additional stages, such as: 'problem finding', the identification of flaws, gaps or inconsistencies (Amabile, 1996; Getzels & Csikszentmihalyi, 1976); frustration before illumination (an intermediary phase, referred to by Wallas as 'intimation') where determination and the ability to persevere with ambiguity and complexity is key (Barron, 1968; Sapp, 1992); and, the communication of ideas to others (Cropley, 2006; Stein, 1974). Despite these contentions, the implication that the creative process involves experiential shifts is clear.

Sterner criticisms have drawn upon Guilford's (1950) admonishment of stage models as superficial and thus attempts have been made to delineate the actual cognitive mechanisms that might contribute to the creative process. Rather than developing a sequential model, this approach seeks to identify a range of cognitive subcomponents that might enable one to be creative. Such an endeavour enables more flexible models of the creative process to be built, or indeed, of a variety of creative processes (e.g. Ward, Smith & Finke, 1999).

Two commonly described dialectic modes of thinking or cognitive subcomponents correspond to some degree with the active, conscious stages of the four-stage model (preparation and verification) and passive stages (incubation and illumination). Proponents of two-factor models describe a fluid, imaginative form of cognition that enables novelty and a goal-directed, critical form of cognition that enables adaptivity and works with 'the known' (refer to Table 2.1 for a list of such two-factor models). For instance, Osborn (1953) referred to these as imaginative and evaluative thinking, Guilford (1967) to divergent and convergent-thinking and Isaksen (1987, p. 11) to creative and critical thinking, where:

> Creative thinking involves making and communicating meaningful new connections to: think of many possibilities; think and experience in various ways and use different points of view; think of new and unusual possibilities; and guide in generating and selecting alternatives ... Critical thinking involves analysing and developing possibilities to: compare and contrast many ideas; improve and refine promising alternatives; screen, select, and support ideas; make effective decisions and judgements; and provide a sound foundation for effective action.

In the following paragraphs, brief consideration will be given to three of the most prevalent two-factor models, which span from the early 20th to the 21st Century, illustrating their persistence.

The distinction between primary-process and secondary-process cognition has often been applied to the creative process (Kris, 1952; Kubie, 1958; Pine & Holt, 1960; Suler, 1980), where 'adaptive novelty' requires the successful use of both – a 'magic synthesis' (Arieti, 1976). This terminology was coined by Freud (1911/1958), the primary-process constituting the instinctual symbolism of the unconscious mind in contrast to the conscious, rational

secondary-process. Care must be taken when employing this terminology, which stretches from the early twentieth to the neonate twenty-first century, as the definitions of these processes have subtly changed. Early psychoanalytical models described primary-process cognition as primitive and instinctual in nature, allowing "a momentary and at least partially controlled use of ... nonlogical, and drive dominated modes of thinking" (Pine & Holt, 1960, p. 370). However, Suler (1980) and Martindale (1989), for instance, have adapted the terms to be consistent with the assumptions of cognitive psychology. A modern interpretation is that: "primary-process cognition occurs in normal states, such as dreaming and reverie, and in abnormal states, such as psychosis and hypnosis. It is autistic, free-associative, and analogical and tends to operate on concrete images rather than abstract concepts. Secondary-process thought is the abstract, logical, reality-oriented thought of everyday waking consciousness" (Martindale, 1989, p. 216).

Table 2.1

'Two-factor models' of cognition

	Enabling novelty?	*Enabling adaptivity?*
Nietzsche (1872)	Dionysian	Apollonian
Wundt (1896)/Martindale (1991)	Associative	Intellectual
Freud (1911)/Kris (1952)	Primary-process	Secondary-process
Osborn (1953)	Imaginative	Evaluative
Guilford (1967)	Divergent	Convergent
Deikman (1982)	Passive	Active
Isaksen (1987)	Creative	Critical
Finke, Ward & Smith (1992)	Generative	Explorative
Runco & Chand (1995)	Ideation	Evaluation
Hunt (1995)	Presentational	Representational
Boden (1996)	Explorative	Goal-directed

One of the most pervasive two-factor models of creativity consists of divergent and convergent-thinking. Through the development of psychometric tests and factor analyses of their outcomes, Guilford (1963) distinguished between 120 different abilities in his Structure of the Intellect (SOI) model. These fall into one of two classes, a small class of memory abilities and a much larger one of thinking abilities. The latter divides into: cognitive abilities (recognition of information); productive abilities (the use of information, e.g. generating new information); and evaluative abilities (judgement of what has been cognised and its value). Productive abilities are of two kinds: convergent and divergent. Convergent processes use

thinking that moves towards a determined or conventional answer, while divergent processes move in various ways to no given answer. Divergent-thinking occurs where there is no set way of solving a problem, while convergent-thinking implies that there is a single correct solution. Guilford (1967, p.156) writes:

> In tests of convergent-thinking there is almost always one conclusion or answer that is regarded as unique, and thinking is to be channelled or controlled in the direction of that answer ... In divergent-thinking, on the other hand, there is much searching about or going off in various directions. This is most easily seen when there is not unique conclusion. Divergent-thinking ... [is] less goal-bound. There is freedom to go off in different directions.

A further two-factor model has been put forward by Ward, Smith and Finke (1999), where creative cognition consists of a variety of subprocesses that fall broadly within either a 'generative' or an 'exploratory' category, with recursive looping between these two broad processes until a final product is decided upon. Generative processes produce novelty and include the retrieval, synthesis and transformation of information, enabling: the retrieval of existing concepts or structures from memory; the making of new associations between structures; and by so doing the generation of new structures; the transformation of existing structures; and the reduction of structures to simpler forms. Exploratory processes are evaluative, they: are those that search for the desired attributes of structures according to goal constraints; consider the implications and functions of structures, in different contexts; and consider the limitations of structures and their suitability for solving problems.

In recent years attention has been focused on specifying neurological correlates of the creative process, and a two-factor model is being supported terms of different mediating neural circuits (e.g. Fink, Grabner, Benedek & Neubauer, 2006). For example, increases in alpha power in the posterior cortex (of the right hemisphere) have been associated with insight/inspiration on divergent-thinking tasks (Jung-Beeman et al., 2004), with concurrent alpha synchronization in the prefrontal circuits (associated with the holding of ideas in working memory and the reduction of distracting input) (Fink et al., 2006). While, increased cortical activity in the prefrontal cortices (correlated with executive rational decision making) has been associated with goal-setting and the selection of valuable ideas (e.g. Dietrich, 2004).

From this review, there appears to be consistency across the majority of creativity researchers that the creative process consists of various stages, constituted broadly by loose, open-ended, unconstrained thinking, characterised by spontaneity, versus critical, accurate, criterion oriented thinking and meta-cognition (planning and self-regulating). However, a number of cognitive psychologists argue that creativity only involves secondary-processes (e.g. Bink & Marsh, 2000; Perkins, 1996; Weisberg, 1986). Creativity, Weisberg (1989; 1999) argues, can be explained through analogical transfer (where two previously unrelated

constructs are linked through a process of trial-and-error) applied to existing knowledge, without the need for primary-process cognition. One rationale for this viewpoint is that there is no need to resort to the mysterious and unobservable to understand the creative process (Ward, Smith & Finke, 1999; Weisberg, 1986) when creativity can be explained by cognitive regularities common to general mundane human abilities (Bink & Marsh, 2000). From this perspective, the conclusion of Ghiselin (1952, p. 5), after studying the reports of eminent creators, that: "production by a process of purely conscious calculation never seems to occur" is merely obsfucatory. Yet, Martindale (1989), defending the role of the primary-process, argues that, in part, this debate is based on confusion about the nature of its role in creativity. For instance, the primary-process can be a conscious waking state, along a continuum of oneiric cognition, that is no more 'mysterious and unobservable' than any other form of cognition. Thus, one may reconsider this debate as a controversy about the perimeters of generative cognition – the extent to and manner by which creative cognition might deviate from 'linear', goal-directed thinking. Even secondary-process only models may be described in terms of a biphasic process, e.g. Bink and Marsh's (2000) model extrapolates from 'generate and edit' models of memory and Weisberg's model requires analogical transfer and reality testing. The current author suggests that a range of potential experiences and processes may constitute a creative process, broadly falling into a recursive biphasic dialectic of generation and evaluation (further support for which is discussed in subsequent sections of this chapter). However, it is recognised that that certain creative problems (e.g. of a convergent nature) may only or predominantly require secondary-process cognition for their solution. This view is consistent with the 'multiple creativities' perspective, where different creativities might involve different cognitive subcomponents. One aim of this thesis is to explore if, experientially, reports of different forms of cognition are related to different dimensions of creativity.

In consideration of the perimeters of generative cognition, a number of authors (e.g. Gowan, 1975; Harmon & Rheingold, 1984; Khatena, 1982; Rowan, 1988; Torrance & Hall, 1980) have suggested that varieties of creative process have not been sufficiently explored and urge further delineation of types of generative cognition that might contribute to the creative process. For example, Harmon and Rheingold (1984) developed a spectrum model of creativity, where different ways of being creative involve different states of consciousness, metaphorically ranging from infra-red to ultra-violet, from instinctual automatic reaction, through the 'visible creative rainbow' (e.g. of divergent-thinking) to experiences of spiritual insight. Torrance and Hall (1980) sought to propagate research into what they call the 'further reaches' of creativity, bemoaning the lack of creativity research beyond the divergent-

thinking paradigm (which Torrance was a central figure in popularising). They argued that: "efforts to assess creative potential have thus far been limited to the rational thinking view of creativity. Almost no attention has been given to the assessment of the further reaches of creative potential – those kinds of abilities that go beyond rational thinking" (p. 1). 'Going beyond reason' they assert, is not contrary to reason but merely outside its province and includes non-sequential cognition, such as moments of intuition and revelation, which are "commonly described as occurring in an instant, creating a feeling of wholeness, a oneness 'with everything'" (p. 3). Torrance and Hall describe such experiences as 'supra-rational' and advocate their exploration in order to understand the full range of creative potential. They delineate the study of: emotional awareness; using fantasy; unusual visual perspective; internal visualisation; extending or breaking through boundaries; parapsychological phenomena such as precognition, telepathy and psychokinesis; intense empathy; and meditative experiences; suggesting that these could play a role in the creative process. Imagistic skills (e.g. LeBoutillier & Marks, 2003) and the role of affect in creativity (e.g. Russ, 2001) have received some attention, as has the study of different types of cognition: intuition (e.g. Shirley & Langan-Fox, 1996); post-formal logic (e.g. Benack, 1989) where 'closed systems' are manipulated with an awareness of context, allowing the appreciation of parts embedded in wholes; and Janusian thinking (Rothenberg, 1979), where apparently contradictory views are synthesized. Further, some attention has been given to creative experiences of insight (e.g. Segal, 2004), inspiration (e.g. Thrash & Elliot, 2003), altered states of consciousness (e.g. Wolfradt & Pretz, 2001) and parapsychological experiences (Kennedy & Kanthamani, 1995). As already outlined, this thesis will continue exploration of the so-called 'further reaches', focusing on altered states and anomalous experiences/cognition in relation to creativity.

This section has emphasised a simplistic two-factor structure of the creative process that might facilitate the emergence of a novel and adaptive product. If this is the case, it appears to be the generative phase that might be related to ASCs and anomalous cognition. In preparation for considerations of this argument in subsequent chapters, models of generative processes that give potential theoretical support for links between creativity and unusual experiences will be considered in more detail.

2.4.1 Cognitive and emotional dimensions of the primary-process

Russ (2001) distinguishes between two interacting types of primary-process cognition (or mechanisms) that might play a role in the production of novelty in the creative process: a cognitive dimension and an affective dimension. The cognitive dimension is characterised by

dispersed attention and a flexible flow of ideas; it is analogical, free-associative and over-inclusive, enabling the synthesis of 'purely cognitive' remote mental elements (as expounded, for example, by: Eysenck, 1993; Martindale, 1989; Mednick, 1962; Mendelsohn, 1976). The affective dimension contains 'affect-laden fantasy' and mood-relevant cognition, for example, the forming of affect-based idiosyncratic associations (e.g. Getz & Lubart, 1999; Russ, 1999). In the following sections models supporting Russ's distinction between interacting cognitive and affective subprocesses will be reviewed, which may be considered as an interjection into creativity research of broader models concerning the interaction of emotion and cognition (e.g. Damasio, 2000; LeDoux, 1989; Teasdale & Barnard, 1993). By thus providing a broad coverage of prevailing models of generative or primary-process creative cognition it is hoped to illustrate the validity of considering ASCs in relation to creativity and the possibility of extending such models to understand the outcomes of the empirical chapters of this thesis.

2.4.1.1 Cognitive-associative models of the creative process

> Everything we see, hear, taste, touch, and smell is laced with associations from previous experiences ... the neuro-ecosphere, built up slowly by a lifetime's conglomeration of associations, determines the quality of our conscious experience, however it has come about. ... As we get older, the associations are richer, while some objects might trigger more associations than others. In this way consciousness may become deeper than at other times. Our consciousness is not all-or-none but a variable phenomenon that grows as we do. Even in adult life it might shrink or expand according to where we are and what we happen to be doing and, most importantly, what the focus of our consciousness is. (Greenfield, 1995, p. 10-11).

Associative models of creativity focus on the combination of loosely or remotely connected elements. Mednick (1962, p. 221) defined creative thinking as: "the forming of associative elements into new combinations", constrained by goals and selection criteria, where "the more mutually remote the elements of the new combination, the more creative the process". Such a position is still held by those contemporary creativity researchers who argue that all creativity involves the flexible browsing of and connection of remote semantic elements into a cohesive and effective whole (e.g. Gianotti, Mohr, Pizzagalli, Lehmann & Brugger, 2001; Martindale, 1999), and that, as such, fluid associative processing might be the cognitive mechanism that underpins the creative process. Mednick (1962) illustrates this with descriptions of the creative process by eminent creators, such as: Einstein's 'combinatory play'; Coleridge's 'facts drawing together in the subliminal mind'; and Poincaré's 'ideas rising in crowds' and 'colliding until pairs interlock'.

In Mednick's (1962) model of associative-processing individual difference variables affect creative performance by facilitating the bringing together of remote elements: associative hierarchies; and the number of stored/available associations/elements.

A flat associative hierarchy is an organisation of mental elements where all potential responses are 'weighted' equally, hence, rare responses are as likely to be made to a stimulus as common ones; further, *more* responses are likely to be made (associational fluency). In 'steep associative hierarchies', one or two responses are dominant (weighted more heavily). These are usually culturally stereotypical responses. For example, in reaction to the word 'foot', a stereotypical response might be 'shoe', while more remote responses may include 'stool' or 'inch' (both of which are associated with the trigger word). Based on word-association tasks with creatives, Mednick suggested that the word-association behaviour of a creative individual is less stereotypical.

Mednick further suggested that creativity is facilitated by having more available elements/associations. This aspect of Mednick's model was elaborated upon by Mendelsohn (1976) in a series of studies examining individual differences that affect the acquisition and accessibility of elements. This research suggested that having a wide attentional capacity (WAC) for both external and internal stimuli was related to better problem-solving performance. Further, high creatives were better able to maintain several streams of cognitive activity simultaneously (males only). In conclusion, Mendelsohn proposed that WAC "increases the likelihood that otherwise separate sequences will be brought into contiguity and combined". WAC enables information to be received and stored in an accessible form from a wide variety of cues (internal and external); and more information to be held in attention simultaneously. Mendelsohn cited further work that supported his model, where divergent-thinking was significantly and positively correlated with memory recall (Minard, 1974) and the use of multiple sets (Rainwater, 1964). Subsequent research has supported the idea that 'high creatives' employ attentional strategies that sample a wider range of environmental stimuli, and effectively process this information without cognitive overload (e.g. Dykes & McGhie, 1976; Kasof, 1997). Kasof thus proposes a 'complexity hypothesis', where creativity tasks (e.g. writing a poem) are more complex than other cognitive tasks (e.g. reading a poem) thus requiring greater breadth of attention and greater parallel processing. In addition, recent models have related working memory (WM) capacity and the availability of elements in long-term memory to enhanced creativity (e.g. Dietrich, 2004; Geake, 2005; Howard-Jones, Blakemore, Samuel, Summers & Claxton, 2005). Martindale (1995) argues that elements in long-term memory not only need to be numerous, but *relevant*, based on expertise in an area pertinent to the problem that needs to be solved. Hence, Poincaré's 'ideas rising in clouds' must have been relevant to the mathematical conundrum he sought to solve, although Poincaré (1952) himself notes that most 'fertile combinations' also include information from domains far apart. In summary, wide attentional capacity and a high capacity working memory might facilitate the making of remote cognitive associations.

Martindale (1989; 1995; 1999) developed a connectionist neural network model of creativity that is consistent with the observations of Mednick and Mendelsohn, hypothesising a mechanism for flat associative hierarchies. Martindale describes attention as the most activated nodes in a neural network, and WM as nodes that are activated, but to a lesser degree. He suggests that Mendelsohn's theory should include the total elements in consciousness, postulating that creative people may be able to activate more nodes simultaneously, either in attention or/and WM. Across and within the nodes are represented a wide diversity of facts and associations. When attention is focused, a few nodes are highly activated (a steep associative hierarchy). When attention is defocused activation is more evenly spread out across a greater number of nodes (a flat associative hierarchy). Martindale (1991) proposes that each node receives 'information' from other nodes (lateral excitation or inhibition, which facilitates or prevents the activation of other nodes, respectively) and also from the arousal system, so that the total activation of a node follows the following law: (excitatory input – inhibitory input) x arousal. This means that increases in arousal leads to more stereotyped responses (it will amplify the activation of the nodes that have slightly higher overall excitatory activation). In other words, Martindale argues that low arousal is related to defocused attention, flat associative hierarchies and thereby to the making of novel, remote associations/novel ideas[4]. However, Martindale (1977-78) also suggested that very high arousal might lead to flat associative hierarchies too (presumably because if sufficiently high, any overall excitatory input, however low, might be amplified enough to cross the threshold level required to activate the node). Medium arousal, he suggests, is associated with logical, reality-oriented, secondary-process cognition with steep associative hierarchies. These models led Martindale to test the idea that arousal is related to creativity[5].

The first confirmation of Martindale's arousal hypothesis came from a study comparing scores on creativity[6] and verbal IQ tests under conditions of low (relaxed environment), medium (pressurised environment) and high (white noise stimulation) arousal. The high arousal condition led to lower creativity scores and the low arousal condition to lower IQ scores, suggesting that states of medium-high arousal diminish creative performance (Martindale & Greenough, 1973). Subsequent studies measured cortical arousal (the inverse

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[4] In problem-solving terms Martindale's (1995) model proposes that the nodes representing a problem to be solved will remain partially activated so that the likelihood of them being associated with other information in order to produce a novel association and potential solution is enhanced (in relaxed states characterised by 'incubation', leading to 'inspiration').

[5] See Kasof (1997) for a review of studies where creative performance diminishes with presumed increase of arousal due to e.g. time pressure, noise or the presence of others.

[6] Across this series of studies, Martindale assessed creativity with the Remote Associates Test (RAT, Mednick & Mednick, 1967) and the Alternate Uses Test of divergent-thinking (AUT, Wilson, Christensen, Merrifield and Guilford, 1960).

incidence of alpha) during tasks analogous to the two-stage model (e.g. inspiration and elaboration).

Although creative people (high scorers on divergent-thinking tests) tended to have slightly higher baseline arousal (Martindale, 1977-78), Martindale and Hines (1975) found that high scorers on the measures of creative cognition showed lower cortical arousal while completing the divergent-thinking task, but not when taking an intelligence test, in contrast to low creatives whose arousal level was maintained across both tests. The amount of alpha while taking the tests correlated significantly with creativity scores (RAT, $r = .31$, AUT, $r = .36$, $p < .05$)[7]. Further, while thinking of a story (inspiration), high creatives (as rated by creative writing instructors) had low arousal, but high arousal when writing out the final version (elaboration), whereas, again, low creatives had a steady level of arousal across these stages (Martindale & Hasenfus, 1978). This appeared to indicate that 'creatives' shift into defocused states according to task demands.

Overall, Martindale suggests that creative people might fluctuate between high and low arousal / focused and defocused attention, as is task appropriate (according to a biphasic model of the creative process); where focusing too much on finding a solution inhibits the production of original ideas and inspiration or producing novel ideas is associated with spontaneously entering states of low cortical arousal. Or as Martindale puts it (1977-78, p. 80): "the more a situation calls for or allows loose, undirected, or creative thought, the more likely it is that highly creative subjects will exhibit low levels of cortical arousal in the situation". He suggests that loose, undirected cognition is likely to arise in ASCs, thus explaining anecdotal reports of ASCs during the creative process; however, this has not been tested directly. As he found that creatives are worse than low creatives at alpha enhancement biofeedback tasks Martindale refutes the suggestion that the shifts in arousal he observed are due to conscious control (Martindale & Armstrong, 1974; Martindale & Hines, 1975). He suggests (1977-78) that the arousal of creatives might be more labile in general[8]. Indeed, Eysenck (1993) argues that Martindale's model can only be integrated with his own if the shifts to low arousal amongst 'creatives' is related to general swings of physiological arousal, as, he argues, is the case for psychoticism.

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[7] Refer to Section 2.6.1.1 and 2.6.1.2 for descriptions of these measures of creativity.

[8] Citing a study showing increased heart-rate variability amongst artists by Florek (1973, p. 76). This was subsequently supported in a study where creativity scores correlated positively with spontaneous fluctuations in galvanic skin-response (Martindale, Anderson, Moore & West, 1996). Martindale (1977-78) further suggests that high creatives are oversensitive to stimuli because they have a high baseline of arousal and tend to 'amplify stimuli' (DT and RAT scores were significantly correlated with intensity reports of electric shocks, citing a study by Martindale & Ogulnick, unpublished, p. 75). He suggests that they have a low threshold for protective inhibition. This idea was further supported (Martindale & Armstrong, 1974) by 'creatives' having high resting arousal and more oversensitivity to the onset of a tone.

Eysenck (1993; 1995) argues that both creative cognition and psychoticism are underpinned by disinhibition (a function of arousal in Martindale's model), which increases cognitive looseness. Eysenck (1993) describes individual differences pertaining to creative ability in terms of 'definitions of relevance', some definitions being wider than others, or 'over-inclusive'. Overinclusive thinking involves the boundaries of concepts overextending, so that they are vague and broad, associated with remote or irrelevant items, with less top-down patterning, thus widening the availability of mental elements and making novel combinations more likely. Rather than gradients (steep versus flat) Eysenck uses the metaphor of associational horizons (closed versus wide) to describe the ways that semantic associations can be organised. For example, on a word-association task: "a person with a wide horizon will consider some words, concepts, memories, or whatever to be relevant, but a person with a narrow horizon might consider the same items irrelevant" (p. 152). Horizons determine the search process in that individuals search within that sphere of relevance. Thus, an individual's position on the associational horizon might be measured by assessing the remoteness of their associations. Such originality of response constitutes creativity as a trait in Eysenck's model, is normally distributed, and related to the trait of psychoticism. Support for Eysenck's model has come from research assessing the performance of creatives on word-association tasks and object-sorting tasks (e.g. Lovibond, 1954) that assess idiosyncrasies in the categorical assessment of common objects (Dykes & McGhie, 1976; Merton & Fischer, 1999; Rawlings & Toogood, 1999). It has been proposed that the 'abnormal facilitation' in the spreading of activation (or disinhibition) within semantic networks that is thought to underlie remote or loose associations made in psychosis (Mohr, Graves, Gianotti, Pizzagalli & Brugger, 2001 p. 475), might also underlie creative thinking (Eysenck, 1995). In accordance, Prentky (2000-2001) proposes a normally distributed cognitive-style that ranges from 'extreme constriction' to 'extreme expansion', either extreme indicating a thought disorder. An optimum deviation from the norm however, in either direction, may facilitate creativity. Creativity, Prentky argues, requires shifting along this continuum, from wide-attentional, holistic, to focused, detailed processing. Thus described, creatives are "ambicognitive" (Brod, 1997, p. 286). However, more extreme deviations lead more extreme shifts in states of consciousness, including hallucinations and delusions at the constriction end and states of extreme distractibility and defocused attention at the expansion end of the continuum.

Inhibitory processes are thought to play a role in selective attention (Milliken & Tipper, 1998), discarding behaviourally irrelevant information in order to reduce WM load (Wuthrich & Bates, 2001). One proposed mechanism for this 'filtering' is cortical lateral inhibition, where activity in one neuron at a hierarchical level, inhibits activity of other neurons at that level (decreasing with distance) – making it more likely that one highly activated

representation dominates over other similar, distracting representations – thereby reducing attentional overload (Walley & Weidon, 1973, cited by Milliken & Tipper, 1998, p. 193-4). However, rather than inferring mechanisms of neuronal inhibition merely, a stream of research has focused on 'cognitive inhibition', through experimental paradigms such as negative-priming and latent inhibition (LI)[9]. Both procedures measure the effect that the presentation of a previously irrelevant stimulus has on performance – if processing is hindered, it is presumed to be due to residual inhibition of the representation of 'irrelevant' stimuli in WM. Geake (2003) proposes that WM and latent disinhibition work together to produce analogical fluidity, where: latent disinhibition increases cognitive variance by allowing more seemingly irrelevant or remote stimuli to enter awareness; and a working memory with a large capacity enables these stimuli to be processed simultaneously and retained long enough for remote aspects to be synthesised and these analogies weighted or evaluated and brought to conscious awareness.

If "creativity is a cognitive disinhibition syndrome" (Barrantes-Vidal, 2004, p. 60) then high creatives, compared to low creatives should demonstrate cognitive-disinhibition effects: having decreased latencies on negative-priming tasks; and learning the association over fewer trials on LI tasks. Performance should be enhanced as the previously distracting, now relevant information, is disinhibited or dehabituated. However, relationships between cognitive inhibition and divergent-thinking are mixed, providing weak support for this model (e.g. Burch, Hemsley, Pavelis & Corr, 2006; Green & Williams, 1999; Kwiatowski, Oshin & Martindale, 1999; Rawlings, 1985; Wuthrich & Bates, 2001). A more promising study used measures of 'creative achievement' (Carson, Peterson & Higgins, 2003) and found that high creative achievers had significantly lower latent inhibition scores than low creative achievers. Eminent creative achievers (who had unusually high scores in a single domain of creative achievement) were 7 times more likely to demonstrate latent disinhibition.

In summary, associational-cognitive models of the creative process suggest that originality arises through the contiguity and combination of remote cognitive elements, the likelihood of which is increased through overinclusive thinking, which is facilitated by a wide attentional capacity and defocused states with flat associational hierarchies, and underpinned by low cortical arousal and cognitive disinhibition. Creativity, thus involves variability of cognition along a loose/unfocused-rigid/focused continuum according to task demands. Some support

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[9] Negative priming assesses inhibitory processes in selective attention, by timing response latencies for target identification (in conditions with and without a target that was an irrelevant distractor in a priming task) (Milliken & Tipper, 1998). LI assesses inhibitory process in associative learning. In a typical LI experiment there are two groups of participants: one that is not exposed to an irrelevant stimulus and one that is pre-exposed to an irrelevant stimulus. This stimulus becomes a cue to solving a problem in a subsequent task – hence the group that have not been pre-exposed to the stimulus should solve the problem faster, learning the instrumental contingency over fewer trials (e.g. Gray, Fernandez, Williams, Ruddle & Snowden, 2002).

has been found for the hypothesis that creativity involves shifts into states of low cortical arousal. However, the hypothesis that cognitive-disinhibition, a weaker filtering mechanism of irrelevant cognitive elements into awareness, as a mechanism enabling originality requires further empirical support[10]. Nevertheless, this body of work provides the basis for a rationale predicting creativity, as an ambi-cognitive ability, to be related to 'boundary-permeability' and ASCs. For example, models of cognitive disinhibition have parallels with the constructs of boundary-permeability (introduced in Chapter Four) as cognitive-styles characterised by a heightened sensitivity to subliminal cues, loose, fluid cognition and unusual experiences. Further, cognitive disinhibition has been associated with hallucinatory experiences, whereby models of increased spreading of activation within semantic networks have been used to explain the association between verbal fluency and auditory hallucinations (where the latter may be due to over-activation of lexical units) (Kerns et al., 1999; Tsakanikos & Claridge, 2005). Finally, attention and arousal, shifts in which are implicated in cognitive models of creativity, are key dimensions of phenomenological consciousness, shifts along which are also implicated in ASCs (e.g. Ludwig, 1966; Fromm, 1977; Pekala, 1991; Vaitl et al., 2005). Martindale, as we have seen, directly predicts that (but does not test whether) novel ideas arise in ASCs in everyday life. For the purpose of this thesis, it may reasonably be asked: is creativity related to ASCs? If so, we may further ask whether any such relationship pertains to particular creativities and whether any relationship is direct (creativity involves ASCs) or indirect (some people may be prone to both be creative and have ASCs).

Breadth of attention and arousal are not the only dimensions of consciousness implicated in ASCs; further dimensions include self-awareness, sensory dynamics and affect (e.g. Vaitl et al., 2005). Consideration of the role of affect in the creative process proliferated in the mid-1990s (see e.g. Shaw & Runco, 1994), a review of which will now be made.

2.4.1.2 Affective models of the creative process

> Association depends in a much greater degree on the recurrence of states of feeling than on trains of ideas. (Samuel Taylor Coleridge, cited by Getz & Lubart, 1999, p. 41).

This section will briefly consider recent models implicating affect in the creative process, exploring Russ's (2001) contention that cognitive models of the role of the primary process in creativity are not sufficient. Russ further postulates a separate, but interacting, 'emotional primary-process'. This section will illustrate how variations in emotional experience might play an important role in the creative process.

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[10] Perhaps the 'task demands' have not appeared to require creativity (rather involving focusing on a linear task) thus triggering low arousal and cognitive disinhibition.

While Mednick (1967) focused upon Coleridge's description of 'facts drawing together in the 'subliminal mind' as anecdotal support of his cognitive-associational model of creativity, Getz and Lubart (1999) focused on Coleridge's declaration of the importance of emotion in the making of associations, as the opening quote of this section elucidates. A number of models have propounded the importance of affect to cognition and consciousness (e.g. Damasio, 2000; LeDoux, 1989; Teasdale & Barnard, 1993). Further, specific models have highlighted the failure to include affect in cognitive models of creativity, such as those of Guilford (1967) and Martindale (1989), and have sought to redress this (e.g. Averill, 1999; 2005; Getz & Lubart, 1999; Runco, 1994; Russ, 2001; 1999). The associational models considered in Section 2.4.1.1 do not include aspects of primary-process cognition, which as well as being fluid and associational, were described by Pine and Holt (1960, p. 370) as being "generally pervaded by intense emotionality – feelings of omnipotence, intense pleasure and/ or pain". The intertwining of affect and cognition is central to the creative process, argues Schuldberg (1994), where variants of 'giddiness' and 'horror' might be the affective components of a dialectical cognitive expansion and constriction.

Affect has been proposed to be involved in creativity in a number of ways: 1) *motivationally*: the expression of emotions through catharsis or purgation (Averill, 2005; Getz & Lubart, 1999); 2) *cognitively*: moods have been shown to affect cognitive processing, e.g. states of mild positive affect appear to facilitate divergent thinking, possibly triggering a broad associative network (Fredrickson, 2002; Isen, 1999; Vosburg, 1998); 3) *experientially*: emotions may accompany the creative process, the pleasure or excitement of problem-solving or challenges, as well as the tension, anxiety and frustration (Averill, 2001; Csikszentmihalyi, 1996; Feist, 1994; Runco, 1994). This links into 1) as these emotions might provide tension or unusual perspectives that drive the process (Schuldberg, 1994) or positive affect might reinforce creative involvement (Russ, 1999); 4) *functionally*: emotions might trigger particular mental content; associations may be made between emotions, images and concepts, as well as between concepts and images alone (e.g. Getz & Lubart, 1999; Russ, 1999); 5) *emotional creativity*: Averill (1999) takes this relationship further by arguing that emotions may be products of the creative process in their own right. In the following paragraphs these models will be briefly considered with the simple aim of highlighting the importance of considering the interaction between cognition and affect in the creative process.

General support for integrative (affect-cognition) models of creativity comes from LeDoux (1989, p. 267) who presents evidence for emotion and cognition being "mediated by separate but interacting systems of the brain", where each may influence the processing of the other. LeDoux defines the core of the emotional system as the computation of affective

significance of stimuli, which operates unconsciously and thus precedes emotional experience. He distinguishes between cognitive computations (which concern the properties of a stimulus and its relationship to other stimuli – semantic associations) and affective computations (which concern the relationship between the stimulus and the individual). Through experience, affective learning and memory enable the affective significance of stimuli to be created/adapted. The affective system may evaluate the significance of cognitive stimuli, images, thoughts and memories, as well as stimuli in the external environment or the body. Hence affective information influences cognitive processing, e.g. "influencing what gets stored in long-term memory or affecting the strength with which various items get stored" (p. 278). LeDoux suggests that this model could be extended so that emotion affects further, unspecified, cognitive processes.

One of the most robust findings concerning affect and creativity is that positive moods appear to facilitate performance on tasks requiring flexible and original cognition (see Isen, 1999, for a review). This effect has been reported to be independent of arousal (postulated through the manipulation of situational contexts, Vosburg, 1998). Isen (1999) argues that the effect might be due to increased dopamine levels, which she links to both positive mood and flexibility/fluency of cognition. For the purposes of this thesis, the key point is that transient background mood may independently affect creative cognition.

Affective memories, in addition to mood-states, have been implicated in the making of remote associations (Getz & Lubart, 1999; Russ, 1999). In the 'emotional resonance model of creativity' (Getz & Lubart, 1999) concepts are linked by emotional profiles or feeling tones. Concepts with a similar feeling tone may 'resonate'. Feeling tones become associated with concepts through direct experience, when meaning is attached to events, and may co-vary with level of self-involvement in the event. Nearly all concepts have affective qualities attached to them, from simple hedonistic valence, to more complex and perhaps idiosyncratic combinations of feeling tones. Getz and Lubart are particularly interested in the role of the latter. While concepts may have a shared meaning, feeling tones about a concept may vary more across individuals. Novelty is generated in this model when a feeling tone resonates with concepts, leading to remote associations. This occurs, Lubart and Getz postulate, with a threshold mechanism for feeling tones, above which concepts with emotional resonance become available to WM. This threshold level may be modified by personal (e.g. motivation, state) and situational (e.g. priming) factors. Russ (1999) similarly hypothesises a node based mood-memory associative network, where links may be made between affect-relevant cognition. While these models draw on research suggesting that emotion (e.g. positive moods) affects cognitive performance on creativity tasks (e.g. Isen, 1999; Fredrickson, 2002), and

anecdotal reports of the role of affect in the creative process (e.g. Schuldberg, 1994), the notion that an emotion-memory associative network underpins the creative process requires empirical support.[11]

Of further import to the current thesis is the suggestion by both Russ (1999) and Getz and Lubart (1999) that individual differences in affect, such as *openness to* and *tolerance of* affect states are likely to impact upon the use of the affective dimension in the creative process. Individuals who are interested in and tolerant of affective states, it is reasoned, will have a more diverse, detailed and complex store of emotional memories or 'affect symbols' (Russ, 1999), providing more associative elements. Openness to affect, described by Krystal and Krystal (1994) as the inverse of alexithymia, is, they argue, central to creativity as it leads to greater perceptual and cognitive freedom, making richer material available for problem-solving. Alexithymia is characterised by an inability to describe emotions and has been related to inhibition of fantasy, creativity and dream recall (Hoppe, 1994)[12]. Affective tolerance, robustness, independence or perseverance, Runco (1994) suggests, might increase the ability to tolerate creative tension (e.g. the disequilibrium of 'not knowing') and uncomfortable or negative emotional experiences associated with the primary-process. Thus, one would expect individual difference variables such as emotional awareness (Lane, 2000), emotional complexity (Kang & Shaver, 2004) or emotional creativity (Averill, 1999) plus resilience/tolerance (see Section 2.5.1) to moderate the creative process. Drawing on personality research (see Section 2.5) Russ (1999) hypothesises that openness-to-experience and tolerance of ambiguity as a trait enable access to affect-laden fantasy and affect-states (such as tolerance of anxiety and passionate involvement in a task), which in turn, facilitates over-inclusive thinking and cognitive flexibility.

However, little research has explored the relationship between openness to affect as a trait and creativity. Carlozzi, Bull and Eell (1995) found involvement in creative activities (artistic, scientific and managerial/teaching) to be significantly correlated with affective sensitivity (r = .44, $p < .05$) – one's ability to detect the affective state of individuals in 28 film-scenes. Further evidence of openness-to-affect being related to creativity has come from tests using anxiety-provoking subliminal stimuli (a threatening face) (Smith & van der Meer, 1994). 'Creatives'[13] were less likely to repress or distort, but rather to transform the threat via

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[11] Research might profitably explore how affective processes might help 'select' creative responses (e.g. on a divergent thinking task), extrapolating from Damasio's (2000) somatic marker hypothesis, where the emotional system guides decision-making in complex situations. Affect might help to both generate (Isen, 1999) and 'mark' creative responses.

[12] Hoppe (1994) found that split-brain patients are alexithymic, suggesting that interhemispheric exchange is important for imagining, fantasizing and expressing emotions.

[13] Ranked with low to high creativity (1-4) according to interviewer ratings of artistic and literary creative activities.

symbolisation. Low creatives tended to resist the subliminal manipulation (and reported little interest in internal fantasy generally). Smith and van der Meer argue that inflexible blocking of threatening information takes effort, deadens affect, and thus hinders creativity. They interpret these findings as suggesting that affective involvement (tolerating anxiety and discomfort, as well as joy) enables creativity, both providing motivational impetus, and enabling open access to the 'micro-genesis of thought', which helps to break conventional patterns of thinking.

Thus far, it has been suggested that background mood, affective memories and affective awareness may facilitate creative cognition. Further theories have considered emotional insights as the basis of creativity in their own right. Schuldberg (1994) argues that 'emotional admixtures', where contrary emotions are experienced in unison (e.g. giddy-horror) may be concurrent with the perception of the unity of opposites and making conceptual leaps; but further, that the experience of emotional admixtures may *enable* a fresh perspective, or extraordinary insight directly. This brings us to the construct of 'emotional creativity', to which the construct of emotional admixtures is central. The term emotional creativity (EC) was coined by Averill (1999; 2002; 2004), whose central thesis is that "emotions may be creative products in their own right" (2000, p. 282), where emotions are "social and individual constructions that develop over time, not simply as autonomic reactions distinct from 'higher' thought processes" (p. 295). Averill argues that emotions do not exist independently of their conceptualisation. The way that an emotional state is described is involved in the construction of the experience itself. Averill argues that: "emotional concepts are not simply descriptive, they are also prescriptive. The network of ideas and propositions that lend meaning to our everyday emotional concepts also help constitute and regulate the behavior denoted by those concepts" (1997, p. 531). The idea of emotional creativity is based on a social-constructionist view of emotion, within a 'range of convenience' (Averill, 2000), that is, there are aspects of emotional experience to which emotional creativity is most applicable. For instance, he argues that creativity does not occur with emotional feelings in which all behaviour is embedded, what Damasio (2000) refers to as 'background feelings', but emerges when these are given symbolic form or manifest in behaviour (what Averill calls 'emotional syndromes'). Emotional syndromes can be products of creativity, whereas emotional feelings are part of the creative process and are not amenable to adaptive novelty themselves, but only in the way they are interpreted, constructed, enacted or expressed. Emotional creativity in experience (rather than potential) emerges with one's engagement with emotions as social and cultural constructions (emotional syndromes, roles and schemas). Despite constraints (biological and cultural), emotions are still open ended enough, argues

Averill, for imaginative interplay during the course and microgenesis of an emotional episode. In summary, as social and individual constructions, emotions are subject to creative change. Novel emotional experiences may too easily fall into the traps of being conveniently defined within existing, limited emotional categories, rather than forming new emotional categories. Averill (1999) argues that the role of great literature is to express novel emerging syndromes with skill and aesthetic sensitivity. He aligns this emergence to Arieti's (1976) endocepts, nonverbal carriers of affect, or 'nascent emotional schemas', which are not primitive for being ineffable, but idiosyncratic, new and different to the experient – 'embryonic syndromes' (Averill, 2005).

As one example of emotional creativity, Averill (2000, p. 282) cites the following experience, where pride, hope and grief are combined to form a novel emotion for the individual in question. While at her sister's wedding:

> I felt so many emotions in such an intense manner that it is very difficult to differentiate and describe them separately. I felt such pride in and for her, that I could not stop smiling. I felt such as sense of loss and grieving, that my stomach tightened and ached. Lastly I felt an emotion similar to, but beyond, happiness. I was genuinely smiling with tears streaming down my face throughout the ceremony.

An emotionally creative response is different from what is standard for an individual or group (novelty), is of some value, and it also is authentic, that is it reflects the creator's own beliefs and values rather than being imitative (Averill, 2005). Averill and Nunley (1992) distinguish between three levels of emotional creativity: 1) the particularly effective application of a pre-existing emotional response in a given situation; 2) the transformation of an existing emotion to better meet the needs of a situation; and 3) developing a new form of emotional experience, expression or response. These three forms of emotional creativity represent points along a continuum, where the response is transformed to different degrees.

A number of constructs may be related to emotional creativity or aspects of emotional creativity at a conceptual level. Together, these constructs have in common a tendency towards introspection and reflection on emotional experience, and in some constructs, the effective regulation of emotions. There is a greater awareness of both the emotions of one's self and others and hence greater emotional complexity. These are continuum traits and are assumed to be normally distributed in the general population, such as alexithymia (Taylor & Bagby, 2000), psychological mindedness (McCallum & Piper, 2000), emotional awareness (Lane, 2000), emotional complexity (Kang & Shaver, 2004) and emotional intelligence (Mayer & Geher, 1996) (Refer to Section 8.2.3 for research supporting these links).

In summary, as suggested by Russ (2001), emotional as well as cognitive pathways may be important to creativity. Further, intense emotional experiences and emotional responses may be the focus of cognitive creativity/creative expression. Individual differences in openness to affective experience might thus be related to creativity. Both ASCs and anomalous experiences have been described as involving extreme changes in affect, for example, the euphoria of positive mystical experiences (Fenwick, 2001) and the foreboding of crisis apparitions (Irwin, 2004). Thus, affective variables and underlying mechanisms (such as openness to, complexity of or lability of affect) might be associated with both creativity or creativities and ASCs.

2.4.2 A note on imagery and the creative process

In both of the cognitive and affective reviews of primary-process cognition and creativity imagery was rarely mentioned, yet it is a key phenomenological component of loose associative states such as daydreaming (e.g. Singer, 1976). Further, imagery has been related to both creativity, for example, Einstein (1952) describes his experiences of 'combinatory play' as being primarily imagistic), and ASCs and anomalous cognition, e.g. hallucinations/apparitions and hypnagogic states (Parker, 1975). Holt (1964, cited by Daniels-McGhee & Davis, 1994, p. 157-8) defined the term 'image' as "a generic term for all conscious subjective presentations of a quasi-sensory but nonperceptual character" and classified the following types of imagery: thought images (waking memory and imagination images), eidetic images (an enhanced thought image, that is vivid and clear), hallucinations, pseudo-hallucinations, paranormal hallucinations (e.g. apparitions), dream images, and hypnagogic and hypnopompic images (creativity and hallucinations, hypnagogia and dream imagery are reviewed in Sections 5.4.1-5.4.5). LeBoutillier and Marks (2003) list eminent creatives who described the following types of imagery in the creative process: deliberate manipulation of thought imagery (e.g. Einstein), prophetic imagery (e.g. Coleridge), synaesthetic imagery (e.g. Debussy), unimodal imagery (e.g. Loewi), and dream-associated imagery (e.g. Helmholtz).

Given such reports, Flowers and Garbin (1989) lament the dearth of research linking creativity with perceptual models. They describe perception as an information reduction process whereby variable patterns become stabilised into automatic and consistent internal representations, arguing that a relative 'looseness' of such involuntary organisational processes, where novel syntheses may arise from fragments of internal noise and loosely controlled fragments of memory, may facilitate creativity when coupled with 'higher-order'

evaluative cognitive processes. Shepard (1978 cited by Flowers & Garbin, p. 152) explains the occurrence of spontaneous visual imagery as the decoupling of perceptual mechanisms from the sensory environment, which may then operate on internal data. Flowers and Garbin argue that such states are conducive to creativity, both through spontaneous insights and through the controlled, deliberate manipulation of such imagery. Indeed, one mode of Guilford's (1963) model of creativity is the ability to manipulate and transform visual data and the research of Finke (e.g. 1996) focuses on such imagistic transformations. It is when imagery is under this conscious control that Flowers and Garbin suggest that creativity and perceptual abilities are positively associated, which includes: "the ability to control various aspects of selective attention, to control figural organization when ambiguous sensory data are presented, to perform manipulations of internal and/or auditory representations of perceptual information, and the ability to equate perceptual experiences obtained from different sense modalities (cross-modal abilities)" (p. 149). Such control could lead to the emergence of novel representations and creative products. Hence, in their model there are three factors that facilitate creativity: 1) the relative looseness of involuntary perceptual organizational processes; 2) executively controlled processes; and 3) sudden insight: processes that are neither under executive control nor driven by sensory data, involving spontaneous mental representations, often visual imagery.

However, LeBoutillier and Marks (2003) conducted a meta-analytical review of the relationship between individual differences in self-reported mental imagery (control and vividness) and divergent-thinking, finding that the overall weighted Fischer's *Z* coefficient ($r = .15$. $p < .001$) was a small effect size (Cohen, 1992) accounting for only 2.25% of the variance. They argued that such small effect sizes do not warrant a theoretical interpretation, showing weak support for a link between mental imagery ability and creativity. As explanations for this outcome they suggest: retrospective embellishments of the experiences of eminent individuals; the creativity and imagery measures were inadequate; the protocols of the study did not assess the creativity-imagery relationship in the context in which it is reported anecdotally, i.e. perceptually mediated; or the samples used (commonly undergraduate students) may not be adequate as there may be 'special imageries' amongst eminent creatives. Alternatively, spontaneous imagery and 'perceptual looseness' might be more or additionally important.

Despite LeBoutillier and Marks's questioning of the relevance of imagery (control and vividness of) to creativity, this section illustrates that theoretical speculation has additionally considered the role of perceptual looseness and spontaneity in the creative process. It may be that imagistic states characterised by perceptual decoupling, such as hypnagogia, are of more

import to creativity or creativities than control or vividness. (Evidence linking states characterised by perceptual looseness and creativity is considered in Chapter Five).

2.4.3 Summary of the creative process

In considering the nature of the creative process, models of perceptual, affective and cognitive looseness have been reviewed. As such, shifts in arousal, attention, cognition, affect and imagery have been associated with the emergence of novelty. These elements are key dimensions of consciousness (refer to Section 5.4), shifts in which have been implicated in ASCs. This provides a rationale for questioning whether, if both creativity and ASCs involve shifts along continuums that form experiential structures of conscious experience, creativity and ASCs might be related. It might be that such shifts are not qualitatively different from everyday states of consciousness, to a sufficient degree, to be described as 'altered' (creative cognition may involve less extreme fluctuations along continuums). Alternatively, qualitatively different states of consciousness might be either experienced in the creative process and/or experienced by creative persons beyond the creative process (that is, are prone to unusual experiences, but do not necessarily use these to be creative). Consideration will now be turned to the creative person – examining research that has focused on the exterior and individual quadrant of *Figure 2.1*. This interacts with the 'interior and individual' quadrant, in that it examines the types of behaviours and personalities that appear to be associated with involvement in the creative process.

2.5 The creative person

This section will provide a brief overview of research endeavours that have sought to understand the 'exterior and individual' quadrant – the creative person. Barron's (1993) notion of 'controllable oddness' will then be introduced – where creative persons are hypothesized to have a propensity for unusual experiences in addition to mental health and resilience. While much of this research has occurred in parallel to that focusing on the creative process, theoretical overlaps between the models arise, as the creative person requires characteristics that enable them to engage in the creative process.

Early research on the creative person led to lists of characteristics that high achievers in the arts and sciences are likely to possess (e.g. Barron & Harrington, 1981; Davis & Subkoviak, 1975; Gough, 1979; Kneller, 1965; Perkins, 1988; Taft & Gilchrist, 1970). Such terms are described by Martindale (1999) as indicative of a lack of self-control and

behavioural disinhibition. These often consist of characteristics that facilitate the production of novel ideas, but are accompanied by those that facilitate the sedulous hard work and self-belief required to bring these to fruition. For example, being more than usually: open-minded; flexible; receptive to new ideas; imaginative; curious; intuitive; prone to experiencing deep emotions; comfortable with ambiguity; attracted to complexity; enthusiastic and energetic; curious; humorous; aesthetically sensitive; risk-taking; original; unconventional; venturesome; clever; quick to respond; inventive; reflective; expressive; impulsive; observant; idealistic; interested in a wide range of subjects; intellectually playful, explorative of ideas for their own sake; prone to seeing subtle and unusual meanings in a situation; nonconformist; internally occupied; able to hold a diverse number of ideas in awareness at the same time. And yet, also being: sceptical; independent of judgement; questioning of conventional ideas; persistent, able to sustain endeavour over long periods of time; withdrawn; driven; committed to a task; aware of one's own creativity; self-confident, with faith in one's work, and a sense of importance, even destiny.

McCrae (1987) suggests that creativity is most clearly related to the personality trait of openness (Falat, 1998; Furnham, 1999; Griffin & McDermott, 1998; King, Walker & Broylers, 1996). "Open individuals are curious about both inner and outer worlds, and their lives are experientially richer. They are willing to entertain novel ideas and unconventional values, and they experience both positive and negative emotions more keenly than do closed individuals" (Costa & McCrae, 1992, p. 15). However, Martindale (1989) argues that this research avenue is tautologous as the two constructs are so similar. Indeed, original adjectives upon which, in part, the openness construct was based (Goldberg, 1983) include 'creativity' and when examining the facets of openness in comparison with adjectives composing Gough's (1979) Creative Personality Scale, over half of the latter are included e.g. 'insightful' and 'original'. However, King et al. (1996) found that openness-to-experience predicted creative achievement only amongst participants high in divergent-thinking, and thus argued that openness acts as a catalyst for production, perhaps through excitement about new or bizarre ideas.

As already discussed, creativity appears to require more than openness. Following the first meta-analysis of creativity and personality studies Feist (1998) described the key attributes of the creative person (independent of domain involvement) as being autonomous, introverted, open-to-new-experiences, norm-doubting, self-confident, self-accepting, driven, ambitious, dominant, hostile and impulsive.

Extrapolating from experimental studies and cognitive models of the creative process, the creative person might be expected to have: a high capacity WM (e.g. Geake, 2003; 2005;

Mednick, 1962); relevant domain-specific skills and knowledge (e.g. Martindale, 1995); and knowledge about/interest in a wide variety of things (e.g. Gough, 1979). Such factors, it has been argued, facilitate the synthesis of remote mental elements as well as the recognition of their relevance. Hence, the aphorism by Pasteur (1854, cited by Cropley, 2006, p. 394) that "chance favours only the prepared mind". However, intelligence and learning do not appear to be synonymous with or sufficient for creativity (see e.g. Feist & Barron, 2002; Sternberg & O'Hara, 1999), leading Martindale (1995, p. 259) to stress that creativity has more to do with *how* knowledge is accessed – creative people are those that can "get themselves into primary-process states of defocused attention". Kris (1952) similarly hypothesized that creative individuals are able to navigate flexibly between secondary and primary-processes. Such 'adaptive regression' of the ego in the creative process, he argued, was permitted by a particular kind of ego-control, allowing access to primary-process. This will be further discussed in terms of the 'controllable oddness' model in Section 2.5.1

McCrae (1987) argues that consideration of the creative person is important, because in addition to possessing cognitive abilities (enabling the forms of creative cognition discussed above), creativity involves the *disposition to use* these abilities. Drive or intrinsic motivation is an important characteristic of the creative person – i.e. engaging in a task primarily due to one's own interest, for its own sake, rather than external goals or rewards (Amabile, 1985; 1996).

Several models have tried to integrate different potential characteristics of the creative person. For example, Sternberg's (1988) three-part model focuses on the interaction between intelligence, cognitive-style and personality/motivation. Cognitive-styles are typically preferred modes of processing information. They don't relate to abilities per se, but to the way that people like to use abilities (Sternberg & Grigorenko, 1997). They may be seen as the interface between cognition and personality. For example, in Sternberg's (1988) model a legislative style of 'mental self-government', which is concerned with creating one's own rules, being autonomous and preferring problems that have not been predetermined or pre-structured, is most associated with creativity. This is in contrast to an executive style, which prefers to follow rules and to work with existing ways of doing things, and a judicial style which prefers to evaluate and critique existing rules and procedures and structures. These styles are similar to the 'innovative' (creating new structures) and 'adaptive' (modifying existing structures) creators of Kirton (1976), except that Kirton sees both as creative, in different ways; ways that Kim (2006) suggests indicate a preference for divergent versus convergent subprocesses.

There is some evidence that personality traits differ among those involved in particular domains. In his meta-analysis of creative personality, Feist (1999) found different characteristics to distinguish creative artists and creative scientists from their 'less creative peers' (in addition to the core characteristics). Scientists were more confident, secure, conventional, dominant, sceptical and disciplined than artists, who were more emotionally labile, norm-rejecting, impulsive and prone to intense affective experience.

In their seminal longitudinal study on creative personality and problem-solving amongst students at the School of the Art Institute of Chicago, Getzels and Csikszentmihalyi (1976, p.38) describe the potential future artists as having a number of distinct personality traits in comparison with matched (gender, age and educational status) college norms:

> ... future artists are socially reserved and aloof. They are serious and introspective. Accepted standards of behaviour and morality have little hold over them – they score low in 'superego strength'. They are intensely subjective, unconventional in outlook, and imaginative. They tend to be radical and experimental. They are resolute and make their own decisions – they score high in 'self-sufficiency'.

The art students did not score higher than college norms on intelligence tests, but did so on mental rotation skills and on tests of aesthetic-figural-preference. In common with creative achievers across other domains (science and architecture, for whom comparable data were available) the art students placed values for theory and aesthetics higher than economic and social values – being committed to the values of their work rather than those of monetary or societal support. There was a difference across disciplines, however, in that scientists valued religiosity less than artists or architects.

Merton (1968, cited by Jackson, 1987, p. 152) categorised the domain of science as valuing: universalism, disinterestedness and organized scepticism. Success in any domain requires goodness-of-fit with an individual's temperament, assert Albert and Runco (1987), and the domain of science, they continue, favours abstraction and distance from immediate experience. In a review paper, Albert and Runco describe the temperament of the scientist, in contrast to the nonscientist, as being less excitable and less interested in personal relations, organising and controlling subjective experiences through "an externally derived rational system" (p. 84). In a further review paper, Jackson (1987) describes engineers and physical scientists as valuing: endurance, achievement and understanding; and being disdainful of social recognition and dependency.

In summary, the creative person has been described as being open, intrinsically motivated, able to shift productively in and out of primary-process cognition, self-confident, having wide interests and the ability to hold many ideas in awareness at once. However, there may be a variety of creative personalities and these might interact with the domain of involvement

(James & Asmus, 2001) – most crudely, scientists may be 'convergers' and artists 'divergers' (Hudson, 1967).

2.5.1 Creativity and 'controllable oddness': A profile of the creative person

> You must also be able to handle what is apt to come out of the bottle. (Smith & van der Meer, 1994, p. 162).

Links have been made between the cognitive processes, styles or temperaments of both creativity and psychopathology (a review of this vast literature is beyond the scope of this thesis and the reader is referred to: Barrantes-Vidal, 2004; Brod, 1997; Claridge, Pryor & Watkins, 1998; Nettle, 2001; Sass & Schuldberg, 2000-2001). In Eysenck's (1993) model, psychoticism underpins both trait creativity (originality) and psychosis. In the general population, creativity has been found to be positively correlated with psychoticism[14] (e.g. Woody & Claridge, 1977) and the positive dimensions of schizotypy[15]: hypomanic traits, perceptual aberration, unusual experiences and magical ideation (O'Reilly, Dunbar & Bentall, 2001; Schuldberg, 1990, 2000-2001). Debate continues about whether this relationship might be due to the flight of ideas and positive affect of mania, or to the loose associations of schizophrenic cognition, or to both (e.g. Jamison, 1993; Schuldberg, 1990, 2001; Kinney, Richards, Lowing, LeBlanc, Zimbalist & Harlan, 2001; Russ, 2001). In light of which, Nettle (2001) distinguishes between 'schizotypy' and 'thymotypy' in relation to creativity – the latter pertaining to fluctuations in affective experience. In any event, it has been argued, as already discussed, that perceptual, affective and cognitive looseness might synergistically be components of both creative achievement and mental illness.

In this section, evidence that the adaptive factor of creativity distinguishes the creative process from psychopathology will be considered, as this further elucidates personality traits that might enable the creative person the deal effectively with unusual experiences. Barron (1993, p. 183) described creativity as 'controllable oddness', where "oddness of thought or feeling, when coupled with an ability to reconsider and reformulate" is a resource for creativity – a balance of conceptual or affective expansion and control and integration – an interaction between psychopathological and healthy processes (Russ, 1999; 2001; Schuldberg, 1994). Such dual-interactive models include overinclusive thinking or

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[14] Eysenck (1996, p. 213) defines psychoticism as "a genetic predisposition to develop psychosis under appropriate stress", which is normally distributed in the general population, ranging from (at low levels) empathy, altruism and conformity to the (at increasingly high levels) criminal/alcoholic, schizoid/psychopathic, unipolar depressive, manic depressive, schizoaffective and schizophrenic.

[15] Brod (1997, p 276) defines schizotypy as "a set of behavioural, affective, and cognitive eccentricities, which in addition to forming some of the underpinnings for episodes of psychotic illness, also exhibit in the normal population at a non-clinical level".

psychoticism/schizotypy[16], which is moderated by variables such as ego-strength or high IQ (Barron, 1968; Claridge, 2000; Eysenck, 1995) – that is, there is 'something that allows' optimum deviations along a continuum of expanded to constricted thinking (Prentky, 2000-2001). Flach (1990) describes characteristics of creatives that pertain to ego-strength, such as: autonomy, setting one's own goals, social poise, and a strong sense of responsibility; presenting a 'resilience hypothesis' where creativity requires the "successful transit of stress-induced episodes of disorganisation and reorganisation" (p. 162), helped by flexibility of personality, the ability to tolerate ambiguity and the ability to reintegrate. Carson, Peterson and Higgins (2003) suggest that high intelligence may enable the insights gained through overinclusive thinking to be interpreted and applied in a healthy way, to be used creatively and integrated into the personality.

A number of studies have shown that while 'psychotics' and 'creatives' both score at a higher level than 'normal' groups on measures of novelty (e.g. remote verbal associations or object sorting tasks), creatives differ in their ability to assess the appropriateness of responses or choose a correct answer (e.g. Dykes & McGhie, 1976; Merton & Fischer, 1999). Dykes and McGhie argued that high creatives, unlike schizophrenics appeared able to inhibit irrelevant responses according to task demands.[17] Merton and Fischer (1999) found that creatives (writers and actors) and schizophrenics scored higher than non-creatives on an open-ended single-word-association task, however, schizophrenics included more stereotypical responses and seemed less able to inhibit these when specifically asked to produce word-associations that were uncommon, unlike the other samples – controlling their response behaviour. Thus, Merton and Fischer argue that creativity is not aligned with associational dysfunction, as in schizophrenia, but with flexibility of cognitive-styles – epistemological flexibility.

Further support for this model, comes from Fodor (1995) who found that participants who had high scores on both psychosis-proneness and ego-strength obtained significantly higher creativity scores (on both the RAT and expert ratings of solutions to an engineering design problem) than other conditions ($F_{(1,92)} = 4.62$, $p < .01$; and $F_{(1,92)} = 5.04$, $p < .01$ respectively). In a post-hoc analysis, Fodor found that these participants demonstrated more complex visualisation on the design problem (as indicated by the participants' diagrams) ($X^2 = 7.72$, p

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[16] Schizotypy is multi-dimensional, with four factors: unusual experiences, introverted anhedonia, cognitive disorganisation and impulsive non-conformity. Psychoticism loads on the latter dimension of schizotypy (Brod, 1997).

[17] This concurs with Martindale and Armstrong (1974) who found that creatives were better at suppressing than enhancing alpha on a biofeedback task, leading them to suggest that creatives may be better at focussing attention, while inspiration arises spontaneously and getting into associated states is not amenable to control.

< .01), leading him to speculate whether ego-strength played an organising role in hallucinatory-like visualisations, harnessing them to the creative process.

In summary, a range of person-variables appear to characterise the creative person, such as motivation, openness-to-experience, resilience and non-conformity. Further variables may be specific to domain involvement, for example, emotional lability and intensity of affective experience may be related to involvement in the arts. Thus, there may be different types of creative person, which may differentially be related to openness to unusual experiences. This will be further considered in Chapter Six, where ASC proclivity (and controllable oddness) are considered in relation to different dimensions of creativity.

2.6 Seeking to measure creativity

The quest to measure creativity, or find predictors of it, maps onto the different quadrants of *Figure 2.1*, and is represented by: cognitive models (divergent-thinking and remoteness-of-associations); psychometric models (creative personality, attitudes, motivation and creative styles); and domain-based involvement (reported creative behaviour, interests and achievements). Other forms of assessing creativity include performance on specific tasks (such as writing poems), ratings by peers or experts, indices of achievement, such as exhibitions or publications, (which are estimates of both creative achievement and eminence) and correlates of creativity such as aesthetic-figural-preference (Barron, 1963a) and perceiving meaning in randomness (Smith & Faeldt, 1999). In this section, key creativity paradigms will be briefly assessed, leading to a discussion of the value of multidimensional creativity measurement. For reviews of available measures, see Feldhusen and Goh (1995), Hocevar (1981), Hocevar and Bachelor (1989) or Plucker and Renzulli (1999).

2.6.1 Cognitive models and measures

2.6.1.1 Divergent thinking

In Guilford's (1963; 1967; 1968) SOI model (introduced in Section 2.4) are delineated 11 factors of divergent-thinking, which are most commonly 'transformations' of different 'contents'. These contents may be: figural, having no reference to anything beyond itself and being perceived or imagined in the form of images; symbolic, including numbers, letters, syllables, words and other conventional signs that likely belong to a system (e.g. the alphabet); semantic, referring to meanings, e.g. of words, rather than their structural

properties; and behaviour, which Guilford added theoretically, in reference to the concept of social intelligence and empathy, dealing with our own behaviour and that of others.

Tests of divergent-thinking are open-ended and focus on eliciting circumstances by which transformational ability can be assessed. These tend to score responses according to all or some of: originality (the ability to produce a rare idea); flexibility (shifting between different categorical sets); fluency (the number of ideas produced); and elaboration (the degree of detail in and complexity of the idea). Thus, the Alternate Uses Test (Wilson, Christensen, Merrifield and Guilford, 1960) requires original uses for household objects (e.g. a brick or a coat hanger) to be listed; and the Obscure Figures Test (OFT; McReynolds & Acker, 1968) requires doodles to be interpreted. Perhaps the most well known tests of divergent-thinking are the figural and verbal forms of the Torrance Tests of Creative Thinking (TTCT) (e.g. Torrance, 1974, 2000), where, for example, in a repeated figures task one is to draw on 9 circles, thus transforming them into something else. These tests are usually administered in a group setting under controlled conditions, with standardised instructions and strict time constraints.

Tests of divergent-thinking have received much appraisal, reflecting their common usage. The validity of divergent-thinking tests has received contrary reports (see Plucker & Renzulli, 1999, for a review). Plucker (1999) argued that they have adequate predictive validity, after re-analysing the data from Torrance's seminal longitudinal study. Controlling for intelligence, he found that children's divergent-thinking scores (taken over three years) accounted for three times as much variance in creative achievement by age 27 than intelligence (.19); just over a third of the variance (.60). The shared variance between divergent-thinking and intelligence was .20. Barron and Harrington (1981) report that overall, previous studies had shown statistically significant positive correlations between divergent-thinking measures and indices of creative achievement or behaviour. They stress the importance of domain relevance, arguing that in studies that demonstrated a null relationship have not always ensured that the content to be transformed is relevant to domains of creative achievement. McCrae (1987) however, argues that divergent-thinking tests in general appear to be associated with creative achievement only in the arts. Further narrowing of their predictive validity has come from research suggesting that it is best among gifted groups (Runco, 1991). Despite this, Runco (2006) argues that tests of divergent-thinking are useful predictors of creative performance, but not measures of actual creativity.

Criticisms of divergent-thinking tests abound. Treffinger, Renzulli and Feldusen (1971) argue that creativity has motivational, affective and personality components, and that, at best, divergent-thinking tests only assess a cognitive component of creativity, assessing merely some intellectual abilities that play an important role in creativity. Likewise, Sternberg (1985)

argues that divergent-thinking measures of creativity capture at best only trivial aspects of creativity. There is the problem that divergent-thinking tasks may seem boring or trivial to creative individuals and thus may not stimulate a creative response. Further, they are limited to a few minutes, while the creative process might typically take much longer – weeks or years. In this way, they bear little resemblance to creativity in the 'real world'. Finally, Treffinger et al. (1971) point out that divergent-thinking tests do not assess the relevance of responses – the adaptive criteria of creativity. Hence, they are in danger of assessing 'quasicreativity' merely (Cropley, 2006).

Wallach and Kogan (1965) developed divergent-thinking tests for children, and found that divergent production tests elicited creative responses only when a game-like, playful atmosphere was maintained and no time limits were imposed. Under standardized testing conditions and with strict time limits, divergent-thinking tests may not allow an opportunity for the expression of true creative abilities (McCrae, Arenberg & Costa, 1987). Carlsson, Wendt and Risberg (2000) made a similar criticism, arguing that if a testing environment is associated with anxiety/high arousal, that this may inhibit creative responses. Wallach and Kogan argue that the typical test-like constraints of divergent-thinking testing lead to conflation with IQ. That the situational constraints on the divergent-thinking test affects the outcome, was considered by Van Mondfrans, Feldhusen, Treffinger and Ferris (1970) who found that scores on figural divergent-thinking scores increased when students could do tests at home with no timing constraints. Further, 'take-home' tests demonstrated better validity and did not correlate significantly with IQ. That divergent-thinking tests are sensitive to instructional set, training and context has been extensively explored (see Runco, 1991 for a review).

2.6.1.2 Remoteness of associations

The theoretical underpinnings of creativity tests that seek to assess associational 'novelty' are discussed in Section 2.4.1.1. The Remote Associates Test, RAT (Mednick & Mednick, 1967) asks one to form an association with three 'remote' words – to produce an associative link between them. For example, between 'wheel', 'electric', and 'high' – the solution is 'chair'. As such, it is a convergent task that is scored by counting the number of correct associates formed from 30 items. The rationale for using common word links (e.g. between wheel and chair) is that these are familiar to all and should not therefore favour those who specialise in creativity with words compared to other elements. As criterion validity Mednick (1962) reports that, as rated by tutors, creative architects and psychology researchers scored higher

than less creative peers on the RAT. However, even more so that divergent-thinking tests, the RAT has been criticized for being highly correlated with IQ scores, specifically verbal intelligence. For example, Davis and Belcher (1971) found that the RAT also correlated positively with the Henmon-Nelson IQ test (males, $r = .76$, $p < .0005$; females, $r = .60$, $p < .005$) and with academic success (males, $r = .57$, $p < .0005$; females, $r = .54$, $p < .005$) rather than with tests of creative achievement. Guilford (1971) describes the RAT as an example of convergent associative production. Gianotti, Mohr, Pizzagalli, Lehmann and Brugger (2001) thus devised a conceptually similar, but 'divergent' association task – the Bridge the Associative Gap (BAG). This test presents participants with word pairs that are of two types: indirectly related (e.g. leg-shoe); and unrelated (e.g. mash-fur). The aim is to think of any word that links two others. All associations are considered valid and responses are timed for latency and for their remoteness (unique, rare or common).

2.6.2 Measures of creative personality

Based on research discussed in Section 2.5, a number of creative personality scales (CPS) have been developed. These have generally taken the approach of distinguishing between those involved in 'creative domains' perceived to be more or less creative (by expert judges) or in terms of creative achievement (e.g. publications) (e.g. Domino, 1970; Gough, 1979; Smith & Schaefer, 1969; Torrance & Khatena, 1970). Some of these focused on creativity in particular domains, e.g. scientists (Lacey & Erickson, 1974) and artists (Domino, 1970). Others attempted to create a scale that assessed creative personality across domains (e.g. Gough, 1979). Further person-level scales have assessed creative styles (e.g. Kirton, 1976), motivation (e.g. Amabile, 1996) and self-perceived creativity (e.g. Kumar, 1997). David and Belcher (1971) argue that the latter is an under-used and valuable measure as creative persons are more likely to perceive themselves as such.

Domino (1970) used the Adjective Check List (ACL, Gough & Heilbrun, 1983) to compare expertly judged 'top creative' art students with 'less creative' controls (matched for age, IQ, psychological adjustment and subject of study). Gough and Woodworth (1960) found that Domino's scale did not predict creativity amongst research scientists and hence sought to create a 'generic CPS'. The two scales overlap in terms of adjectives included (and correlated at .68, Gough, 1979). Gough (1979) administered the ACL to 1709 participants, rated for creativity by expert judges (including architects, mathematicians, research scientists, psychology students and engineers), isolating 30 adjectives that consistently characterised 'creatives'. Hocevar and Bachelor (1989) suggest that Gough's scale is the most promising of these CPSs. However, Gough's scale has been criticised for being more associated with

scientific CPS (James & Asmus, 2001). Indeed, his samples were heavily 'science based' and the research scientists in Gough's study had a higher average mean score on his CPS than the other samples. Hence, although Gough's scale has received better psychometric support (see Section 3.1.3) caution must be taken over interpreting its scores as indicative of 'generic CPS'.

2.6.3 Measures of domain-based 'creative behaviour'

Hocevar (1981) strongly asserts that actual creative behaviour is the best indicator of creativity. A number of self-report checklists or inventories of current creative interests and achievements have been developed (e.g. The Creative Behavior Inventory, Hocevar, 1979). Hocevar (1979) asked university students to name their most creative accomplishments in: art, mathematics and science, literature, music, performing arts and miscellaneous. Another 50 students then rated thee accomplishments in terms of their perceived creativity. These ratings were used to generate a 90-item inventory (see Section 3.1.3). Based on the assumption that the best indicator of future creative behaviour is past creative behaviour (Runco, 1991), biographical inventories have assessed the occurrence of 'creative' involvement or achievements across the lifespan (e.g. the Alpha Biographical Inventory, Taylor & Ellison, 1966). However, such measures are heavily skewed towards behaviour in certain domains (e.g. product based) and fail to assess creativity in a broad range of 'everyday' realms (e.g. occupational or interpersonal) (Richards et al., 1988). Further, these checklists favour quantity rather than quality of involvement (Runco, 1991).

Further measures of domain involvement might include Averill's (1999) thirty-item Emotional Creativity Inventory, which assesses intrapersonal/interpersonal creativity according to self-reported: preparedness (understanding and learning from one's own and others' emotions); novelty (the ability to experience unusual emotions); effectiveness (the adroit expression of emotions); and authenticity (the honest expression of emotions). The psychometric qualities of this questionnaire are covered in Section 3.1.3.

2.7 Multi-dimensional creativity assessment

Different measures of creativity generally appear to have very low to medium convergent validity (e.g. Belcher & Rubovits, 1977; Davis & Belcher, 1971; James & Asmus, 2001; Wolfradt & Pretz, 2001) and factor analyses suggest that creativity is multi-dimensional (e.g. Kim, 2006). For example, from ten different measures of creativity, Belcher and Rubovits found three factors, which they labelled: convergent-thinking (e.g. RAT); creative personality

(e.g. Gough's CPS) and divergent-thinking (e.g. Unusual Uses). Guilford (1971) argued that it is not surprising that creativity measures have low convergent validity when creativity is factorially-complex. Thus, the measures reviewed above may be seen to partially assess creativity at best.

In his review of available creativity tests Hocevar (1981) recommended using creative achievements and activities scales as the core means of assessing creativity, suggesting that other measures, such as divergent thinking may be better considered as correlates of creativity. In addition to mentioning the value of ratings of self-perceived creativity, Davis and Belcher concur with the predictive power of creative behaviour, as do Feldhusen and Goh (1995), although the latter prefer the assessment of products by experts as indicative of creative behaviour (rather than self-reported activities). Unlike Hocevar, Feldhusen and Goh suggest that measures of ideational fluency are also amongst the best measures of creativity available. As previously discussed, such controversies can be reconciled by considering and testing integratory models, e.g. where ideational fluency interacts with environmental and person variables to lead to creative behaviour (e.g. Eysenck, 1995; King et al., 1996).

Based on a componential model of creativity (Section 2.3), it is commonly argued by creativity researchers that the multi-dimensionality of the construct means that it can best be assessed, and then imperfectly, through the use of a wide selection of predictors (Brown, 1989; Davis and Belcher, 1971; Feldhusen & Goh, 1995; Guilford, 1971; Hocevar, 1981; Isaksen, 1987; Perkins, 1996; Treffinger, 1987). Based on such assertions, for this thesis it was decided to use a broad range of creativity measures, from both the 'person' and 'process' quadrants' and from the 'product' quadrant, as different processes and characteristics might be pivotal to creativity in different domains. These measures included: creative personality, self-perceived creativity, involvement in music, writing, visual arts, science and performance arts, emotional creativity, remoteness-of-verbal-associations and figural divergent-thinking. Further, in an attempt to assess creative styles that might pertain to the use of ASCs in creative processes, an additional scale was developed (the Creative Cognition Inventory; described in *Chapter Three*).

2.8 Summary of key points of this chapter

Creativity has been defined as adaptive novelty and reviewed as a multi-dimensional, componential phenomenon, whereby different forms of adaptive novelty might arise from a matrix of cognitive, trait, motivational, situational and domain/skill based factors. It has been argued that any attempt to measure creativity must consider this multi-factorial structure.

Further, it has been suggested that creativity is a bi-phasic process, and that generative creative processes that involve variance or looseness of cognition, affect and/or imagery might be related to ASCs, boundary-permeability and anomalous cognition. However, it has been maintained that the pluralist nature of the creativity construct indicates that not all ways of being creative or ways of measuring creativity might be related to unusual experiences.

Models of the generative creative process that have been described in this chapter focus on mechanisms by which cognitive looseness, enabling the connection of remote mental elements, might be accentuated. These 'mechanisms' – which entail shifts into states of low cortical arousal, wide, diffused attention, and cognitive disinhibition have phenomenologically been implicated in ASCs (e.g. Pekala, 1991). It has been suggested that creativity might involve an ambicognitive ability to shift into different cognitive styles – and to use insights thus gained productively – having a personality profile of controllable oddness. It has further been suggested that such shifts may be imagistic in nature (Flowers & Garbin, 1989) and that shifts into different affective states might also facilitate creativity – again, shifts in affect and imagery also characterise ASCs (e.g. Pekala, 1991). Having drawn these parallels, the remainder of this thesis will assess the empirical evidence supporting such theoretical links and will extend this research, considering the relationship between different dimensions of creativity (e.g. cognitive and affective novelty, and artistic and scientific involvement) and both ASCs and anomalous cognition – exploring the extent to and manner by which creativity might be related to epistemological flexibility.

In this thesis, adaptive novelty will be considered at its most fundamental level – with a focus on the individual quadrants – and a consideration of individual differences in personality, cognitive-styles and reported subjective experiences. At worst, such experiences might be considered epiphenomena of underlying computational processes, fabrications or delusory explanations. At best, these analyses might lead to further understanding of types of creativities and associated experiences and traits, highlighting potential underlying processes that might deserve further exploration, as well as leading to further knowledge about the interaction between unusual experiences and factors of creativity.

The next chapter will begin this exploration by describing the development of a new psychometric measure, the Creative Cognition Inventory, which assesses the potential use of a range of epistemologies in the creative process.

CHAPTER THREE

The Creative Cognition Inventory: Construction of a new psychometric tool

The current chapter introduces the 'Creative Cognition Inventory' (CCI), a new self-report scale devised by the current author to assess and demarcate a range of experiences and epistemologies thought by individuals to be important to their creativity. The CCI is used in empirical Studies Two and Three of this thesis. Thus, the current chapter prepares the reader by describing the CCI's factor structure, internal consistency and construct validity.

The rationale for developing the CCI was to construct a tool that would enable some assessment of whether, if relationships occur between altered states of consciousness (ASCs) and creativity, such states would be reported to be of importance to the creative process by experients, that is, reported to be *functionally of use* to their creativity. Further, it was hoped that the scale would help to assess whether particular 'styles of being creative' might mediate any relationship between creativity and ASCs. More generally, it was hoped to develop a useful psychometric tool for creativity research, given that no such self-report scale, assessing types of creative cognition and experiences consciously drawn upon in the creative process, previously existed. Items for the CCI were derived from phenomenological reports of epistemologies employed in the creative process (Holt, 2000) and literature reviews of creative cognition (as described in Chapter Two). Thus, items broadly fell into a dual-process model, relating to both structured, linear thinking (an example being: "the careful selection of ideas") and types of non-linear, primary-process thinking and experiences (examples being: "a sense of purpose that seems to come from beyond the self" or "sudden moments of inspiration in waking life"). As such, items were chosen to reflect a wide variety of experiences commensurate with calls to examine the 'further reaches' of creative cognition (Torrance & Hall, 1980). The CCI has 29 items, consisting of a comprehensive list of experiences and processes that might be thought by respondents to facilitate their creativity (including loose, playful thinking, expanded states, automated states, sensed presence, absorption, the use of analogy, rational logic, goal-orientation, inspiration, intuition, hunches, fortunate accidents, mental imagery, dreams, hypnagogia, daydreams, meditation and affect). Respondents are asked to rate each item on a five-point Likert scale, which ranges from 'not important' (0) to 'important' (4), according to the question: 'To what extent are the following experiences or processes important to your creativity?' A copy of CCI is displayed in *Appendix 6.1.*

An initial factor structure of the CCI was used in Study Two of this thesis, and a slightly modified factor structure (CCI-Revised, CCI-R), based on data collected in additional studies (Holt, 2006; Holt & Roe, in press; Roe & Holt, in press) was used in Study Three. Both versions are described in the current chapter, along with assessments of the internal consistency of sub-scales. Further, the construct validity of the revised factor structure is assessed. Validity assessments include the degree to which components of the CCI are related to creativity, ASCs and personality. One would expect a scale purporting to measure 'ways of being creative' to be positively associated with psychometric measures of creativity; presumably, creative persons will report experiences that are pertinent to their creative process, and which may even contribute to them being creative persons. Further construct validity assessed the degree to which components of the CCI were associated with experiential (e.g. altered states of consciousness, Quekelberghe, Altstotter-Gleich & Hertwick, 1991) and personality measures (e.g. the five-factor model, Costa & McCrae, 1992). For instance, it was expected that certain 'creative epistemologies', such as entering absorbed states of concentration when being creative or utilising novel ideation or imagery that arose in a hypnagogic state would correlate positively with measures that assess experiences of related altered states. Finally, correlations between the components of the CCI and personality traits were examined. For instance, convergent and discriminant validity would be supported if unstructured forms of creative cognition were associated with openness-to-experience (which subsumes intrapersonal exploration) and 'structured' or linear forms with conscientiousness (a tendency to be orderly, purposeful and determined).

3.1 Method

3.1.1 Participants

Participants constituted three samples. The first consisted of 211 participants, 101 males and 108 females (2 did not disclose gender) recruited through opportunity sampling. Ages ranged from 18 to 70+, with the most common age groups being 21-30 (51) and 31-40 (51). 36 were professional artists, 27 were professional scientists and remaining participants came from a broad range of professions (refer to Section 6.1.3 for further details). The second sample consisted of 80 participants (32 males and 48 females, mean age = 31.22 [range = with 18 to 61]) drawn from psychology staff and students at the University of Northampton and from members of the general public who were listed on a database as interested in taking part in parapsychological research (recruited from public talks and local advertisements). Each of these participated in one of two related experimental parapsychology studies (Holt & Roe, in press; Roe & Holt, in press). The

third sample were visual artists (painters and sculptors) from the Cyprus College of Art who took part in an pilot study (Holt, 2006) that used the precognitive habituation paradigm developed by Bem (2003), $n = 14$, 4 males and 10 females, mean age = 28.43 (range = 20 to 41).

3.1.2 Procedure

Participants completed the CCI in their own time and chosen location, amongst a collection of further questionnaires. The presentation order of the CCI was counterbalanced within these packages of psychometric measures. In Sample One participants completed in addition to the CCI: The Emotional Creativity Inventory (Averill, 1999); the Creativity Checklist (Griffin & McDermott, 1998); Gough's Creative Personality Scale (1979); two items relating to self-perceived creativity; Remoteness of Associations; Shapes; the Assessment Schedule for Altered States of Consciousness (Quekelberghe, Altstotter-Gleich & Hertwick, 1991); Barron's Ego-Strength Scale (1968); the Transliminality Scale (Thalbourne, 1998); and the shortened Boundary Questionnaire (Kunzendorf, Hartmann, Cohen & Cutler, 1997). In Sample Two, participants completed in addition to the CCI: the Emotional Creativity Inventory (Averill, 1999); the Creativity Checklist (Griffin & McDermott, 1998); two items relating to self-perceived creativity; the NEO Five-Factor Inventory of personality (Costa & McCrae, 1992); the complex partial epileptic signs subscale of The Personal Philosophy Inventory (Persinger & Makarec, 1987); a measure of mood lability (Akiskal et al. 1995); four items on the belief in and experience of parapsychological phenomena; and the oblivious involvement subscale of the Absorption Scale (Tellegen & Atkinson, 1974). Participants returned their completed questionnaires to the author by email or with a freepost envelope with which they were supplied. In Samples Two and Three participants completed and returned the CCI prior to taking part in the experimental session.

3.1.3 Measures

The Creative Cognition Inventory, CCI. A 29-item questionnaire, with a five point Likert response scale, developed by the present author to assess the import of different modes of cognition and experiences to an individual's creative process, including: daydreaming, hypnagogia, logical thinking, emotions, channelling and expanded states.

Creativity measures

The Emotional Creativity Inventory, Averill (1999). A 30-item inventory examining three facets of emotional creativity, based on Wallas's (1926) stage model of creativity: preparedness ($\alpha = .82$); novelty ($\alpha = .84$); authenticity and effectiveness ($\alpha = .83$). The entire scale

demonstrated an internal reliability coefficient of $\alpha = .90$ ($n = 489$). Test-retest reliability with a three-month discrepancy gave a coefficient of .91 ($n = 45$). Construct validity was established in a series of studies: by examining relationships with batteries of psychometric tests related to personality and affect (Averill, 1999); high scorers on the ECI were able to better express unusual emotions symbolically in stories and pictures (Averill & Thomas-Knowles, 1991; Gutbezahl & Averill, 1996) and were rated by peers as more emotionally creative based on their everyday experience of them (Averill, 1999).

Creativity Checklist, (Griffin & McDermott, 1998). A 54-item checklist, focusing on the visual arts, performance arts, writing and domestic arts, with a dichotomy between an active interest in these activities and recent experience of these activities. This checklist was based on the 90-item Creative Behavior Inventory (Hocevar, 1979). An interest and activity in each domain was found to be significantly and positively related to openness-to-experience on the NEO-PI (Costa & McCrae, 1992). A 14-item scientific activities subscale was added, by the current author, also based on Hocevar (1979).

Gough's Creative Personality Scale, CPS (1979). A 30-item sub-scale of the Adjective Checklist (Gough & Heilbrun, 1983), 12 adjectives being antithetical to and 18 being associated positively with 'creative personality'. Internal reliability coefficients ranged between .73 to .81 for males and females of different creative groups, composed predominantly of scientists, architects and psychology students (Gough, 1979). Test-retest reliabilities were: .68 for males, with a six-month interim; and .70 for females, with a one-year interim (Gough & Heilbrun, 1983). High concurrent validity was established with three other measures of creative personality (Domino, 1970; Schaefer, 1972) and 'expert-rated creativity' from a number of professions. James and Asmus (2001) found this scale to be significantly related to self-perceived artistic and problem solving creativity, but not to a measure of divergent-thinking. Gough and Heilbrun (1983) describe: "The high-scorer on the CPS is venturesome, aesthetically reactive, clever, and quick to respond. Intellectual characteristics such as breadth of interests, cognitive ability, and ideational fluency are also apparent. The low-scorer is more subdued, less expressive, more conservative, and less inclined to take action in complex or ill-defined situation" (p. 18). As elucidated by Eysenck (1995) this scale includes elements that relate to ego-strength. Ego-strength may be defined in terms of a healthy self-integratory system, related to self-adequacy, and personal adaptiveness and effectiveness, the resourcefulness with which an individual responds to vicissitudes in daily life (Barron, 1968b; Harmon, 1980; Storr, 1972).

Self-perceived creativity and the importance of creativity. An author-devised 2-item measure on a 7-point Likert scale, asking: "How creative would you describe yourself to be?", with responses from 'not at all creative' to 'highly creative'; and "Is involvement in a creative practice an importance purpose in your life?", with responses from 'not at all important' to 'highly important'. These items demonstrated an internal reliability of .72 and some criterion validity was established with correlations of *rho* = .49, $p < .001$, 2-tailed and *rho* = .51, $p < .001$, 2-tailed, respectively, with openness-to-experience (Roe, Holt & Simmonds, 2003).

Remoteness of Associations. A task devised by the present author, based on the model that making remote word associations is related to creativity (e.g. Mednick, 1969; Eysenck, 1995; Martindale, 1989; Mendelsohn, 1976). Drawing in particular on Merton and Fischer's (1999) single-word-association task (discussed in Section 2.5.1), upon which high-creatives produced the most original *and* appropriate responses, participants were asked: "as quickly as you can, please write down a word that you associate with each of the words listed below. Please try to make your associations as unusual but as clearly relevant as you can". Ten words, some concrete (e.g. apple, boat) and some abstract (e.g. command, time) were listed as stimuli. Responses were rated according to the frequency of their occurrence on a five point scale, indicating the degree to which they were conceptually 'unusual', e.g. for the word 'sky' the most common response was 'blue', which received a score of one, intermediary responses were 'TV', 'stars' or 'vast', and a unique association was 'astronaut', receiving a score of five. (A copy of this task can be seen in *Appendix 6.2*). Following Guilford (1967) this task may be categorised as one of divergent semantic transformation. This particular remoteness of associations test was not assessed for validity, although the general procedure has received support as a measure of creativity, as cited above.

Shapes. A drawing task devised by the present author, based on the divergent-thinking model of creativity. *Shapes* consists of three simple un-named line drawings (a curve, an 'open box' and a 'triangular cross'), each repeated three times on a shaded square background. Participants are asked to: "please see how many objects or pictures you can make from the shapes below, by drawing. Try to think of as many things as you can that no one else will think of and give names or titles to the objects that you create". Following Torrance (2000) responses were scored by: *flexibility*, the total number of different ideas produced, e.g. if three shapes are made into a face, this will obtain a flexibility score of 1, as this represents one idea; and *originality*, the unusualness of the object made, e.g. the curved shape was most commonly made into a swan, and this response would receive an originality score of one, whereas a 'rare' response was 'British

coastline' which received a score of 5. Responses were also scored for *boundary crossing*, the number of drawings that crossed the edge of the shaded area around each shape. (A copy of this task can be seen in *Appendix 6.2*). 'Breaking boundaries' was used by Torrance (2000) as an additional measure of creativity in his figural-DT tests, demonstrating high predictive validity (*r* = .53 to .72). 'Shapes' was a take-home home task, the benefits of which were considered in Section 2.6.1.1 (Van Mondfrans et al., 1970). 'Shapes' is very similar to other figural-DT tasks, such as the Repeated Figures and Picture Completion tasks of the TTCT, the Obscure Figures Test (McReynolds & Acker, 1968) and Wallach and Kogan's (1965) abstract figures task. Following Guilford's (1967) SOI model it may be categorised as a divergent figural transformation task. This particular figural-divergent-thinking test was not assessed for validity, although the general procedure has received support as a measure of creativity, as cited above. The author communicated with the Scholastic Testing Service (the publishers of the TTCT) in the production of this scale, due to its similarity to sub-scales of the TTCT; they affirmed the face validity of Shapes as a test of DT and assured the author that no copyright laws had been infringed.

Experiential, belief and personality measures

The Assessment Schedule for Altered States of Consciousness, (ASASC) short-form, van Quekelberghe, Altstotter-Gleich, and Hertwick (1991). The 97-item ASASC has eleven sub-scales pertaining to different categories of ASC, with a five-point response scale, avoiding pathological wording to reduce response bias. These subscales are: *extraordinary mental processes*, 8-items (unusual trains of thought, strange ideas, or extraordinary experiences); *parapsychological experiences*, 6-items, (e.g. precognition and telepathy); *esoteric practices*, 9-items (e.g. superstition, working with a pendulum, spiritual healing and séances); *positive mystical experiences*, 11-items (unitive/ecstatic states of consciousness and peak experiences); *negative mystical experiences* 14-items (e.g. disintegrating, losing control over oneself, or feeling surrounded by 'evil forces'); *imagination* and visualization ability, 5-items; *dream,* 9 items (the extent to which individuals are preoccupied with dreams, hypnagogia, and the occurrence of different types of dreams such as lucid dreams); *dissociation*, 7-items (the intensity of experiences relating to trance or hypnotic types of experience as well as tendencies towards deep concentration); *hallucinations*, 11-items, (hallucinatory images and mental processes resembling megalomaniac ideas and delusions of being influenced by alien forces); *hypersensitiveness*, 6-items (synaesthetic experiences, perceptual sensations of an extreme nature and heightened body sensitivity); *changed feelings of space and time*, 9-items (altered perceptions of body, time and

objects). MacDonald, LeClair, Holland, Alter and Friedman (1995) report that the internal reliability (split-half) is between α = .81 and .98 for these sub-scales. The validity (content, criterion, discriminant, convergent and factorial) has received support (MacDonald, 2000; MacDonald, Friedman & Kuentzel, 1999; MacDonald, Gagnier & Friedman, 2000; MacDonald, LeClair, Holland, Alter & Friedman, 1995).

The Transliminality Questionnaire: Form B, Thalbourne (1998). A 29-item questionnaire with a True/False response scale, containing items related to absorption, fantasy-proneness, magical ideation, paranormal belief and experiences, mystical experience, magical ideation, creative personality, hyperaesthesia, manic-like experience and behaviour, and attitude toward dream interpretation. Two questions relating to creative personality were not included in the total transliminality score computed for use in subsequent analysis. Thalbourne (2000b) reports Cronbach alpha reliability coefficients ranging between .85 and .90, and a test-retest reliability of .88 (across a seven week interval).

The Shortened Boundary Questionnaire, BQ18. (Kunzendorf, Hartmann, Cohen & Cutler, 1997). Kunzendorf et al. developed the BQ18 by selecting those items from each of the twelve subscales of the full 138-item Boundary Questionnaire that had the highest correlations with the full BQ. They report an unpublished study with 856 participants where the BQ18 correlated at r = .87 with the 138-item BQ. Hartmann, Kunzendorf, Rosen and Grace (2001) administered the BQ18 to 165 participants and demonstrated a test-retest reliability of $r = .77$ ($p < .01$). Using the data from study one of this thesis, the BQ18 correlated highly with the 138-item BQ, where r = .83, $p < .0001$. It correlated at a lower level with 'external boundary thinness' (e.g. opinions about people and cultures) ($r = .42$, $p < .01$) than with 'internal boundary thinness' ($r = .85$, $p <$ .0001).

The NEO Five-Factor Inventory (NEO-FFI), Form S (Costa & McCrae, 1992), a 60-item questionnaire with a five-point response scale (from 'strongly disagree' to 'strongly agree'). Item scoring is balanced to control for acquiescence, and scores do not appear to be associated with socially desirable responding. The inventory has five subscales, each with 12 items, measuring independent traits of: neuroticism, extraversion, openness-to-experience, agreeableness and conscientiousness. 'Neuroticism' measures the "general tendency to experience negative affects such as fear, sadness, embarrassment, anger, guilt, and disgust. … to be less able to control their impulses, and to cope more poorly than others with stress." (Costa & McCrae, 1992, p. 14). 'Extraversion' measures a tendency to "like excitement and stimulation and tend to be cheerful in disposition. … [Extraverts] are upbeat, energetic, and optimistic." (Costa & McCrae, 1992, p.15).

'Openness to Experience' assesses the degree to which "individuals are curious about both inner and outer worlds" (Costa & McCrae, 1992, p. 15), as discussed in Section 2.5. 'Conscientiousness' assesses the ability to control impulses and be purposeful and determined. High scorers tend to be oriented towards task completion, orderly, conformist, prudent, and to show constraint. 'Agreeableness' assesses ones degree of 'social-emotional orientation' or consensuality, high scorers tend to be warm, likeable and lack paranoia and aggressiveness. The NEO-FFI sub-scales have adequate internal consistency and 6-month retest reliability scores, ranging from .85 to .93, and have demonstrated construct, predictive, concurrent and discriminant validity (McCrae & Costa, 1992).

The complex partial epileptic signs subscale of The Personal Philosophy Inventory (Persinger & Makarec, 1987), which consists of 16-items pertaining to temporal lobe lability (e.g. visions, hearing inner voices, intense sensations of smells without an obvious source, sense of noesis, perceptual aberrations, bodily vibrations, and dissociation from 'reality') with a dichotomous ('yes'/'no') response scale. Persinger (1983) argues that all humans can be placed on a continuum of temporal lobe stability and that increased electrical lability of the temporal lobes may facilitate unusual experiences (Persinger, 1989). He describes the person with temporal lobe lability as more likely to be impulsive, versatile, imaginative, emotionally sensitive, verbal, interested in philosophical questions and aesthetics and suggestible.

Belief in and experience of ESP and PK. Four items, with a 7-point Likert response scale, concerning the strength of belief in and personal experience of extra-sensory perception and psychokinesis, which are part of the participant information form for research at the Centre for the Study of Anomalous Psychological Processes at the University of Northampton.

The 'oblivious involvement' subscale of the Tellegen Absorption Scale (Tellegen, 1992; Tellegen & Atkinson, 1974). This includes 6-items with a five-point Likert response scale, ranging from 'strongly agree' to 'strongly disagree'. An example item is: "While watching a movie, a TV show, or a play, I may become so involved that I may forget about myself and my surroundings and experience the movie as if it were real and as if I were taking part in it". The sub-scale assesses the capacity to enter an attentional state characterised by a high degree of imaginative involvement and "a full commitment of available perceptual, motoric, imaginative and ideational resources to a unified representation of the attentional object" (Tellegen & Atkinson, 1974, p. 274).

3.2 Results

3.2.1 The factor structure of the CCI

A principal components analysis (PCA) was conducted with the 29-items of the CCI based on the data from Sample One. There were 204 cases with no missing data, which is considered adequate for such an analysis (Hair, Anderson, Tatham & Black, 1998). The Kaiser-Meyer-Olkin measure of sampling adequacy was .88. Six factors emerged with eigenvalues over 1, accounting for 62% of the variance. An orthogonal varimax rotation was performed in order to optimise differences between factors by minimizing the number of items that load highly on more than one factor. The component matrix of which is displayed in *Appendix 3*. Each item was put into a single factor, that upon which it had the greatest loading, resulting in the following subscales, for which factor loadings and internal reliability coefficients are indicated in parentheses.

Factor 1: **Heightened internal awareness** (eleven items)
28. A sense of communicating with something other (.78)
27. Paying attention to bodily feelings (.74)
29. A sense of being in tune with nature or the universe (.74)
7. A sense of communicating with a deeper sense of self (.70)
22. Paying attention to auditory impressions (.68)
18. A sense of purpose that seems to comes from beyond the self (.65)
24. The release of negative emotions (.64)
26. Positive emotions, e.g. joy, excitement, euphoria (.63)
12. Meditation (.63)
13. Paying attention to visual imagery (.63)
21. A sense of channelling information (.48)
(Cronbach's α = .91)

Factor 2: **Intuition** (four items)
2. Trusting hunches or instincts (.76)
10. Following your intuition (.69)
5. Sudden moments of inspiration in waking life (.63)
1. Making discoveries through trial and error (.49)
(Cronbach's α = .73)

Factor 3: **Linear cognition** (four items)
4. Methodical and systematic problem solving (.83)
6. Rational, logical thought (.78)
8. The careful selection of ideas (.69)
20. Working with a set goal or outcome in mind (.58)
(Cronbach's α = .74)

Factor 4: **Playful cognition** (three items)
15. Playing with ideas (.70)
9. Loose, unconstrained thinking (.54)
14. Experiences of losing track of time when involved in creative work (.53)

16. Luck, chance, fortunate accidents (.44)
(Cronbach's α = .70)

Factor 5: **Use of analogy** (three items)
17. The use of analogy (.71)
19. Recombining existing elements in new ways (.70)
25. Non-verbal modes of thinking (.47)
(Cronbach's α = .63)

Factor 6: **Oneiric cognition** (three items)
3. Ideas arising while dreaming (.72)
11. Ideas arising as falling asleep or waking up (.71)
23 Day dreaming (.46)
(Cronbach's α = .73)

There was high internal consistency for the overall scale (α = .90) and for the 'linear' (α = .74) and 'non-linear' subscales (α = .92), the latter being composed of all of the scales apart from 'linear cognition' combined. All of the sub-scales demonstrated adequate internal consistency, being above .70 (Kline, 2000), except that of 'analogy', which, at .63, was quite low. The items in this component were more difficult to interpret, 'non-verbal modes of thinking' fitting less well conceptually with the other items. Several items loaded at low levels on several factors, which may be weak or complex items and their efficacy may be questioned. These were "a sense of channelling information", "luck, chance, and fortunate accidents" and "daydreaming".

This initial factor structure of the CCI was partially replicated based in an identical analysis using the combined data from Samples Two and Three (refer to *Appendix 3* for details). Due to the small sample size of this analysis (n = 91, with no missing data) the emerging factors could only be viewed as a weak representation of any underlying structure and were computed simply in order to assess whether all available data could advisably be combined. The outcomes of the two PCA analyses were sufficiently similar to justify such a combination in a single analysis.

In the combined sample there were 295 cases with no missing data on the CCI. An alpha factor analysis was conducted (in order to maximise the internal consistency of the factors) with an oblique rotation to simplify the factors. The alpha factor analysis was chosen as this procedure optimises the internal consistency of the emerging factors, being designed for use in scale construction (Hair, Anderson, Tatham & Black, 1998). The oblique rotation, with Kaiser Normalization, was chosen in the final stage, because the pattern matrix of accounts for 'unique' variance only, partialling out the shared variance between factors. It was therefore hoped that this would help to interpret the 'complex' items, which loaded on several factors at a similar level in the previous orthogonal rotations. The pattern matrix of the oblique rotation therefore 'simplifies'

Table 3.1

Factor loadings and item-scale correlations for the sub-scales of the CCI-R

Item		Components						Item scale correlation
		Internal awareness	Linear cognition	Playful cognition	Intuition	Oneiric cognition	Beyond the self	
27	Paying attention to bodily feelings	**.750**	.001	.051	-.050	.058	-.039	.460
26	Positive emotions	**.739**	.060	.018	.096	-.046	.137	.550
29	A sense of being in tune with nature or the universe	**.663**	-.108	.004	.251	-.002	-.123	.662
7	A sense of communication with a deeper sense of self	**.542**	-.091	-.039	.240	-.147	-.148	.703
24	The release of negative emotions	**.533**	.000	-.055	-.131	-.210	.040	.486
12	Meditation	**.432**	.026	.069	.233	-.109	-.222	.550
22	Paying attention to auditory impressions	**.370**	.030	-.178	-.088	-.171	-.243	.569
6	Rational, logical thought	.003	**.786**	.039	.056	.016	.144	-.107
4	Methodical and systematic problem solving	.046	**.777**	-.080	.011	.042	.057	.002
8	The careful selection of ideas	.110	**.558**	-.182	-.127	.038	-.141	.149
20	Working with a set goal or outcome in mind	-.126	**.416**	.125	.026	-.095	-.135	-.076
15	Playing with ideas	.036	.048	**-.738**	.000	-.014	.086	.490
19	Recombining existing elements in new ways	-.151	.075	**-.550**	.118	-.035	-.174	.400
14	Experiences of losing track of time when involved in creative work	.264	-.052	**-.527**	-.092	.074	-.056	.481
17	The use of analogy	-.124	.114	**-.511**	.104	-.150	-.057	.424
9	Loose, playful unconstrained thinking	-.013	-.131	**-.436**	.100	-.308	.271	.421
1	Making discoveries through trial and error	.021	.178	**-.443**	.359	.219	.058	.303
13	Paying attention to visual imagery	.183	-.101	**-.391**	-.080	-.173	-.320	.603
25	Non-verbal modes of thinking	.253	-.087	**-.380**	-.089	-.199	-.059	.565
16	Luck, chance, fortunate accidents	.078	-.172	**-.359**	.234	-.055	.001	.456
2	Trusting hunches or instincts	.108	.019	-.053	**.716**	-.099	-.069	.534
10	Following your intuition	.071	-.104	-.086	**.583**	-.219	-.036	.541
5	Sudden moments of inspiration in waking life	.175	.046	-.215	**.311**	-.244	.223	.495
3	Ideas arising while dreaming	.079	.010	.100	.197	**-.683**	-.036	.544
11	Ideas arising as falling asleep or waking up	.025	.002	-.056	.056	**-.603**	-.123	.531
23	Day dreaming	.318	-.120	-.250	-.230	**-.420**	.117	.520
21	Channelling information	.081	.248	-.071	.079	-.145	**-.475**	.412
28	A sense of communicating with something other	.327	-.195	-.094	-.082	-.261	**-.431**	.672
18	A sense of purpose that seems to come from beyond the self	.299	-.233	-.182	.227	-.149	**-.321**	.684

Note: Loadings are from the pattern matrix of a principal components analysis with oblique rotation, $n = 295$. Items are sorted according to factor loadings on the six sub-scales; those in bold are the highest loading for each item. Underlined loadings are at or above .32, but load more highly on another sub-scale.

interpretation of the factor structure. Further, an oblique rotation allows for inter-correlations of the factors, this was deemed appropriate because there appeared to be substantial co-variance between the 'non-linear' factors (some of which do correlate moderately with each other, as is evident in Tables 3.2 and 3.3). The number of factors to be retained was decided by examining eigenvalues (where, only if > 1 do they explain more variance than does a single item), the scree plot, and semantic stability (Tabachnick & Fidell, 1996). This PCA resulted in six factors with eigenvalues over 1, which appeared to be meaningful, and accounted for 60% of the total variance[1]. The Kaiser-Meyer-Olkin measure of sampling adequacy was acceptable at .886. The factor structure, derived from factor loadings on the pattern matrix, is shown in Table 3.1. Loadings greater than .30 were taken to be statistically significant (Hair et al., 1998).

Four of the sub-scales remain essentially the same to those in the initial factor structure of the CCI: Internal Awareness, Oneiric Cognition, Intuition and Linear Cognition. The main difference between the revised (CCI-R) and initial factor structures is that 'channelling information' has formed a separate factor that loads with items concerning a sense that ideation has come from a source 'other' than ones self. A second difference is that Playful Cognition and the Use of Analogy have combined to form a single sub-scale, which includes items relating to visual imagery, which is easier to interpret and has higher internal consistency.

The first factor was labelled *Internal Awareness,* explained 20.72% of the variance (eigenvalue = 6.01), and demonstrated high internal consistency, Cronbach's alpha (α) = .852. It loaded on seven items pertaining to attention being paid to the body and affect, expanded states and meditation. This factor may be aligned with models where emotional awareness and affective experience, both positive and negative, drives, or provides with its content, the creative process (Averill, 2005; Damasio, 2000; Schuldberg, 1994). In addition to such potentially 'embodied states' this scale includes expanded or 'participatory' states of awareness (Milner, 1957), which are further discussed in Sections 6.4.6 to 6.4.7 in relation to creativity.

The second factor, *Linear Cognition*, explained 8.55% of the variance (eigenvalue = 2.48), α = .724. It loaded on four items relating to the use of logic, methodical and systematic problem solving and the careful selection of ideas in the creative process. This factor is concurrent with models of convergent (Guildford, 1967), intellectual (Martindale, 1991), secondary-process (Kris, 1952), goal-directed (Boden, 1996), critical (Isaksen, 1987) cognition that facilitates 'adaptivity', as outlined in Table 2.1.

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[1] This same factor structure has subsequently been replicated with additional data, giving a sample size of n = 406, suggesting that this structure is stable. However, item 21 (channelling information) was deleted in this later nalysis as it loaded on a separate, seventh, factor, on its own.

The third factor, *Playful Cognition*, explained 15.69% of the variance (eigenvalue = 4.55), and loaded on nine items associated with playing with ideas, losing track of time, recombining elements, trial and error, loose, unconstrained thinking, analogy, visual imagery and fortunate accidents (α = .801). This factor is commensurate with models of playful, chaotic, metaphorical, free-associative (Martindale, 1996), unstructured (e.g. Finke, 1996), divergent (Guildford, 1967), or overinclusive (Eysenck, 1995) thinking, as discussed in Chapter Two.

The fourth factor, *Intuition*, explained 10.14% of the variance (eigenvalue = 2.94) and loaded on three items pertaining to following hunches, instincts and intuition and having moments of inspiration (α = .748). This factor epitomises experiences of 'knowing without knowing why' (Claxton, 1988), or the experience of: "a breathing in of some idea, purpose, etc. into the mind; the suggestion, awakening, or creation of some feeling or impulse, especially of an exalted kind" (Thrash & Elliot, 2003, p. 887).

The fifth factor, *Oneiric Cognition*, explained 16.14% of the variance (eigenvalue = 4.68), with three items relating to experiences along a dream-wake continuum: remembering ideas from dreams, hypnagogic and hypnopompic states and daydreaming (α = .730). The relationship between dream states and creativity is discussed further in Sections 6.4.1 to 6.4.4.

The final and sixth factor was called *Beyond the Self*, and explained 6.79% of the variance (eigenvalue = 1.97), consisting of three items concerning a sense of purpose seeming to come from, or communicating with, 'something other' (α = .723). This factor corresponds with Jung's (1967) notion of visionary creativity, which seemingly emanates from a deeper part of self that is experienced as alien, and more contemporaneously, with Persinger and Makarec's (1992) contention that affectively profound verbal creativity may be accompanied by sensed presence, an experience which they anecdotally relate to the Greek Muses, and physiologically, to increased access to right temporal lobe processes during periods of enhanced limbic activity.

The revised sub-scales demonstrate improved and adequate internal consistency (Cronbach alphas ranging between .72 and .85). The internal consistency coefficient for the whole CCI is α = .897, and for the 'non-linear' cognition scales α = .918.

All items showed moderate to large item-scale correlations (ranging from .303 to .703, refer to Table 3.1), apart from those for items in the Linear Cognition factor, which appear to form an orthogonal factor to the overall scale, yet with high internal consistency within this factor.

Some of the items (1, 13, 28) load significantly on more than one factor in the pattern matrix, suggesting that their unique contribution to one sub-scale is not clear. The structure matrix, shown in Table 3.2, further illustrates that several of the items correlate at moderate to high levels

Table 3.2

Inter-correlated factor loadings: the structure matrix

Item		Internal Awareness	Linear cognition	Playful cognition	Intuition	Oneiric cognition	Beyond the self
27	Paying attention to bodily feelings	**.706**	-.172	-.184	.055	-.263	-.207
26	Positive emotions	**.721**	-.145	-.278	.221	**-.364**	-.078
29	A sense of being in tune with nature or the universe	**.765**	-.248	-.315	**.377**	**-.421**	-.305
7	A sense of communication with a deeper sense of self	**.725**	-.221	**-.364**	**.400**	**-.523**	**-.337**
24	The release of negative emotions	**.616**	-.175	-.273	.033	**-.428**	-.135
12	Meditation	**.549**	-.065	-.214	**.344**	**-.393**	**-.379**
22	Paying attention to auditory impressions	**.551**	-.057	**-.366**	.105	**-.427**	**-.387**
6	Rational, logical thought	-.239	**.770**	.011	.053	.182	.045
4	Methodical and systematic problem solving	-.149	**.769**	-.108	.052	.138	-.052
8	The careful selection of ideas	.033	**.557**	-.203	-.029	.026	-.234
20	Working with a set goal or outcome in mind	-.190	**.444**	.102	.021	.041	-.168
15	Playing with ideas	.270	.053	**-.749**	.224	-.256	-.002
19	Recombining existing elements in new ways	.107	.152	**-.563**	.287	-.214	-.218
14	Experiences of losing track of time when involved in creative work	**.428**	-.082	**-.571**	.096	-.225	-.140
17	The use of analogy	.131	.148	**-.559**	.287	-.291	-.133
9	Loose, playful unconstrained thinking	.264	-.197	**-.536**	.279	**-.441**	.170
1	Making discoveries through trial and error	.083	.232	**-.484**	**.435**	.002	-.001
13	Paying attention to visual imagery	**.494**	-.125	**-.518**	.148	**-.460**	**-.421**
25	Non-verbal modes of thinking	**.499**	-.166	**-.514**	.128	**-.449**	-.184
16	Luck, chance, fortunate accidents	.314	-.180	**-.470**	**.365**	-.309	-.069
2	Trusting hunches or instincts	.311	.011	**-.346**	**.786**	**-.376**	-.203
10	Following your intuition	**.340**	-.132	**-.361**	**.682**	**-.468**	-.161
5	Sudden moments of inspiration in waking life	**.350**	-.050	**-.435**	**.452**	**-.426**	.063
3	Ideas arising while dreaming	**.398**	-.121	-.225	**.373**	**-.745**	-.223
11	Ideas arising as falling asleep or waking up	**.362**	-.090	-.301	.257	**-.676**	-.276
23	Day dreaming	**.559**	-.285	**-.423**	.000	**-.583**	-.043
21	A sense of channelling information	.247	.268	-.227	.214	-.292	**-.575**
28	A sense of communicating with something other	**.739**	-.311	-.314	.295	**-.499**	**-.509**
18	A sense of purpose that seems to come from beyond the self	**.611**	-.278	**-.429**	**.401**	**-.524**	**-.443**

Note: Loadings are from the structure matrix, which does not partial out shared variance between items and factors, of the principal components analysis with oblique rotation, $n = 295$. Items are sorted according to factor loadings on the pattern matrix, to enable easy comparison with Table 3.1. Emboldened loadings are those above .32.

with two or three of the 'non-linear' sub-scales. For example, 'a sense of communicating with something other' loads on Internal Awareness (.725), Oneiric Cognition (.499) and Beyond the Self (.509). Thus, there appears to be some overlap in items concerning experiences related to 'other' between Internal Awareness and Beyond the Self. However, such overlaps do not occur

between items between the 'non-linear' (all sub-scales apart from linear cognition) and linear cognition subscales. Linear Cognition emerged as a simple, 'purer' factor, its items loading exclusively upon it.

That the non-linear sub-scales cluster together is supported by observation of the correlations between the factors reported in Table 3.3. Linear cognition forms negative or close to zero correlations with all the non-linear sub-scales. The remaining sub-scales are positively inter-correlated, with low to moderate to large effect sizes (from .470 to .745). Internal Attention and Beyond the Self correlate most highly with each other (*rho* = .745, $p <$ .001). These correlation matrices suggest that while different types of non-linear cognition appear to be factorially distinct, phenomenologically, experiences of them overlap.

Table 3.3

Correlations between sub-scales of the CCI-R

	Internal Awareness	Linear cognition	Playful cognition	Intuition	Oneiric cognition	Beyond the self
Internal Awareness	1.000	**-.160 (<.006)**	**.529 (<.001)**	**.511 (<.001)**	**.588 (<.001)**	**.745 (<.001)**
Linear cognition		1.000	.027 (.646)	-.058 (.319)	**-.156 (.007)**	-.082 (.161)
Playful cognition			1.000	**.588 (<.001)**	**.507 (<.001)**	**.531 (<.001)**
Intuition	1.000			**.470 (<.001)**	**.496 (<.001)**	
Oneiric Cognition				1.000	**.551 (<.001)**	

Note: Spearman's *rho*, two-tailed, $n = 295$. Sub-scale scores were computed by summing raw scores for the items characterising each sub-scale. Emboldened correlation coefficients are statistically significant where $p < .01$.

3.2.2 Descriptive statistics and gender differences for sub-scales of the CCI

Table 3.4 displays the mean values and standard deviations for males and females on the sub-scales of the CCI. Based on the Samples One and Two combined, females ($n = 154$) scored significantly higher than males ($n = 128$) on Internal Awareness (with mean scores of 15.403 compared to 12.281 for males), Beyond the Self' (with mean scores of 6.253 versus 5.227), and Oneiric Cognition (with mean scores of 7.808 versus 6.242). Males however scored significantly higher on Linear Cognition (with mean scores of 10.758 versus 9.860). There was no significant difference between males and females on Playful Cognition or Intuition.

Table 3.4

Descriptive statistics for the sub-scales of the CCI, according to gender

	Internal Awareness	Linear cognition	Playful cognition	Intuition	Oneiric cognition	Beyond the self
Possible range	0 – 28	0 – 16	0 – 36	0 – 12	0 - 12	0 – 12
Mean Males	12.28	10.76	22.73	9.07	6.24	5.23
SD males	6.80	3.08	6.22	2.25	3.11	3.18
Mean females	15.40	9.86	22.56	9.30	7.81	6.25
SD females	5.91	3.09	6.55	2.35	2.76	3.20
Chi-Square	15.54	8.35	.03	1.30	17.83	7.44
df	1	1	1	1	1	1
P-value	.00008	.004	.858	.254	.00002	.006

3.2.1 Assessing the construct validity of the CCI-R

3.2.3.1 To what extent is the CCI related to measures of creativity?

This section reviews the correlations between components of the CCI and measures of creativity, based on Sample One. An initial glance at the correlation matrices of Table 3.5 shows that the non-linear subscales of the CCI all correlated significantly with varieties of creativity, providing construct validity by supporting the proposition that these cognitive styles are associated with creativity. However, the Linear Cognition correlated mostly at null levels with the creativity measures.

The non-linear subscales all correlated significantly and positively with self-perceived creativity (.266 > *rhos* > .551), the importance of creative practice to daily life (.259 > *rhos* > .539), involvement in artistic creative activities (.172 > *rhos* > .496) and emotional creativity (.480 > *rhos* > .617). This provides some construct validity for Internal Awareness, Playful Cognition, Intuition, Oneiric Cognition and Beyond the Self. To varying degrees they are all associated with involvement in artistic and social-intrapersonal affective creativity. Linear Cognition does not appear to be related to these dimensions of creativity, but only correlates at low levels with publishing work and involvement with science. This suggests that Linear Cognition is associated with the sedulous honing of ideas that enables publication and, perhaps, with convergent thinking involved in scientific work.

Further measures of creativity (figural divergent-thinking, remoteness of associations and creative personality) correlate only with Playful Cognition and Intuition. This provides further validity for these scales, which appear to be associated with the forming of unusual associations and with an imaginative and independent personality. Overall, these two sub-scales Playful

Table 3.5

Correlation coefficients for the association between sub-scales of the CCI and creativity measures in Sample One

	Internal awareness	Linear cognition	Playful cognition	Intuition	Oneiric cognition	Beyond the self
Self-perceived creativity	**.266 (<.001)**	-.077 (.278)	**.551 (<.001)**	**.393 (<.001)**	**.388 (<.001)**	**.285 (<.001)**
The importance of creative practice	**.259 (<.001)**	-.032 (.649)	**.539 (<.001)**	**.397 (<.001)**	**.335 (<.001)**	**.273 (<.001)**
Creative activity checklist score	**.213 (.002)**	.078 (.270)	**.496 (<.001)**	**.310 (<.001)**	**.355 (<.001)**	**.172 (.014)**
Involvement in the visual arts	**.323 (<.001)**	-.122 (.084)	**.495 (<.001)**	**.278 (<.001)**	**.356 (<.001)**	**.308 (<.001)**
Involvement in performance arts	**.210 (.003)**	-.015 (.832)	**.241 (.001)**	.089 (.204)	**.156 (.026)**	.107 (.128)
Involvement in music	.115 (.102)	-.069 (.329)	**.153 (.029)**	.002 (.982)	.114 (.105)	-.067 (.346)
Involvement in academic writing	-.023 (.745)	.115 (.103)	**.226 (.001)**	**.157 (.026)**	.103 (.147)	.113 (.110)
Involvement in artistic writing	**.268 (<.001)**	.007 (.926)	**.354 (<.001)**	**.317 (<.001)**	**.338 (<.001)**	**.208 (.003)**
Number of writings published	-.083 (.241)	**.148 (.036)**	.038 (.590)	.045 (.525)	-.058 (.412)	.061 (.385)
Involvement in domestic crafts	.033 (.642)	.040 (.570)	.122 (.084)	.130 (.064)	.039 (.586)	-.057 (.421)
Involvement with science	**-.219 (.002)**	**.188 (.007)**	-.012 (.868)	-.055 (.435)	-.069 (.330)	**-.206 (.003)**
Emotional creativity	**.617 (<.001)**	**-.163 (.021)**	**.527 (<.001)**	**.552 (<.001)**	**.480 (<.001)**	**.556 (<.001)**
Figural divergent thinking	**.161 (.037)**	.050 (.518)	**.206 (.007)**	**.252 (.001)**	.085 (.274)	.095 (.223)
Remoteness of verbal associations	.090 (.203)	-.056 (.428)	**.196 (.005)**	**.140 (.048)**	.116 (.102)	.025 (.724)
Creative personality	.020 (.779)	.040 (.567)	**.337 (<.001)**	**.263 (<.001)**	.097 (.166)	.010 (.890)

Note: Non-parametric correlations were computed (Spearman's *rho*) and are two-tailed; $n = 204$. Probability values are indicated in parentheses, those in bold are significant at the $p < .05$ level.

Cognition appear to represent the non-linear cognitive styles most generally associated with creativity, correlating positively and significantly with total scores on all creativity measures. Oneiric Cognition, Internal Awareness and Beyond the Self appear to represent cognitive styles that are perhaps used in specific domains of creativity, those involving aesthetic and affective exploration. Internal Awareness correlated most strongly with emotional creativity (*rho* = .617, p <.001), again providing some construct validity in support of the use of affective awareness in the creative process (Averill, 2005). Hence, some discriminant validity is displayed for the sub-scales of the CCI, which show different levels of involvement in different domains of creativity (affective, cognitive, trait, scientific and artistic).

3.2.3.2 To what extent is the CCI associated with experiential and belief variables associated with 'unusual experiences'?

Further construct validity was assessed by correlating scores on the sub-scales of the CCI with self-reports of experiences of altered states of consciousness (ASCs), boundary thinness, transliminality, temporal lobe lability, oblivious absorption and belief in the paranormal. As the CCI purports to tap into a range of experiences and forms of cognition, beyond rational thinking, it would be expected that the non-linear subscales would correlate with measures designed to assess a general proclivity towards related experiences. This form of construct validity is perhaps more important for the CCI, as it aims not to assess creativity directly, but to assess the use of different epistemologies which pertain differentially to 'unusual experiences'.

In Table 3.6 it can be seen that Internal Awareness, Playful Cognition, Intuition, Oneiric Cognition and Beyond the Self correlated positively and significantly with ASCs and experiential traits associated with disinhibition, fluidity or a low threshold for subliminal or unusual ideation

Table 3.6

Correlations between sub-scales of the CCI and altered states of consciousness, transliminality and boundary thinness

	Internal awareness	Linear cognition	Playful cognition	Intuition	Oneiric cognition	Beyond the self
Parapsychological experiences	**.436 (<.001)**	-.098 (.165)	**.307 (<.001)**	**.443 (<.001)**	**.478 (<.001)**	**.470 (<.001)**
Positive mystical experiences	**.466 (<.001)**	**-.164 (<.001)**	**.499 (<.001)**	**.500 (<.001)**	**.408 (<.001)**	**.460 (<.001)**
Negative mystical experiences	**.279 (<.001)**	**-.165 (.019)**	**.227 (.001)**	**.157 (.026)**	**.273 (<.001)**	**.299 (<.001)**
Vivid imagination	**.383 (<.001)**	-.049 (.487)	**.509 (<.001)**	**.442 (<.001)**	**.521 (<.001)**	**.428 (<.001)**
Dreams	**.468 (<.001)**	**-.149 (.034)**	**.436 (<.001)**	**.429 (<.001)**	**.603 (<.001)**	**.432 (<.001)**
Dissociation	**.449 (<.001)**	-.035 (.616)	**.477 (<.001)**	**.455 (<.001)**	**.384 (<.001)**	**.446 (<.001)**
Hallucinations	**.507 (<.001)**	**-.221 (.002)**	**.442 (<.001)**	**.429 (<.001)**	**.534 (<.001)**	**.544 (<.001)**
Hypersensitivity	**.397 (<.001)**	-.064 (.363)	**.339 (<.001)**	**.318 (<.001)**	**.353 (<.001)**	**.430 (<.001)**
Changed feelings of time and space	**.422 (<.001)**	-.066 (.348)	**.503 (<.001)**	**.308 (<.001)**	**.381 (<.001)**	**.435 (<.001)**
Total score on the ASASC	**.578 (<.001)**	**-.184 (.009)**	**.553 (<.001)**	**.529 (<.001)**	**.606 (<.001)**	**.619 (<.001)**
Boundary Thinness	**.474 (<.001)**	**-.295 (<.001)**	**.532 (<.001)**	**.424 (<.001)**	**.524 (<.001)**	**.408 (<.001)**
Transliminality	**.604 (<.001)**	**-.183 (.009)**	**.511 (<.001)**	**.535 (<.001)**	**.579 (<.001)**	**.614 (<.001)**

Note: probability values are indicated in parentheses, those in bold are significant at the $p < .05$ level. Non-parametric correlations were computed (Spearman's *rho*) and are two-tailed; $n = 204$, Sample One.

to enter awareness (Hartmann, 1991; Thalbourne, 2000), constructs which are discussed in further detail in Chapter Four. Linear Cognition formed null or negative relationships with these ASC related variables, being associated in particular with 'boundary thickness', where black and white thinking, clear demarcation, orderliness and rationality is favoured in contrast to fluidity and primary process cognition.

When considering particular types of ASC in relation to sub-scales of the CCI, a number of coherent patterns emerged. Oneiric Cognition correlated most highly with the 'dreams' sub-scale (*rho* = .603, p <.001), which includes high dream recall and experiences of unusual dreams (e.g. archetypal and lucid dreams) and hypnagogia. Playful Cognition correlated most highly with having a vivid imagination and visualisation ability (*rho* = .509, p < .001). Beyond the self correlated most highly with hallucinatory experiences, which may be commensurate with experiencing a sense of 'otherness' guiding the creative process (*rho* = .544, p < .001).

Table 3.7 shows clearer differentiation between experiential and belief factors. All non-linear sub-scales are associated with temporal lobe lability, with its purported characteristics of impulsivity, versatility, imagination, emotional sensitivity and hallucinatory experiences, this is particularly the case for Internal Awareness (*rho* = .503, p < .001) and Beyond the Self (*rho* = .475, p < .001). Further, these two subscales of the CCI are the only ones that consistently correlate at a significant level with experiential and belief items pertaining to paranormal experiences, commensurate perhaps with their loadings on items associated with experiences

Table 3.7

Correlations between sub-scales of the CCI and belief in and experience of psi, temporal lobe lability and oblivious absorption

	Internal awareness	Linear cognition	Playful cognition	Intuition	Oneiric cognition	Beyond the self
Temporal lobe lability	**.503 (< .001)**	-.212 (.058)	**.333 (.003)**	**.326 (.003)**	**.392 (< .001)**	**.475 (< .001)**
Oblivious absorption	**.474 (.002)**	-.031 (.851)	**.322 (.043)**	.265 (.098)	**.573 (< .001)**	**.434 (.005)**
Belief in extrasensory perception	**.364 (.021)**	-.246 (.126)	.094 (.562)	.200 (.215)	.275 (.085)	**.353 (.025)**
Experience of extrasensory perception	**.444 (.004)**	-.213 (.188)	.280 (.080)	**.378 (.016)**	**.335 (.035)**	**.424 (.006)**
Belief in psychokinesis	**.394 (< .001)**	-.073 (.522)	**.235 (.036)**	**.269 (.016)**	**.257 (.021)**	**.362 (.001)**
Experience of psychokinesis	**.468 (.002)**	-.091 (.575)	.115 (.481)	.093 (.567)	.221 (.171)	**.413 (.008)**

Note: probability values are indicated in parentheses, those in bold are significant at the p < .05 level. Non-parametric correlations were computed (Spearman's *rho*) and are two-tailed; n = 40, for all except belief in temporal lobe lability and belief in PK, where n = 80. Data is taken from Sample Two.

pertaining to those that come from 'other', which may be interpreted within a paranormal world - view (e.g. as being guided by spirits). Of further note is that Internal Awareness, Playful Cognition, Oneiric Cognition and Beyond the Self were all significantly correlated with imaginative/oblivious absorption. That Intuition was not might suggest that while associated with unusual experiences, Intuition is spontaneous and not inculcated through dissociative states.

3.2.3.3 To what extent is the CCI associated with the 'big five' personality traits?

The final assessment of the construct validity of the CCI considers the differential relationship of its sub-scales to the five personality traits of neuroticism, extraversion, openness-to-experience, conscientiousness and agreeableness (Costa & McCrae, 1992), aspects of which were discussed in relation to creativity in Section 2.5. The inter-correlations between these variables are displayed in Table 3.8. All non-linear sub-scales, especially Playful Cognition correlated positively and significantly with openness-to-experience (.223 > *rhos* > .560), which has been linked to creativity through its emphasis on curiosity about ideas, aesthetics, affect and behavioural experiences. With much interest it is observed that Linear Cognition correlated only with conscientiousness (*rho* = .284, p = .011), characterised by a tendency to be painstakingly careful, self-disciplined, oriented towared achievement, exacting, organised and to act with deliberation.

Table 3.8

Correlations between sub-scales of the CCI and the five factor model of personality

	Internal awareness	Linear cognition	Playful cognition	Intuition	Oneiric cognition	Beyond the self
Neuroticism	.164 (.146)	-.157 (.165)	-.215 (.055)	-.005 (.962)	.139 (.220)	-.032 (.778)
Extraversion	.067 (.553)	.041 (.715)	.123 (.279)	.132 (.245)	.135 (.233)	.171 (.129)
Openness-to-experience	**.309 (.005)**	-.053 (.639)	**.560 (< .001)**	**.436 (< .001)**	**.505 (< .001)**	**.223 (.047)**
Agreeableness	-.011 (.924)	.036 (.753)	-.090 (.427)	-.010 (.928)	.024 (.835)	-.035 (.755)
Conscientiousness	-.123 (.279)	**.284 (.011)**	-.012 (.915)	-.072 (.528)	-.092 (.420)	-.054 (.634)

Note: probability values are indicated in parentheses, those in bold are significant at the $p < .05$ level. Non-parametric correlations were computed (Spearman's *rho*) and are two-tailed; $n = 80$.

That the orthogonal sub-scales of the CCI (linear and non-linear) are conversely associated with openness-to-experience and conscientiousness on the NEO provides strong discriminant and

convergent validity. Non-linear cognition is associated with the exploration of inner and outer experience and linear cognition with careful planning and structure. It is of further import to note that the CCI does not form significant correlations with the traits of neuroticism, extraversion or agreeableness, which appear to be independent to preferred styles of creative cognition. However, there is a non-significant trend of interest, where Playful Cognition correlated negatively with Neuroticism (*rho* = -.215, p = .055), suggesting that the prevalence of negative affect, such as anxiety, at the trait level is associated with less use of absorbed, unconstrained thinking and fortunate accidents, a view in support of the association between positive affect and divergent thinking (Fredrickson, 2002; Isen, 1999; Vosburg, 1998).

3.3 Discussion

The psychometric analysis of the Creative Cognition Inventory suggests that the scale may be of use in future research that examines creative styles reported to be used in the creative process. The scale has demonstrated good internal consistency (αs ranging between .723 and .918), an adequately stable factor structure and construct, convergent and discriminant validity.

Conceptually, the CCI appears to have a factor structure with two 'pure' factors that are orthogonal to each other, 'linear' and 'non-linear' cognition, each with high internal consistency (α = .724 and .918 respectively). Non-linear cognition consists of five sub-scales, which are factorially distinct but inter-related: Internal Awareness (paying attention to affect, bodily feelings and meditative states); Playful Cognition (imagistic, associative, loose, absorbed thinking); Oneiric Cognition (ideas arising in states along the dream-wake continuum); Intuition (following hunches, instincts, intuitions and moments of inspiration that arise in waking states); and Beyond the Self (a sense of ideas coming from 'something other'). These five sub-scales demonstrated correlations with both creativity measures and altered state measures in a fashion consistent with the view that they tap into both constructs, in a way that would be expected of a measure that assesses the use of a range of states of consciousness in the creative process. Scores on the non-linear subscales correlated significantly, at moderate levels, with several creativity measures: emotional creativity, self-perceived creativity and artistic involvement. Playful Cognition and Intuition correlated significantly with figural divergent-thinking, remoteness of associations and creative personality. Internal Awareness and Beyond the Self correlated most highly with emotional creativity. All non-linear sub-scales correlated positively and significantly with ASC proclivity, transliminality and boundary thinness, while linear cognition correlated negatively or at a null level with these, providing construct validity for the altered state and

permeable, fluid cognitive processes involved in the non-linear sub-scales. Oneiric cognition correlated most highly with having an intense dream life. Internal Awareness and Beyond the Self correlated significantly with belief in and experience of PK and ESP and temporal lobe lability, again, providing construct validity for the altered senses of self and other that permeates these sub-scales. Finally, that Linear Cognition was associated with conscientiousness and non-linear sub-scales with openness-to-experience reinforces the interpretation that the CCI taps into a dual-cognition model of creativity, as a dialectic between structured and unstructured cognition. Yet, beyond the more usual unstructured modes of cognition that are typified by Playful Cognition and Intuition in the CCI, further unstructured modes are delineated: those that appear to be used in aesthetic and affective creativity and involve altered states: dream states (Oneiric Cognition), expanded states (Internal Awareness) and 'visionary states' (Beyond the Self).

In Chapter Six of this thesis the CCI will be used to assess whether these creative cognitive styles mediate the relationship between ASCs and creativity, and whether they predict both subjective paranormal experiences and psi performance (in Chapters Seven and Eight).

In conclusion, the CCI, as a scale in development, has demonstrated good psychometric propertied and may prove to be a useful instrument. Future psychometric work on the scale could seek to replicate and further assess the factor structure, with a larger sample size. In addition, attempts could be made include items that differentiate more clearly between any underlying constructs of the 'non-linear' sub-scales, in particular link between experiences of 'other' in both the Internal Awareness and Beyond the Self sub-scales. Finally, test-retest reliability should be assessed.

CHAPTER FOUR

Creativity and 'boundary-permeability' – An empirical study

[The characteristics of the creative person include] openness to new experiences, a tolerance of ambiguity, and an approach to life and the world that is relatively free of preconceptions. This flexibility permits them to perceive things in a fresh and novel way, which is an important basis for creativity. But it also means that their inner world is complex, ambiguous, and filled with shades of grey rather than black and white. It is a world filled with many questions and few easy answers. The creative person lives in a more fluid and nebulous world. (Andreason, 2006, p. 101).

4.1 Introduction and Chapter Overview

Do creative people 'live in a more fluid and nebulous world' as Andreason (2006) suggests in the quote above? The current chapter presents an empirical study that examines the relationship between creativity and 'boundary-permeability'. The term boundary-permeability is used to encompass the constructs of internal and external psychological boundary-thinness (Hartmann, 1991) and transliminality, the occurrence of "psychological material crossing thresholds into or out of consciousness" (Thalbourne, 2000a, p. 193), which will be discussed in detail below. Boundary-permeability is described as a personality-experiential construct, encompassing both trait and state. It may broadly be defined as both receptiveness to experiences of consciousness that are open and fluid and a structure of consciousness that is open and fluid – analogous to states characterised by cognitive, perceptual and/or emotional 'looseness'. As such, the empirical study presented in the current chapter extends upon the literature presented in Chapter Two by assessing the extent to which different dimensions of creativity are associated with *traits* characterised by 'disinhibition', 'weak stimulus barriers' or 'skinlessness' (Claridge, 2001).

Conceptually, the constructs of boundary-thinness and transliminality appear to be related, although no empirical studies had explored their relationship at the time that this study was conducted[1]. Both have been explained in terms of increased communication between cognitive units and processes (Hartmann, Kunzendorf, Rosen and Grace, 2001; Lange, Thalbourne, Houran and Storm, 2000), which may be manifested as an enduring trait and/or a transitory state.

As a trait, both transliminality and boundary-thinness have been conceptualised as an extension of the openness-to-experience dimension of the five-factor model of personality,

[1] Since the current study was conducted Houran, Thalbourne and Hartmann (2003) reported a positive correlation between the two constructs ($r = .66$), with a convenience sample of 268 participants, supporting the suggestion that they are related constructs.

with which they have both formed robust correlations (McCrae, 1994; Thalbourne, 2000b[2]). As a personality factor, openness-to-experience, as discussed in Chapter Two, suggests a preference for novelty in different areas of life. Individuals may vary in 'openness' to a range of experiences, such as feelings (Rogers, 1959) or ideas and beliefs (Rokeach, 1960). Based on a factor analytic study of the openness-to-experience factor, McCrae (1994) suggested that it be extended to include attributes such as hypnotisability, meditative states, being empathic and 'regressing' into primary-process states in 'service of the ego'. Boundary-permeability may represent such a facet of openness, focusing on the intrapersonal, in particular primary-process cognition and altered states of consciousness (ASCs).

As a state, the construct of boundaries in the mind may be understood at a metaphorical level, aligned with phenomenological accounts of ASCs, where alterations in body boundaries, or self-other boundaries, for instance, may be experienced (Walsh, 1995; Pekala, 1991). In this way, 'types of boundary' are analogous to the perceptual-cognitive-affective dimensions of consciousness delineated in Table 4.1 (discussed further in Chapter Five). These phenomenological dimensions are susceptible to change and experiences of them may vary along continua in a way that may be described as boundary-permeability. For instance, Hartmann's (1991) theoretical boundaries include fluidity in experiences of 'ego' and 'identity', which maps on to 'self-awareness' (Pekala, 1991) and 'self or identity' (Walsh, 1995), a dimension in the configuration of consciousness that co-varies with states of consciousness. Hunt's (1995) cross-modal model of consciousness provides support for the construct of boundary-permeability conceived in this way. In this model, different experiences of consciousness, ranging from poetic metaphorical thinking, to synaesthesia, to mystical states of consciousness, involve increased connectivity between different perceptual-cognitive-affective processes or units. Such synaesthetic boundary-permeabilities, in varying degrees, underlie all experiences of consciousness in Hunt's view, in either simple or complex forms. For example, language is described as a complex synaesthesia involving vision, vocal sounds, articulatory and gestural kinesthetes, where there is increased permeability or connectivity between these particular cognitive centres. Another example, is the experience of 'self', which Austin (2000), describes as a synaesthetic emergent, from a neuropsychological perspective. The construct of boundary-permeability expands upon these 'cross-modal models' of consciousness, proposing that there are individual differences in the degree of interconnectedness experienced, forming a personality-experiential continuum.

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[2] Subsequent to the current study, significant positive correlations have also been observed between boundary-thinness and openness-to-experience by van Hiel and Mervielde (2004).

Table 4.1

A comparison of 'dimensions of phenomenal consciousness' (Pekala, 1991; Walsh, 1995) and Hartmann's 'boundaries in the mind'

Pekala (1991)	Walsh (1995)	Hartmann's (1991) Boundaries in the mind	
Dimensions of Consciousness		*Theoretical*	*'Personal' sub-scales of the Boundary Questionnaire*
Self-awareness	Nature of the sense of self or identity	Id/ ego/ superego Identity	
Body-image	Out of body experience	Body boundaries	
Arousal/ alertness	Degree of arousal	States of awareness/consciousness	Unusual experiences
	Degree of reduction of awareness		
Subjective sense of being in an altered state of consciousness			
Attention (intensity, extensitivity and selectivity)	Concentration The degree of concentration Whether attention is fixed or fluid	Sleep/dream/wake	Sleep/dream/wake
Volition	Degree of control Ability to enter and leave ASC at will Ability to control content of ASC	Decision and action	
	Ability to communicate		
	Degree of calm (low agitation and low distractibility)	Thoughts/feelings/ moods	Thoughts/feelings/ moods
Rationality			
Meaning			
Positive affect	Affect		
Negative affect			
Perception	Sensitivity or subtlety of sensory perception	Perceptual boundaries	Sensitivity
Memory		Memory	Childhood/adolescence/ adulthood
Imagery (vividness)	Content of inner experience:		
Internal dialogue	Formless Differentiated objects Organisation Modality Intensity Psychological level		
	Developmental level of the state		
Space-time			
		Play	
			Interpersonal
		Organising one's life	Neat/exact/precise Edges/lines/clothing

The rationale for predicting that creativity (or varieties of creativity) is related to boundary permeability is multi-faceted. Firstly, dimensions of creativity have consistently been found to correlate with 'openness' as a trait (as discussed in Section 2.5). If boundary permeability forms part of the openness-to-experience construct, then we would expect it also to be related to creativity. Thus, the creative personality might have traits associated with boundary permeability, such as those described in the opening quote to this chapter: open, flexible complex and ambiguous (Andreason, 2006). A second strand is extrapolated from the models of generative creative cognition presented in Chapter Two. These suggested that creativity (or creativities) might be facilitated by adaptively shifting into states characterised by loose cognitive associations, awareness of 'irrelevant', weak stimuli, and affective openness (the latter particularly in artistic creativity). Such states are subsumed under the boundary-permeability construct, described as an awareness of and interest in the intrapersonal, and encompassing experiences along the 'sleep-wake continuum', primary-process cognition and affective sensitivity (as will be expounded upon and clarified in the following sections).

Given this rationale for hypothesising that creativity is (or facets of creativity are) related to boundary-permeability as both a trait and state, it initially seems conflictual that in the only empirical studies directly addressing this hypothesis, no significant correlations have been found between creativity and either boundary-thinness or transliminality (Thalbourne, Bartemucci, Delin, Fox & Nofi, 1997; Thalbourne, 2000a; Levin, Galin & Zywiak, 1991). Are descriptive claims made about the 'fluid and nebulous' psychology of the creative person merely hyperbole? Alternatively, were the above studies methodologically flawed in some way? This chapter will explore the relationship between creativity and boundary-permeability in greater detail, both theoretically and empirically, seeking to redress any methodological concerns in previous research. It is suggested that these paradoxical outcomes may reflect the multi-dimensional nature of creativity – where varieties of creativity may differentially relate to boundary-permeability and its sub-components. In the subsequent sections, both the history of the individual concepts of boundary-thinness and transliminality, and their relationship to creativity will be discussed.

4.1.1 Creativity and Hartmann's boundaries

> ... certain aspects of thin boundaries such as sensitivity, openness, and awareness of one's deepest feelings appear to characterize artists and creative people in general. (Hartmann, 1991, p. 192)

The concept of boundary-thinness emerged from Hartmann's (1991) work with frequent nightmare sufferers, amongst whom he observed similar personality structures, which were characterised by a "striking openness and lack of defensiveness" (Hartmann, Russ, Kolk,

Falke, & Oldfield, 1981, p. 795), sensitivity, artistic creativeness and, he hypothesised, a vulnerability to schizophrenia, yet without any signs of chronic mental illness. From this observation, Hartmann (1991) conceptualised a continuum of 'openness' as a key dimension of personality, ranging from 'thick' to 'thin' boundaries, analogous to open and closed systems (Rokeach, 1960). Hartmann (1991, p. 4) conceptualises 'mind' as a series of interconnected components, the interconnectivity between which may vary:

> When we consider the contents of our minds – our thoughts, feelings, memories, sense of self – or of underlying cognitive mechanisms–perceptual processes, semantic processes, memory processes – we are speaking of parts, of regions, functions, or processes that are separate from one another and yet interconnected with one another. The boundaries between them are not absolute separations: and individuals may vary in the degree of interconnectivity – the boundaries between 'parts' can be relatively thick or solid on the one hand or relatively thin or permeable on the other.

Extreme 'thick-boundaried' individuals are conceived as hard-working, driven, fastidious, appearing to be solid and organised, "fairly normal and conventional" (Hartmann, 1991, p. 69), thinking in terms of 'black and white', having low dream recall, rigid defence mechanisms and a strong, censoring 'superego'. "Persons with very thick boundaries are characterised by sharp and definite separations between different sensations, between thought and feeling, between fantasy and reality, between waking and sleep. They see and emphasise the differences between men and women, between adults and children, between different groups of people" (Hartmann, Kunzendorf, Rosen, & Grace, 2001, p. 98). In addition, a person with very thick boundaries may have a sharp sense of focus, being able to concentrate on one thing, while ignoring others (Hartmann, Harrison & Zbrowski, 2001).

In contrast, individuals with 'thin boundaries' are described as having high dream recall, a rich fantasy life, as being prone to nightmares and vivid dreams, being sensitive, fragile, open, imaginative, experiencing synaesthesia, being schizotypal, creative and often involved in artistic careers or pursuits. Their minds are portrayed as flexible and able to experience many thoughts, images and feelings at the same time (Hartmann, 1991; Hartmann, Kunzendorf, Rosen, & Grace, 2001). They may experience their thoughts and feelings as being interconnected, they may have a less clear body boundary, and may accept ambiguities in sexual identity. Their identity in general tends to be less fixed and more transitory and open (Hartmann, Harrison & Zborowski, 2001).

Levin, Gilmartin and Lamontanaro (1998) describe boundary-permeability as a "cognitive-style" characterised by a fluid and 'open' "organization of the mind" (p. 25), which identifies "individuals who are apt to report a host of unusual experiences and yet do not evidence psychopathology when assessed by traditional assessment measures" (p. 35). 'Thickness' describes compartmentalised, separated and more differentiated sub-components

(memories, thoughts, feelings and other processing units), while 'thinness' involves a higher level of connection between such 'compartments'. Hartmann, Kunzendorf, Rosen and Grace (2001) describe boundary-thinness as a 'trait continuum' from very thin to very thick cognitive boundaries, related to an analogous state continuum ranging from loose, unstructured thinking (e.g. reverie, daydreaming and dreaming) to focused, logical, directed thinking.

Hartmann (1991) developed the Boundary Questionnaire (BQ), consisting of twelve subscales demarcating different types of cognitive boundary. These broadly fall into two categories, 'personal' and 'world' boundaries, i.e. those relating to intrapersonal and interpersonal realms versus those relating to opinions about cultural groups, ideas, organisations and institutions. Personal or internal boundaries include those between thinking and feeling, between memories of adulthood and childhood, and conceptualisations of the past and future. They also include experiencing states of consciousness along the sleep-wake continuum and unusual experiences. Empirical studies using the BQ have found 'thin boundaries' to be associated generally with openness to internal experiences. Significant positive correlations have been found with susceptibility to hypnosis and absorption ($r = .54$, $p < .001$; Barrett, 1989, cited by Hartmann, 1991) and the Intuition and Feeling sub-scales of the Myers-Briggs Type Indicator (Ehrman, 1993, cited by Hartmann et al., 1998). In a factor analysis including the NEO Personality Inventory, the Myers-Briggs Type Indicator and the BQ, McCrae (1994) replicated the five-factor model of personality, with an expanded 'openness' factor that included boundary-thinness and intuition. McCrae describes this openness factor as one that conveys "both the idea of welcoming new input – whether sensory, cognitive, or affective – and the notion of permeability that characterizes the structure and functioning of open minds" (p. 265). Boundary-thinness has found to be associated with both access to dream imagery and vivid or unusual dream experiences, in particular: the ability to recall dreams; dream vividness; lucid dreams; archetypal dreams; fantastic nightmares (very vivid, upsetting dreams, remembered in detail upon awakening); prelucid dreams (where there is an awareness that one might be dreaming); control dreams (control is exercised in the dream that is not possible in daily life, with or without lucid awareness of dreaming); and post-traumatic nightmares (Hicks, Bautista & Hicks, 1999b; Levin, Gilmartin & Lamontanaro, 1998). Schredl, Kleinferchner and Gell (1996), finding that individuals who had had recent experiences of both extremely positive and extremely negative dreams scored significantly 'thinner' on the BQ, argued that this relationship is underpinned by a proclivity to intense emotional dreams, rather than nightmares alone. Additional research (Hicks, Bautista & Hicks, 1999a) found thin boundaries to be significantly related to mixed handedness (on the Briggs-Nebes Handedness Scale, 1975), an

indicator of increased communication between the cerebral hemispheres (Houran & Thalbourne, 2001).

Certain of the boundaries demarcated on the BQ, as well as the correlates of the BQ discussed above, have been related to dimensions of creativity. For example, creativity has been significantly correlated with unusual experiences (O'Reilly, Dunbar, & Bentall, 2001), fantasy-proneness (Lynn & Rhue, 1986) and mystical experience (Averill, 1999), as reviewed in Chapter Five. Hartmann delineates one type of boundaries as those 'between states of consciousness', elucidating that for "thick-boundaried people, states of awareness are totally separate and distinct. When not actually asleep, they are mostly in an ordinary waking, thinking state"; while thin-boundaried people experience more indefinite states, and "move easily from one state to another" (p. 27). As discussed in Chapter Two, creativity has been associated with shifts along dimensions of phenomenal consciousness, such as attention, arousal, affect and perception: it is merely a matter of terminology to describe these 'propensities to shift' in terms of boundary-permeabilities. To further illustrate the role these might play in creativity, the relationship between creativity and perception (Thapa & Murthy, 1985), attention (Fishkin & Jones, 1978), and self-awareness (Fromm, 1977) will be briefly considered below (constructs which the respective authors have described them as being central to shifts into ASCs).

Perceptual Boundaries. Boundaries exist even at the simple level of perception, ranging from the way we typically, habitually break up, isolate and categorise that which we see, labelling rather than really noticing details, patterns and relationships, to synaesthesia, a boundary-permeability between various of the five senses, experienced as tasting shapes or hearing colour for example (Cytowick, 1994). As discussed in Chapter Two, Flowers and Garbin (1989) argue that perceptual looseness or boundary-thinness, coupled with executive control mechanisms may facilitate creativity. Hartmann (1991) cites synaesthesia as another type of perceptual boundary-thinness, the perceptual-sensory analogue of increased connectivity. Dailey, Martindale and Borkum (1997) found that 'high creatives'[3] when compared to 'low creatives' showed significantly more synaesthetic associations, for example between colour and tone of sound and between colour and emotion.

Attentional Boundaries. Boundaries may be experienced in the deployment of attention, where attention may be sharp and focused like a spotlight or broad, open, scanning and diffuse (Reed, 1988). Mendelsohn (1976) hypothesised that having a wide attentional focus enables increased elements to enter consciousness, thus increasing the likelihood of forming novel associations. The ability to shift from a wide to a narrow attentional focus may be

[3] Assessed by scores on the Remote Associates Test.

particularly important to the creative process. Edge (2001) classifies a spectrum of dissociative experiences, which are forms of attentional boundary-permeabilities that may facilitate growth and creativity through a process of dissociation and integration; for example, one may purposefully enter a nonlocalised expansive state of awareness with creative intent.

Self-awareness. Individuals may have different boundary-permeabilities concerning aspects of the 'self', such as the physical perimeters of the 'body as self', or the ability to empathise and connect with other 'selves'. Dennett (1991) describes this as the 'extended phenotype' where conceptual self-boundaries include aspects of the immediate physical environment, tools or other people. In contrast, the self-concept may shrink and be associated with some intense internal experience. The idea that the self is not limited by the boundaries of the skin is a view propounded by Bateson (1973), where the boundaries of the mind are determined by context, where mind is "a dynamic system that has dynamic boundaries set by the specific context of the activity" (Neuman & Bekerman, 2000, p. 315). Dennett hypothesises that as an abstraction, the boundaries of the self are in constant flux and change, interacting with the demands of everyday life. Hartmann's concept of thick or thin boundaries would suggest that there are individual differences in the extent and manner to which this occurs. As an example of thin ego boundaries in the creative process, Milner (1950) describes the loss of self-awareness while painting, in a kind of 'creative participation'. Blackmore (1999, p. 240) similarly suggests that "creative acts often come about in a state of selflessness, or loss of self-consciousness, when the self seems to be out of the way". In other words, the creative process is often viewed as involving a breakdown or transcending of the everyday, usual boundaries of the self/ego.

While creativity, particularly of an artistic kind, has consistently been described as a common attribute of thin-boundaried individuals (Hartmann, 1981, 1991, 2001; Levin et al., 1998), this has received little empirical investigation. Schredl, Schäfer, Hofmann and Jacob (1999) found an association between the self-rating of dreams as involving 'many creative aspects' and boundary-thinness ($r = .21$, $p < .05$) and a non-significant correlation with dreams as problem-solvers ($r = .14$). Levin, Galin and Zywiak (1991) explored the relationship between two tests of creativity and boundary-thinness. They hypothesised that thin boundaries would facilitate qualities central to the creative process such as associational mobility, less rigidly fixed ideations and increased accessibility to internal fantasy. However, neither a divergent-thinking measure (the Brick Uses Test, Guilford et al., 1957) nor a remoteness-of-associations measure (RAT, Mednick & Mednick, 1967) demonstrated significant correlations with the BQ ($r = .22$ and $r = .10$ respectively). In addition, these creativity tests failed to correlate significantly with each other ($r = .21$) indicating that they tap into relatively independent aspects of creativity. As discussed in Chapter Two, Davis and

Belcher (1971) criticised the RAT, a measure of convergent thinking, as being more related to verbal intelligence than to creativity and concluded that self-report behavioural inventories may be the most valid way of estimating creative potential. This stresses the need to use multi-dimensional measures of creativity, enabling the hypothesised relationship between boundary-thinness and creativity to be investigated more intricately and extensively.

In summary, although there is a clear theoretical basis supporting a relationship between Hartmann's construct of 'thin boundaries' and creativity, this has not been established empirically. Both creativity and boundary-thinness have independently been related to openness-to-experience (McCrae 1987; 1994), better dream recall (Armitage & Fitch, 1988; Levin et al., 1998) and absorption (Barrett, 1989; Thalbourne et al., 1997), for example. However, boundary-thinness has not been found to be related to either divergent-thinking or remoteness-of-associations as measures of creative cognition (Levin et al., 1991). Clearly, it would be advisable to test the theorised relationship between boundary-thinness and creativity further by using measures of creative behaviour and personality.

4.1.2 Creativity and transliminality

> The true locus of the creative imagination is the border state that marks off the conscious from the nonconscious. This is the stage between conscious alert awareness ... and the deep nonconscious... This is the Taoists' state of 'letting things happen', where daydreaming and reveries go on, where Whitehead's prehension and Wild's intuition, as primal awareness, function; where we know before we know. My hypothesis makes it the true creative center. (Rugg, 1963, cited by MacKinnon, 1971, p. 227).

Rugg named this state, where material crosses from the 'nonconscious' into the conscious mind, the transliminal mind, due to its 'across-the-threshold' power (the word being derived from the Latin *trans*, meaning across and *limen* meaning threshold). MacKinnon (1971) expanded this concept, focusing on a range of 'transliminal experiences', characterised by a flow of information, bi-directionally, across the threshold of awareness, emphasising a process rather than a state, "a series of movements from waking to sleeping and from sleeping to waking, from the waking state to the hypnotic trance and back again, from perceiving to forgetting to recalling of events, and so on" (p. 228).

Thalbourne and Delin (1994) developed the transliminality construct into an individual differences measure, indicating the degree to which psychological material 'crosses the threshold' into and out of conscious awareness. They proposed this to be a common factor underlying creative personality, mystical experience, manic-depression, belief in the paranormal, magical ideation and manic experience. In this usage, the notion of transliminality draws upon Bergson's (1910, cited by Gunn, 1920) idea of a mechanism that

acts as a barrier, filter or permeable membrane between subliminal and supraliminal consciousness. Thalbourne and Delin propose that people differ in the permeability or threshold level of this hypothesised 'membrane or boundary', regulating the flow of material into conscious awareness, allowing high or low transliminality. This may manifest as an enduring trait or a susceptibility to spontaneous, isolated transliminal experiences. Hence, the concept of transliminality has developed from a border state of mind to a spectrum of experiences of consciousness to a mechanism, the degree of threshold permeability itself. Naturally, all these are interlinked and together indicate a proclivity to experience states of consciousness and forms of cognition other than the 'ordinary' mental processes, pervaded by Aristotelian logic and everyday, ego-bound, thoughts and speculations.

The Transliminality Scale (TS; Thalbourne, 1998) appears to be related to the construct of boundary-thinness, with a focus on the irruption into consciousness of 'primary-process' content. Like the BQ, the TS has been found to correlate highly with openness-to-experience (Thalbourne, 2000b). One criticism that may be made of the scale is that it includes a diverse range of experiences, some of which are adaptive (e.g. creativity) others which may be maladaptive (e.g. psychosis), with no attempt to distinguish between different types of experience. In addition several items on the scale relate to distinct and extreme experiences, with responses on a dichotomous true/false scale, which may occlude more subtle boundary-permeability facets. Despite this, the scale appears to tap into a unified construct, which may indicate an openness to unusual experiences of consciousness.

Thalbourne (2000b) expanded the core correlates of transliminality, finding these to additionally include: general religiosity, frequency of dream interpretation, schizotypal personality, fantasy-proneness, absorption and hyperaesthesia. Thalbourne and Houran (2000) found transliminality to be associated with all seven sub-scales of the Mental Experience Inventory (Kumar & Pekala, 1992): belief in psi-related and unusual events; paranormal and unusual experiences; a sense of being high e.g. feeling intense emotions; daydreaming; a sense of mental potency (believing in the power of the mind); introspection; and altered consciousness. Lange, Thalbourne, Houran and Storm (2000) replicated Hicks et al.'s (1999) dream study, also finding positive correlations with each of the six types of dreams measured by the Spadafora and Hunt (1990) dream scale. Lange et al. further found transliminality to be significantly correlated with 'warmth', 'abstractedness' and 'openness to change' on the Cattell Sixteen Personality Factor test (Russell & Karol, 1994) and to be negatively associated with rule-consciousness, tough-mindedness and self-control. Lange et al. argue that such emotional and cognitive experiences, e.g. paranormal experiences, mystical experiences, absorption and lucid dreaming share a common core; this being high transliminality. They suggest that highly transliminal individuals possess a lack of inhibition or a greater degree of

connection between mental processes than low transliminal individuals, facilitating the range of psychological experiences found in the studies above. Thalbourne, Houran, Alias and Brugger (2001) speculate that neurological interconnectedness and fluidity regulates transliminality, enabling, for example, loose associations to be made through the spreading activation of neural networks. They suggest that enhanced interconnectedness (or 'poor gating') exists between frontal and subcortical regions, across the corpus-callosum, and also involves the primary or secondary sensory areas. The latter would appear to be one explanation for the significant correlation (*rho* = .57, $p < .001$) found between synaesthesia and transliminality (Thalbourne et al., 2001).

Thalbourne and Delin (1994, p. 23) argued that creative individuals exhibit high transliminality, "in that their consciousness is characteristically and from time to time presented with thoughts – novel ideas or solutions to problems; connections between elements – that appear not to be the result of direct reasoning". Empirical studies seeking to find relationships between established creativity measures and transliminality have had limited success, despite the fact that 'creative personality' forms part of the construct of transliminality itself. Thalbourne, Bartemucci, Delin, Fox and Nofi (1997) found no significant correlation between transliminality and divergent-thinking: the verbal form of the TTCT (Torrance, 1974). This led them to speculate that "either the Torrance test is an inappropriate measure of creativity or that creativity itself plays a lesser part in transliminality than has thus far been supposed" (p. 332). While it must be borne in mind that creativity and transliminality may be unrelated constructs, both of these suggestions may be tenable. The TTCT addresses a particular kind of thinking which may not be applicable to all forms of creativity (Khatena, 1982). If creativity is a multidimensional phenomenon, transliminality may 'play a greater part' in some types of creativity than others.

Thalbourne (2000a) attempted to find positive correlations between transliminality and two measures of creativity, a 9-item creative personality scale devised by himself and the Revised-Barron-Welsh Art Scale, stressing that "there is an urgent need to locate the role of other measures of creativity in transliminality" (p. 196). The transliminality scale (with statements relating to creativity removed) correlated significantly with creative personality ($r = .41, p = .003$, 2-tailed) but not with the aesthetic preference for complex figures, developed as a measure of creativity by Barron and Welsh (1952), where $r = -.13, p = .387$. Again, these two measures of creativity did not significantly correlate with each other ($r = -.15, p = .288$), supporting a multi-dimensional creative cognition model. It must be borne in mind that Thalbourne's minimally validated 9-item creative personality scale predominantly focuses upon the 'inspirational' aspect of creativity, concerning the novelty and unusualness of ideas, rather than aspects of creativity relating to preparation, verification and the development of

ideas. Considering this, it would be valuable to investigate how transliminality relates to a more balanced measure of creative personality.

4.2 Creativity dimensions and measurements

If divergent-thinking, remoteness-of-associations and visual-aesthetic-preference, as measures of creativity, do not relate (at least consistently) to boundary-thinness and transliminality, then what measures of creativity, if any, might?

The creativity measures used in previous research were predominantly cognitive, assessing cognitive expansion. In the current study, creativity measures were chosen in an attempt to assess further dimensions of creativity, extrapolating from the Quadrant Model of Creativity (*Figure 2.1*). Measures of the 'creative person' (personality and self-assessed creativity), the 'creative process' (related to affective expansion) and the 'creative product' were thus chosen. These were: Gough's Creative Personality Scale (CPS, 1979); self-perceived creativity (devised by the current author); involvement and interest in artistic creative activities (Griffin & McDermott, 1998); and emotional creativity (Averill, 1999). By selecting these measures the aim was to examine whether 'boundary permeability' might be associated with involvement in particular domains (i.e. the arts, following Hartmann, 1991), whether it might be associated with presumed domain generic characteristics of the creative person, and whether it might be associated with openness to affect and creativity with affective constructs. It was thought that some of these measures might relate to boundary-permeability due to past performance: Wolfradt and Pretz (2001) found high scores on the CPS to be predicted by openness-to-experience and faith in intuition; measures of artistic creative involvement have been significantly correlated with a proclivity to experience ASCs and peak experiences (Taft, 1969; Ayers, Beaton & Hunt, 1999); and Averill (1999) found emotional creativity to be related to openness-to-experience ($r = .58$, $p < .001$) and mystical experience (using the Hood Scale, 1975) where $r = .39$, $p < .001$. These measures had not previously been used in combination (emotional creativity not having been compared with other creativity measures), hence there was little background data on their collective convergent validity.

4.3 Study aims

Based on the model that 'creativity' is associated with fluid cognitive-styles and the expansion of conceptual boundaries (e.g. Eysenck, 1993; Martindale, 1999) and with 'affective and perceptual looseness' (e.g. Flowers & Garbin, 1989; Russ, 2001), it was predicted that the creativity measures chosen would be positively correlated with overall

boundary-thinness and transliminality.

In view of the dimensional nature of creativity (refer to Section 2.7) it was intended, with the use of a carefully chosen multi-dimensional creativity package, to use creativity measures that had not been previously been used in creativity/boundary-permeability research. Further, it was thought that different aspects of boundary-permeability might relate differentially to dimensions of creativity, hence it was intended to correlate the subscales of the BQ with the creativity measures used, which had not been done in previous research.

The relationship between transliminality and boundary-thinness had not previously been assessed. However, it was hypothesised that they would correlate significantly and positively with each other, due to the conceptual similarity and common correlates of these constructs.

The hypotheses of Study One were thus:

1) Both total scores on the BQ and TS will form positive and significant correlations with scores on: emotional creativity, creative personality, involvement and interest in artistic activities and self-perceived creativity.

2) Total scores on the TS and BQ will correlate positively and significantly with each other.

In addition, the following exploratory analyses were planned: the relationship between the sub-scales of the BQ and both the creativity measures and transliminality; and the relationship between the creativity measures. It was decided in advance to correct for multiple analyses for the specific hypotheses, but not to do so for exploratory analyses, which would require replication in future research.

4.4 Method

4.4.1 Participants

Sixty-five second year psychology undergraduates (49 females; 16 males; median age '19 to 20', ranging from 19 to 50 years) participated in this study on a voluntary basis, linked to a research methods workshop on questionnaire construction. Participants were not pre-selected according to any creativity criteria.

4.4.2 Measures

The Transliminality Questionnaire: Form B, Thalbourne (1998). (Described in Section 3.1.3). *The Boundary Questionnaire*, Hartmann (1991). A 138-item questionnaire with twelve sub-scales relating to the permeability of psychological boundaries, both those pertaining to 'self/internal' (personal boundaries) (e.g. "I feel very separate and distinct from everyone

else" and "I am usually sensitive to loud noises and to bright lights") and 'other/external' (world boundaries) (e.g. "I think a good teacher must remain in part a child"). These include 'unusual experiences', experiences related to dreams, feelings and thoughts, sensitivity, neatness, interpersonal boundaries, preferences for rigid boundaries aesthetically and environmentally and opinions about peoples, nations, groups, institutions and cultural ideas. Funkhouser, Würmle, Cornu & Bahro (2001) found a high retest reliability (over a six month period) where $r = .87$, and split half reliability of .93 has been demonstrated (Hartman et al., 2001). This scale has been shown to discriminate between groups predicted to have thin versus thick boundaries e.g. nightmare sufferers, (Hartman, 1991), lucid dreamers (Hicks et al., 1999) and artists versus Wall Street Brokers (Levin et al., 1998).

The Emotional Creativity Inventory (Averill, 1999). (Described in Section 3.1.3).

The Creative Activities and Interests Checklist (Griffin & McDermott, 1998). A 54-item checklist, focusing on the visual arts, performance arts, writing and domestic arts, with a dichotomy between an active interest in these activities and recent experience of these activities. (Described in Section 3.1.3).

Self-perceived creativity and the importance of creativity. (Described in Section 3.1.3). *Gough's Creative Personality Scale*, CPS (1979). . (Described in Section 3.1.3).

Please refer to *Appendix 3.1* for copies of the listed measures.

4.4.3 Procedure

Participants were invited to take part in this questionnaire study during taught workshops on psychometrics within a 'research methods in psychology' module. This was with the dual purpose of allowing students to experience different types of psychometric scales and to have the opportunity to contribute to a departmental research project. Participants were informed of these purposes and invited to take part by seven different psychology lecturers during separate workshops, over the time span of one week, each consisting of up to 20 students. The research study was described as an exploration of the relationship between different kinds of creativity and dimensions of personality. Depending on the structure of the workshops, implemented by the individual lecturers, volunteers were either encouraged to complete the questionnaire within the workshop schedule, or they were asked to complete the questionnaire in their own time. In the latter instance, they were asked to either return it to the lecturer in question at a later date or via internal mail to the researcher if preferred. 10% of responses were received through the latter option. Participants were informed on the front cover of the questionnaire booklet of the aims and purpose of the study, and of the identity of the researcher. They were made aware of their right to withdraw form the study at any point, during or subsequent to the

completion of the questionnaire, or from individual questions. They were thanked for their interest in the study and if interested in participating asked to complete the questionnaire as quickly as possible, based on 'intuitive' responses. Questionnaires were returned anonymously. However, respondents could choose to receive information concerning the overall outcome of the study by denoting their student numerical email address. In addition, participants were invited to contact the researcher via email or telephone if they had any queries, questions or comments about the research project. Please refer to *Appendix 3.2* for a copy of these instructions.

4.5 Results and discussion

Correlational analyses were performed using Pearson's Product Movement Coefficient, for all variables except those of the creative activities checklist, based on the rationale that although some of the data was ordinal, these were based on established psychometric measures. The sample size, homogeneity of variances and distribution of scores were suitable to meet the requirements of a parametric analysis. No outliers were observed, skewness coefficients did not deviate significantly from the normal distribution and scatterplots indicated a linear relationship with measures of boundary-permeability. However, the distribution of the total score of the creative activities checklist and the sub-scales of 'performance arts' and 'writing' were significantly positively skewed, hence the Spearman Correlation Coefficient was used for this measure (please refer to *Appendix 3.3* for data, charts and plots supporting this section). As the data points used in these parametric and non-parametric tests were independent of each other, no problems in using different tests of association were envisaged, the meaningfulness of each test outcome being interpreted in isolation according to appropriate test assumptions.

4.5.1 Reliability analyses

Using Cronbach's alpha, the internal consistency of each of the scales administered was assessed. High reliability coefficients were obtained for each of the creativity measures: the Creative Activities and Interests Checklist (CAIC), $\alpha = .88$; the Emotional Creativity Inventory (ECI), $\alpha = .79$; and the Creative Personality Scale (CPS), $\alpha = .77$. The BQ displayed a Cronbach's alpha of .92 overall, and the TS obtained $\alpha = .88$. All of these reliability coefficients are high enough to indicate that they are measuring unified constructs, and demonstrate acceptable internal consistency for further empirical usage and statistical analyses (Kline, 2001).

The sub-scales of the CAIC each demonstrated high internal consistency: art ($\alpha =$

.80); writing (α = .74); performance arts (α = .86); and domestic arts (α = .80). The personal boundaries subscale of the BQ obtained an internal consistency of α = .91 and the world boundaries subscale, α = .92. However, some of the twelve sub-scales of the BQ demonstrated low internal consistency.[4] Hence, it appears that while the overall construct of boundary-thinness has high internal consistency, this was not reflected throughout the subscales. It may be advisable to analyse the factor structure of the BQ in future studies.

It was decided to include in further statistical analyses only with subscales obtaining internal consistency coefficients above .7 (Kline, 2001). These were: the subscales of the creative activities and interests checklist; and from the BQ, personal versus world boundaries, and boundaries concerning sleep, thoughts and feelings, and unusual experiences.

4.5.2 Transliminality and boundary thinness

Transliminality and boundary-thinness correlated highly with each other, $r = .71$, $p = .0009 \times 10^{-7}$, 1-tailed, indicating that they are measuring a similar construct. However, transliminality correlated more robustly with 'personal boundaries' ($r = .72$, $p < .001$, 2-tailed) than with 'world boundaries' ($r = .35$, $p = .005$, 2-tailed), and most strongly with the sub-scale of the BQ concerned with a fluidity between thoughts and feelings ($r = .72$, $p < .001$, 2-tailed). Transliminality also correlated highly with the 'unusual experiences' subscale ($r = .68$, $p < .001$, 2-tailed) and moderately with the 'sleep/wake/dream' subscale ($r = .45$, $p < .001$, 2-tailed). This suggests that transliminality is associated with intrapersonal openness, particularly with fluid, absorbed and affective cognition, and with unusual experiences, while 'boundary-thinness' is a wider construct, incorporating more facets of psychological openness, such as opinions about the 'external world', facets that are nevertheless significantly correlated with transliminality, but share much less variance with it.

4.5.3 Creativity and boundary permeability

All measures of creativity were positively and significantly correlated with boundary-permeability, as can be observed in Table 4.2.[5] Self-perceived creativity, creative activities and interests, emotional creativity and creative personality were each significantly and positively correlated with both boundary-thinness on Hartmann's BQ and with transliminality (where $p < .02$). When correcting for multiple analyses using the planned, multi-stage

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[4] These were as follows: sleep/wake dream (α = .76); unusual experiences (α = .79); thoughts/feelings/moods (α = .75); childhood/adolescence/adulthood (α = .58); interpersonal (α = .41); sensitivity (α = .56); neat/exact/ precise (α = .60); edges/lines/clothing (α = .61); Opinions about children and others (α = .53); opinions about organisations and relationships (α = .62); Opinions about peoples, nations, groups (α = .28); and opinions about beauty, truth (α = .37).

Bonferroni procedure (Larzelere & Mulaik, 1977, cited by Howell, 1992, p. 354) several of these remained significant, although the shared variances were small (ranging between 10% and 23%). Creative personality and emotional creativity correlated most highly with boundary-permeability. These results suggest that aspects of creativity are associated with an openness to 'experiences of consciousness' and with a fluid cognitive-perceptual-affective style. However, this relationship differs in strength across dimensions of creativity, as will be delineated below.

Table 4.2

Correlations between creativity measures and boundary permeability

	Self-Perceived Creativity	Creative Activities and Interests					Emotional Creativity	Creative Personality
		Total	Art	Performance	Writing	Domestic		
Transliminality	.296 (.010)	.279 (.015)	.222 (.043)	.178 (.085)	.127 (.165)	.233 (.036)	**.477** (.00004)	**.432** (.0003)
Boundary-thinness	.277 (.013)	**.318** (.006)	.215 (.046)	.232 (.034)	.288 (.011)	.191 (.066)	**.389** (.0008)	**.343** (.003)

Note. Correlations coefficients in bold remain statistically significant when correcting for multiple analyses. Refer to *Appendix 3.4* for supporting calculations. Correlations are one-tailed.

Emotional creativity was most robustly correlated with both boundary-thinness ($r = .39$, $p = .0008$, 1-tailed) and with transliminality ($r = .48$, $p = .00004$, 1-tailed), concurring with Averill's (1999) finding that emotional creativity is associated with openness-to-experience and positive mystical experiences. McCrae (1994) found scores on the BQ to be significantly related to all six facets of openness-to-experience ($.370 > rs > .580$), in particular openness to fantasy, aesthetics and feelings. This centrality of openness to feelings may explain the shared variance between emotional creativity and boundary-permeability.

Creative personality was positively and significantly correlated with transliminality ($r = .43$, $p = .0003$, 1-tailed) and boundary-thinness ($r = .34$, $p = .003$, 1-tailed). This supports the relationship between transliminality and creative personality ($r = .41$, $p = .003$, 2-tailed) found by Thalbourne (2000a), and concurs with previous findings, where scores on the CPS were significantly correlated with openness-to-experience, faith in intuition (Wolfradt & Pretz, 2001) and a belief in the importance of unconscious processes (Kumar et al., 1997). This measure of creative personality consists of self-perceived attributes related to different aspects of the creative process, such as imaginative capacity and ideational fluidity (the 'unstructured' stages) and ego-strength and logical analysis (the 'structured' stages) (Eysenck, 1995; Gough, 1979). Hence, it includes traits relating to both 'thinly' structured and 'thickly' structured states of consciousness, concurring with the 'epistemological flexibility' hypothesis

[5] Two items in each of the BQ and TS that pertained to creativity were not included in subsequent analyses.

discussed in Chapter Two. Gough's CPS claims to encompass traits common to creative individuals in both the science and arts. Hence, it appears that an open, fluid experiential-structure of consciousness is moderately related to creative personality as a general creativity factor, across domains of endeavour.

The self-perception of 'being creative' has been described as one attribute of the creative person (Davis & O'Sullivan, 1980). Hence, it is not surprising that 'self-perceived creativity' like 'creative personality' correlated positively with transliminality ($r = .27$, $p = .01$, 1-tailed), and with boundary-thinness ($r = .28$, $p = .013$, 1-tailed). However, these effect sizes are smaller and are non-significant when corrected for multiple analyses. It appears that the perception of one's own creativity, and hence lay definitions of what 'creativity is', are less robustly related to boundary-permeability than emotional creativity and creative personality.

Overall involvement with the creative arts was again positively correlated with transliminality ($r = .28$, $p = .015$, 1-tailed) and with boundary-thinness ($r = .32$, $p = .006$, 1-tailed), but only the latter was significant after correcting for multiple analyses. This provides partial support for studies that have found a positive relationship between involvement in the creative arts ASC proclivity and unusual experiences (O'Reilly et al., 2001; Ayers et al., 1999), which are discussed in Chapter Five. However, none of the correlations with particular domains of involvement (visual art, performance arts, writing and domestic crafts) remain independently significant when correcting for multiple analyses.

In summary, it appears, amongst this sample, that creativity is moderately related to creativity as a 'general trait factor' and to creative involvement in emotional and artistic domains. This outcome is in contrast to the non-significant correlations found between boundary-permeability and divergent-thinking, remoteness-of-associations and figural-aesthetic preference ($-.13 > rs > .22$) (Thalbourne, 2000a; Levin, Galin & Zywiak, 1991). These findings could be reconciled by considering the complex and multi-dimensional nature of creativity. It has been argued (e.g. Hocevar, 1981) that the core dynamic of the creativity construct is actual involvement in creative behaviour, while measures of cognitive-perceptual styles (such as divergent-thinking or preference for complex figures) are correlates of certain forms of creative behaviour. However, several of the effect sizes in the current study are similar to the .22 correlation found between divergent-thinking and the BQ by Levin et al. From this limited number of studies, it appears that boundary-permeability is differentially related to different aspects of creativity. However, replication with these measures and more diverse sampling strategies are required in order to draw any firm conclusions on this matter[6].

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[6] For additional data concerning the relationship between creativity dimensions, boundary-thinness and transliminality, refer to Appendix 3.5, which constitutes data from empirical Study Two.

4.5.3.1 Creativity and the 'primary-process' sub-scales of Hartmann's Boundary Questionnaire

In a factor analysis of the BQ (Hartmann, 1991) the main factor was labelled 'primary-process' and consisted largely of items from the first three sub-scales: 'sleep/wake/dream'; 'unusual experiences' and 'thoughts/feelings/moods'.

Sleep/wake/dream. Despite some research suggesting that vivid dream experiences such as increased primary-process content in dreams and high dream recall are associated with creativity (Domino, 1976; Sladeczek & Domino, 1985), this sub-scale displayed non-significant relationships with all of the four measures of creativity (as revealed in Table 4.3). It must be noted that this sleep/wake/dream scale does not cover areas such as dream bizarreness, archetypal dreams, hypnagogia or lucid dreams. It focuses on the boundary between dreaming and waking experience/thought, characterised by an uncertainty as to whether one is 'awake' or 'asleep', the incidence of nightmares/daymares and the merging of identities/people within dreams. It may be that different types of creativity are associated with different experiences of dreaming, for example, in Chapter Five literature is reviewed where professional, exhibiting visual and performing artists had significantly more archetypal-mythological dreams than 'non-creative controls' (Ayers, Beaton & Hunt, 1999), while remoteness of associates was not significantly associated with dream bizarreness (Wood, Sebba & Domino, 1990).

Unusual experiences. The unusual experiences sub-scale includes a wide variety of alterations in the dimensions of consciousness, including: feelings of the self falling apart, synaesthesia, changes in body boundaries, déjà vu, reality-imagination confusion, auditory hallucination, the perception of auras, out-of-body experiences, telepathy and clairvoyance. The 'unusual experiences' sub-scale was positively and significantly correlated with involvement in creative activities ($rho = .36$, $p = .004$, 2-tailed), and with writing ($rho = .31$, $p = .015$, 2-tailed). It was also positively significantly correlated with emotional creativity ($r = .40$, $p = .001$, 2-tailed). However, 'unusual experiences' did not correlate significantly with creative personality or self-perceived personality. To some extent, this concurs with O'Reilly, Dunbar and Bentall (2000), where scores on the 'unusual experiences' dimension of schizotypy significantly distinguished creative arts students from humanities students, while divergent-thinking scores did not. Unusual experiences may be associated to a greater degree with involvement in particular domains of creative endeavour, in this case, the creative arts and emotional creativity, rather than with measures of creative attributes across all domains, such as creative personality, or measures of particular cognitive-styles, such as divergent-thinking.

Table 4.3

Correlations between creativity and the primary process sub-scales of the Boundary Questionnaire

	Self-Perceived Creativity	Creative Activities and Interests					Emotional Creativity	Creative Personality
		Total	Art	Performance	Writing	Domestic		
Sleep/wake/ dream	.111 (.385)	.178 (.162)	.127 (.319)	.173 (.176)	.144 (.260)	.084 (.513)	.158 (.212)	.057 (.661)
Unusual experiences	.218 (.084)	.356 (.004)	.220 (.083)	.215 (.091)	.306 (.015)	.191 (.133)	.396 (.001)	.191 (.137)
Thoughts/ feelings/ moods	.248 (.049)	.315 (.012)	.223 (.080)	.277 (.028)	.242 (.056)	.187 (.143)	.469 (.00009)	.384 (.002)

Note: Probabilities are two-tailed.

Thought/feelings/moods. The 'thoughts/feelings/moods' sub-scale explores boundary-permeabilities between thinking and feeling, fluidity of thoughts and the ability to experience without rationalising. It also covers items related to imagination, visualisation ability and imaginative absorption. This sub-scale demonstrated the most consistent correlations with the creativity measures, and was significantly positively correlated with: self-perceived creativity (r = .25, p = .049, 2-tailed); creative activities and interests (rho = .32, p = .012, 2-tailed); emotional creativity (r = .47, p = .00009, 2-tailed); and creative personality (r = .39, p = .002, 2-tailed). This concurs with studies finding significant positive relationships between creativity and primary-process cognition (Suler, 1980), fantasy-proneness (Lynn & Rhue, 1986) and absorption (Thalbourne et. al., 1997). Given the fact that this subscale correlated most consistently with creativity, we may ask why neither Thalbourne et al. (1997) nor Levin et al. (1991) found significant relationships between divergent-thinking, as a measure of cognitive flexibility and fluency, and boundary-permeability. This suggests that modes of cognition beyond the divergent-thinking construct are involved in creativity, as suggested by Torrance and Hall (1980), for example, affect-laden primary-process thinking (Russ, 2001).

4.5.4 Creativity: A multidimensional construct

While it seems that dimensions of boundary-permeability are consistently related to creativity, these dimensions of creativity do not all correlate significantly with each other. As can be observed in Table 4.5, three of the four measures of creativity, self-perceived creativity, creative activities and interests and creative personality did inter-correlate significantly and positively, with shared variances ranging between 12 to 36%. However, emotional creativity was correlated positively and significantly only with creative personality. This is surprising, due to suggestions that 'affective looseness' has been associated, conceptually, with artistic

expression (e.g. Averill, 2005). However, this might be a relationship that is specific to practising artists, rather than psychology undergraduates.

Table 4.4

Correlations between the four measures of creativity

	Self-Perceived Creativity	Creative Activities & Interests	Creative Personality	Emotional Creativity
Self-Perceived Creativity	1	.600 (.000001)	.457 (.0001)	.133 (.290)
Creative Activities & Interests		1	.341 (.007)	.151 (.236)
Creative Personality			1	.348 (.005)
Emotional Creativity				1

Note: Probabilities are two-tailed.

4.5.5 Summary and conclusions

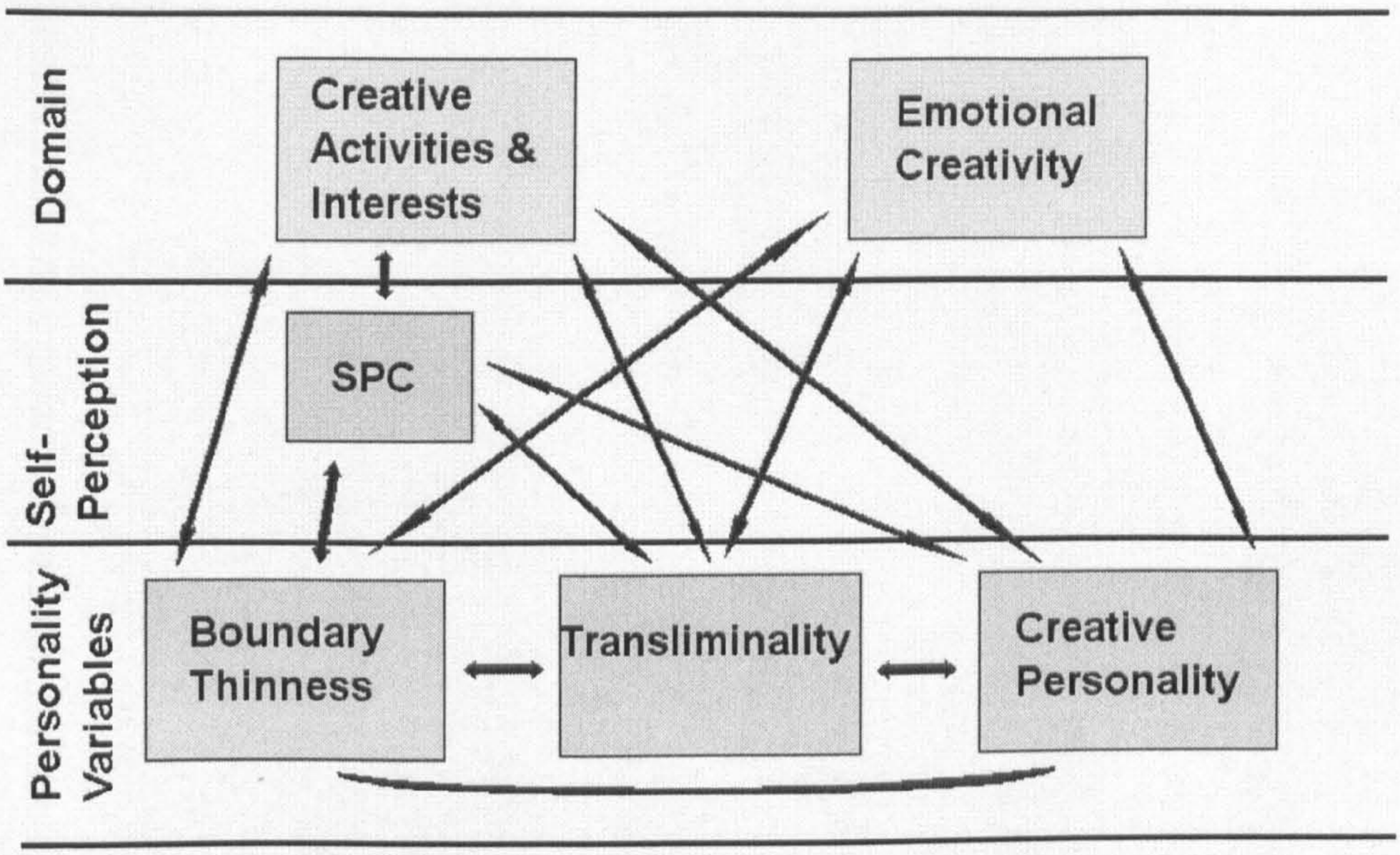
As hypothesised, transliminality and boundary-thinness correlated significantly with each other, at a level suggesting that they might be related constructs ($r = .71$, $p < .001$). The hypothesis that the creativity measures would be positively and significantly correlated with boundary-permeability was also met. 'Self-perceived creativity', 'creative personality', 'emotional creativity' and 'involvement in artistic activities' all correlated positively and significantly with both transliminality and boundary-thinness ($.277 > rs > .477$), and those with emotional creativity and creative personality remained significant when correcting for multiple analyses. *Figure 3.1* illustrates the main relationships uncovered in this study, where emotional creativity and creative activities and interests are relatively independent of each other, yet are both related to boundary-permeability and creative personality. These results suggest that 'creative personality' may even act as a 'mediator variable', enabling, with its emphasis on 'ego strength' (Eysenck, 1995; Barron, 1993) the creative individual to shift adaptively between boundary permeable cognition to focused, goal-directed cognition. However, this interpretation is highly speculative.

Exploratory analyses suggested that different aspects of creativity might be related to different boundary-permeability configurations, suggesting that particular cognitive-affective-perceptual sensitivities or configurations of consciousness facilitate the production of novelty in particular domains.

Permeability between thoughts, feelings and moods was significantly related to all four dimensions of creativity ($.248 > rs > .469$). This sub-scale is characterised by fluidity between

Figure 4.1

Significant positive correlations between creativity and boundary-permeability



different modes of cognition, a blurring of the boundaries between feeling and thinking, the ability to suspend rational cognitive processes and being able to enter states of imaginative absorption. This outcome concurs with Levin et al. (1991) who suggested that 'thin boundaries' facilitate creativity by increasing associational fluency, and increased access to internal fantasy. It also supports Thalbourne and Delin (1994) who suggested that transliminality would be related to creativity by increasing the formation of connections between elements that appear not to be the result of direct reasoning. It might be the case that this single sub-scale would correlate positively with divergent-thinking and/or remoteness of associations. However, the 'thinking/feeling/moods' sub-scale taps into 'affect-laden' primary-process cognition, thus assessing a form of primary-process cognition that involves both cognitive and 'affective expansion' (Russ, 2001), which appears to be related to creativity at low to moderate levels.

'Unusual experiences', a sub-scale related to ASC proclivity, was only significantly correlated with involvement in the creative arts (*rho* = .356, $p = .004$) and emotional creativity ($r = .396$, $p = .001$). 'Unusual experiences' have not been found to significantly correlate with other measures of creativity, such as divergent-thinking (O'Reilly et al., 2001), although they have been found to be associated with involvement in the creative arts (Ayers et al., 1999). Hence, it may be that unusual experiences are associated with creative activities in particular domains, perhaps those associated with self-exploration and expression, rather than with creativity across all domains. Further research is required to explore this. Feist (1999a) for

example found openness-to-experience to be associated with creativity in the arts to a greater extent than in the sciences. However, he found that highly creative scientists are more open-to-experience than less creative peers. A similar pattern may emerge with boundary-permeability, one speculative explanation for why many anecdotal reports of ASCs in the creative process concern eminent scientists and creative artists in general.

4.5.6 Criticisms and future research

One may argue that the population used in this study, psychology undergraduates, may not represent the most creative individuals in society, or may demonstrate a limited range of types of creativity or limited expertise with particular domains of creativity. Hence, it would be valuable to replicate this study with a different sample, including professional artists, scientists and a wide variety of people in the population in general. In addition, it would be interesting to compare these groups on additional measures, such as performance measures of divergent-thinking and remoteness-of-associations, both estimates of cognitive flexibility and originality. Clearly, the range of creative activities measured would need to be extended to include scientific creativity such as inventions and solving mathematical problems (Hocevar, 1979). Wolfradt and Pretz (2001) found science undergraduates to score significantly lower on creativity and openness-to-experience measures compared to psychology and art and design undergraduates. This pattern might be replicated with boundary-permeability. Alternatively, it might be that scientific creativity is associated with particular boundary-permeability configurations. With a larger sample size, more diverse participants and further creativity measures, it would be valuable to do a factor analysis with the aim of further delineating types of creativity and creativity-boundary-permeability relationships.

4.6 Update: Boundary-permeability, schizotypy, temporal lobe lability and cognitive-perceptual looseness

Since conducting this study Thalbourne, Crawley and Houran (2003) have proposed that transliminality may be explained by a high degree of neurological interconnectedness, both within the temporal lobes and between the temporal lobes and other parts of the brain. They found a high correlation (r = .72) between transliminality and scores on the general temporal lobe scale (Persinger, 1984), which led them to argue that the psychophysiological underpinnings of transliminality might be a hyperconnectivity between temporal-limbic structures and sensory association cortices – suggestive of a synaesthetic-like, heightened interaction between thoughts, emotions and sensory experience. Further, they hypothesised that transliminality is mediated by intense emotional states. This provides one possible interpretation for the significant positive correlation between emotional creativity and

transliminality found in Study One – both might be related to a proclivity to experience intense affective states[7].

In an additional study, Thalbourne, Keogh and Gerke (2005) report that transliminality correlated with the 'unusual experiences' schizotypy sub-scale of the Oxford-Liverpool Inventory of Feelings and Experiences (OLIFE, Mason, Claridge & Jackson, 1995) at $r = .78$, suggesting that this is a similar construct. Transliminality only formed small correlations with the other sub-scales of the OLIFE, which were significant for 'impulsive nonconformity' ($r = .18$, $p = .008$) and 'cognitive disorganisation' ($r = .25$, $p < .01$), but not for 'introverted anhedonia' or the lie scale.

A smaller correlation has been reported between total scores on the BQ and schizotypy, $r = .40$, $p < .01$, $n = 99$ (Farias, Claridge & Lalljee, 2005). Given the patterns of correlations found in Study One of this thesis, and the findings of Thalbourne et al. (2005), it may be that a stronger relationship would be found between the 'unusual experiences' subscale of the O-LIFE and 'personal boundaries'. However, in support of the idea presented in the current chapter that boundary-thinness is related to 'cognitive and perceptual looseness', Farias et al. report that total scores on the BQ were a significant predictor of performance on an experimental task designed to assess just this. The task involved observing a screen consisting of a display of 100 random dots and describing any meaningful patterns that emerged. Boundary-thinness predicted both the frequency of reporting of complex patterns (meaningful objects and integrated scenes, rather than simple, isolated geometric shapes) ($r = .35$, $p < .01$) and the number of different complex patterns reported ($r = .36$, $p < .01$). This scoring is analogous to that of divergent-thinking tests in terms of fluency and flexibility, and as such could be interpreted as a measure of creative-cognition. Indeed, Smith and Faeldt (1999) have developed a similar perceptual task as a specific assessment of creativity.

Collectively, this recent research provides further construct validity for the TS and BQ as measures of unusual experiences and cognitive-perceptual-affective looseness.

4.7 A note on schizotypy

Given that the unusual experiences dimension of schizotypal personality is strongly associated with the construct of boundary-permeability, further description of this construct is in order. Schizotypy is a term derived from 'schizophrenic genotype' and indicates a greater disposition toward schizophrenia (Claridge, 1997). Advocates of the fully dimensional model of schizotypy argue that, as a set of traits, it is distributed normally within the general

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[7] Further, Roe and Holt (in press) found emotional creativity and temporal lobe lability to be significantly correlated with each other ($rho = .511$, $p < .001$, $n = 40$), suggesting some commonality between the constructs of emotional creativity, temporal lobe lability and transliminality.

population, and that, rather than being associated with psychosis per se (e.g. meeting the diagnostic criteria for Schizotypal Personality Disorder or Schizophrenia), high schizotypy interacts with other personality and situational variables, thus leading to different outcomes. Outcomes include psychosis, but also include profiles of the healthy and 'happy schizotype' – individuals who are prone to spiritual and paranormal experiences in the absence of psychopathology (Claridge, 2001; Goulding, 2005; Jackson, 1997; McCreery & Claridge, 1995).

Four traits are subsumed within the schizotypy construct (Claridge & Davis, 2003). Mason, Claridge and Williams (1997) describe the most consistent factor – 'unusual experiences' as including magical or religious beliefs, altered sensations and perceptions of one's own body and the world, hypersensitivity to sounds and smells as well as a heightened sensitivity to the external environment; déjà vu, jamais vu, and auditory hallucinations and pseudo-hallucinations. A second factor, 'cognitive disorganisation', reflects difficulties with attention, concentration and decision-making, alongside a sense of purposelessness, moodiness and social anxiety (Mason, Claridge, & Jackson, 1995). Claridge and Beech (1995) add that cognitive disorganization comprises aversiveness and possibly paranoid ideation. A third factor, 'introvertive anhedonia', is characterized by schizoid solitariness and lack of feeling (Claridge & Beech, 1995). Mason, Claridge and Jackson (1995) describe this factor as pervaded by a lack of enjoyment derived from social interaction and physical pleasure; alongside which is a withdrawal from emotional and physical intimacy and an emphasis on independence and solitude. The fourth component is described as 'impulsive nonconformity', which includes for example, odd behaviour, such as the urge to smash things and mood lability, leading Claridge and Davis (2003) to suggest that this trait relates to affective forms of psychosis.

These factors of schizotypy are independent but correlate with one another in the general population (Mason et al., 1997). Unusual experiences and cognitive disorganization are often referred to as 'positive' dimensions of schizotypy. The positive schizotypal nervous system is one characterised by 'weak gating' or disinhibition (at the sensory or cognitive level) (Claridge & Davis, 2003), which may lead to 'flooding' of the contents of consciousness and over-inclusive thinking, this being conceptually akin to neurological models proposed to underlie boundary-permeability and, indeed, cognitive disinhibition models of creativity. The positive dimensions of schizotypy, in particular, the unusual experiences dimension, have been related to creativity (Brod, 1997; Burch, Pavelis, Hemsley, & Corr; Nettle, 2006; O'Reilly, Dunbar & Bentall, 2001) and to spiritual experiences (Jackson, 1997; Claridge, 2001). As such, this thesis, in part, may be envisaged as an exploration of traits and experiences related to the unusual experiences dimension of schizotypy.

CHAPTER FIVE

Creativity and altered states of consciousness

> A supra-rational view of creativity suggests that the individual consciousness transcends the boundaries of the deliberate rational creative process and experiences an altered state of consciousness, a wholistic state of awareness, a state of instant communication among all the parts. (Torrance & Hall, 1980, p. 3).

This chapter constitutes a literature review of the relationship between creativity and altered states of consciousness (ASCs). In Chapter Two the multi-dimensional and multi-phase nature of the creative process was explored. It was seen, that as a multi-phasic process, creativity is constituted of different psychological stages. In Chapter Four it was suggested that aspects of creativity are associated with traits characterised by a fluid and open cognitive structure and a proclivity to unusual experiences in general. In the present chapter, the *multi-state* nature of creativity will be considered in greater detail, focusing on the basic proposition that the creative process may involve ASCs. The relationship between creativity and specific states of consciousness will be examined. While phenomenological and anecdotal accounts of the creative process frequently describe experiences of ASCs, few empirical studies have explored their relationship, and none have done so using multi-dimensional measurements of both creativity and ASCs. As suggested in Study One of this thesis, it might be that different types of creativity are related to different experiences of consciousness. This chapter will prepare the ground for Study Two, which evaluates such propositions.

The following sections will introduce key terms, from consciousness as an awareness of mental content and a unified 'self', to states of consciousness as stable, recognisable configurations of consciousness, to ASCs as states of consciousness that deviate from the baseline 'normal' waking state.

5.1 Operational definition of consciousness

Miller (1962, cited by Velmans, 2002, p. 5) warned that "consciousness is a word worn smooth by a million tongues", suggesting that the term consciousness has become so confused with polysemic nomenclature that its meaning has eroded away. While it is assumed that all sentient human beings experience 'what it is like to be conscious', the very use of the term consciousness has been denigrated as being too broad, leading to muddled, incoherent usage (Young & Block, 1996). This conceptual mire will be avoided here by developing a clear operational definition of consciousness and associated terms[1].

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[1] For reviews of different approaches to and explanations of consciousness, please refer to Hunt (1995), Velmans (2000), Young and Block (1996) and Natsoulas (1987).

In this thesis, consciousness is defined in terms of 'self-consciousness', a special kind of reflective awareness where the 'self' may be the object of consciousness (in retrospect as a constructed model). Young and Block (1996) describe this as 'monitoring and self consciousness', involving thoughts about one's own actions, their effect, the monitoring of perceptual information in coordination with plans, and a concept of the self which is used in thinking about the self. This 'awareness of self' is experienced immediately as an ongoing, subjective, holistic, seamless and integrated impression of being. Natsoulas (1987, p.912) describes this in terms of a 'personal unity' referring to the "totality of the impressions, thoughts, and feelings, which make up a person's conscious being". James (1890/1986) uses the metaphor of a stream of consciousness, an enduring, flowing, fluctuating continuum. Within this 'unitary' phenomenological self, which has been described as an emergent gestalt (Greenfield, 1995), there may be an awareness of particular dimensions of consciousness, or aspects of self, such as emotions, inner speech, ideas, sensations, perceptions (Pekala, 1991; Tart, 1975; Walsh, 1995; Clark, 1986). This complexity within unity, where a unified field of awareness co-exists with a continuously fluctuating multiplicity of mental contents is one of the paradoxes of human consciousness (Edelman & Tononi, 2001). Hence, in this thesis, the unified process and multifarious dimensional definitions of consciousness will be combined. Consciousness will be defined as the awareness of perceptual-affective-cognitive mental contents, which are amenable to self-reflection and intentional acts (volitional control), and which arise within a field of existential-phenomenological awareness that is unitary, holistic, continuous and uniquely private. This aligns with Searle (1997) who argues that conscious states have two fundamental properties, subjectivity and 'intrinsic intentionality' (where intentionality in this sense (Brentano, 1960; Dennett, 1991) refers to the representational nature of consciousness, its 'aboutness', the awareness of mental contents). Hence, this definition synthesises a process view of consciousness (James, 1986; Edelman & Tononi, 2001), where consciousness is uniquely subjective, and continuous yet in a continual process of change, with a multidimensional view of consciousness[2].

This definition of consciousness recognises the phenomenological irreducibility of the conscious experience (i.e. the holistic, unique, subjective experiencing self), encapsulating the

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[2] While a full explication of this issue is outside the scope of this thesis, there are debates over the unity versus disunity of consciousness (e.g. refer to: Young and Block, 1996; Greenfield, 1995; Dennett, 1991; Damasio, 1992; Parfit, 1989; Pekala, 1991; Velmans, 2000). The unitary 'gestalt' need not imply that there is one place in the brain where 'everything is put together', a kind of Cartesian theatre (Dennett, 1991). It may be that the experience of unity is a subjective illusion, however, we still experience it, just as the 'self' may be a construction, a complex self-representation (Parfit, 1989), yet we still experience the world with it as referent to our experience (Glover, 1988; Austin, 2000). As Damasio (1992) argues, the rejection of the Cartesian Theatre does not amount to rejecting the sense of the self as experiencer. These two views can be reconciled (Greenfield, 1995), assisted by the recognition that consciousness has several operational definitions, referring to different functions/levels of consciousness (Young and Block, 1996; Natsoulas, 1987).

'what it is like to be' criterion of consciousness propounded by Nagel (1974) and the qualia of Chalmers (1996). In addition, the dimensions of consciousness, and the objectively observable mechanisms, structures or neurological underpinnings of consciousness are recognised as essential for a complete understanding of consciousness (Crick, 1994; Dennett, 1991). A multi-faceted, integrative approach to consciousness research enables a rich, contextualised model of conscious experience and its correlates to be developed (Wilber, 1996). Such a theoretically integrative approach will be taken in this thesis, weaving together evidence from a variety of levels of enquiry that throw light on the relationship between creativity and ASCs.

5. 2 What is a state of consciousness?

This stream of reflective consciousness may be categorised into particular recurring types of conscious experience. Theorists from different perspectives converge upon remarkably similar definitions of what a state of consciousness (SC) is, this being: *a stable configuration of the cognitive-perceptual-affective structures of consciousness* (Pekala, 1991; Wackermann, 1999; Mandler, 1985). For instance, from a phenomenological-cognitive perspective, Pekala (1991) describes a SC as a particular intensity or pattern of phenomenological awareness. From a neurophysiological perspective, Wackermann (1999) defines SCs as modes of organisation of the perceptual, cognitive, emotional and conative aspects of the experience of consciousness that correlate with 'functional states of the brain', the dynamic spatio-temporal patterns of physiological brain processes. From a cognitive perspective, Mandler (1985, p. 60) defines a state of "unified phenomenal conscious experience" as the awareness of experiences constructed out of activated schemas. Schemas allow stimuli to be identified and categorised, and begin the process for higher order cognitive capacities, such as problem-solving or language. They allow us to select and process relevant information from a chaotic plethora of stimuli in our psychological and physical environment. Hence, a SC is constructed out of cognitive-perceptual-affective structures, in the moment-by-moment context of a particular personality and environment.

A useful term, 'discrete state of consciousness', is used by Tart (1975) to refer to consistently reoccurring and recognisable SCs, for example, the dream state or the everyday waking state. These precisely unique, dynamic configurations of psychological dimensions compose an identifiable SC, despite variations in subsystems. For example, we might recognise and classify dreaming sleep as a particular reoccurring SC, despite differences in the content of our dreams. In this thesis, the term state of consciousness will be used in this sense.

According to Fromm (1977), in 1885, Western psychology only acknowledged two SCs: waking and sleeping. One hundred years later, Krippner (1972) listed twenty SCs he argued still deserved further psychological exploration, these include: states within dreaming and sleeping; hypnagogic and hypnopompic states; hyperalterness and lethargy; states of rapture; hysteria; fragmentation and regression; meditative and trance states; reverie; daydreaming; internal scanning; stupor; coma; expanded consciousness; and normal, everyday consciousness. Daily, our SC may fluctuate between the core SCs: dreaming sleep, non-dreaming sleep, and the waking state (Wackermann, 1999; Edelman & Tononi, 2001). In addition, SCs may fluctuate from a borderline state between waking and dreaming (Greenfield, 1995; Virel, 1984; Glicksohn, 1989; States, 2000), to intense focused concentration, loose playful thinking, or lethargy (Deikman, 1982).

5.3 Altered states of consciousness

Of these twenty SCs listed by Krippner, how is the term altered state of consciousness applied? Which SCs constitute altered SCs? Most definitions of ASCs describe them as a reorganisation of perceptual, cognitive and affective structures that differs from the ordinary waking state of consciousness. (Wackermann, 1999; Ludwig, 1966; Clark, 1986; Pekala, 1991; Fromm, 1977). For example, Glicksohn (1986) defines an ASC as a "state in which the subject experiences, or an observer notes, a change in characteristic cognitive functioning for that subject" (p. 218). This involves various shifts in the dimensions of consciousness: cognition, visual perception, time perception, emotional expression and attention. Ludwig (1966) conceptualises further common correlates of ASCs: loss of control, body image changes, changes in meaning or significance, a sense of the ineffable, feelings of rejuvenation and hypersuggestibility. Pekala (1991) stresses changes in additional dimensions: self-awareness, imagery vividness, internal dialogue and memory. Sufficient shifts in these perceptual-affective-cognitive dimensions leads to a new gestalt, which may be identified as an altered state of consciousness.

A commonly cited definition of an ASC is that made by Ludwig (1966, p. 255). Its strength lies in considering both objective and subjective identification of ASCs and in recognising different forms of trigger for an ASC:

> ... any mental state(s), induced by various physiological, psychological, or pharmacological manoeuvres or agents, which can be recognized subjectively by the individual himself (or by an objective observer of the individual) as representing a sufficient deviation in subjective experience or psychological functioning from certain general norms for that individual during alert, waking consciousness.

However, this definition includes the core states of dreaming and non-dreaming sleep as ASCs, while it might be argued (Tart, 1975) that these states are too commonly experienced to be described as altered. Tart (1975) overcomes this problem by focusing on subjective identification of ASCs, contextualised in an individual's experiences of consciousness. Hence, commonly experienced SCs for a particular individual are described as 'identity' SCs, while unusual SCs that deviate from identity SCs subjectively are termed ASCs. While the present author recognises this as a valuable approach at an individual level, it renders discussion of ASCs at a collective level difficult, due to cultural, sub-cultural and individual differences in what is perceived to be an ASC. This may be overcome by defining ASCs at a collective level, as SCs that deviate from the core states of consciousness: dreaming sleep, non-dreaming sleep and the ordinary waking state. Hence, in this thesis, an altered state of consciousness will be defined as *a stable configuration of the cognitive-perceptual-affective structures of consciousness that markedly differs from the baseline core SCs ('normal' dreaming sleep, non-dreaming sleep, and the 'normal' waking state) according to subjective experience and/or objectively observable correlates.*

5.4 Creativity and the proclivity to experience ASCs: A review of the literature

Anecdotal and phenomenological descriptions of the creative process frequently stress the importance of 'unusual experiences' or ASCs, whereby a potential solution to a problem may occur in a hypnagogic state or a moment of reverie for example, an inspirational or illuminating phase (Mavromatis, 1987; Laski, 1961; Walsh & Vaughan, 1993). The following example by the mathematician Henri Poincaré (1952, p. 36) is a commonly cited example:

> For fifteen days I strove to prove that there could not be any functions like those I have since called Fuchsian functions. I was then very ignorant; every day I seated myself at my work table, stayed an hour or two, tried a great number of combinations and reached no results. One evening, contrary to my custom, I drank black coffee and could not sleep. Ideas rose in crowds; I felt them collide until pairs interlocked, so to speak, making a stable combination. By the next morning I had established the existence of a class of Fuchsian functions.

Transpersonal experiences are ASCs, defined as those in which the sense of self extends beyond the personal (everyday ego-focused sense of self) to encompass awareness of wider aspects of humankind, life, psyche or cosmos (Walsh & Vaughan, 1993). Grof (1988) suggests three different ways in which 'transpersonal' inspiration may interact with the creative process. Firstly, after a long period of struggle with a particular problem the solution may spontaneously arise in a dream, a hallucination, during a time of exhaustion, or in meditation. Traditional ways of thinking are ceased and a creative synthesis is enabled. (This

aligns with Wallas' (1926) traditional four phase model.) Secondly, sudden inspiration from the transpersonal domain may initiate the creative process. The ideas may only be brought to fruition later after much hard work (as described in the quote below). Thirdly, inspiration may arise as a finished product, ready to be communicated to others.

> ... the idea came like a flash of lightning and in an instant the truth was revealed. I drew with a stick on the sand the diagrams shown six years later in my address before the American Institute of Electrical Engineers, and my companion understood them perfectly. The images I saw were wonderfully sharp and clear and had the solidity of metal and stone... *(Nikola Tesla describing a moment of creative inspiration concerning the design of a more efficient dynamo, cited by Harman and Rheingold, 1984, p. 58).*

Alternatively, the very act of being creative has been described as involving an ASC (Holt, 2000; Milner, 1950). For instance, the 'flow' state, characterised by a merging between action and awareness, and a reduced awareness of self and linear logic, has been described in a wide variety of activities including mountain climbing, playing golf or scientific problem-solving (Csikszentmihalyi 1992, 1996; Pates & Maynard, 2000). Consider for example the following experience described by a painter:

> Absolute blending in with everything so that one becomes nothing. Like being light waves. When it happens working on a piece of art, it is that sense of being at one with something beyond oneself. I am not there at the easel. I am in the abstract space of the piece I am working on. In the idea, in the concept, which has no place or time. I am being my 'being', not my body. I am separate yet part of creation by being creative. (Holt, 2000, p. 30).

While phenomenological and anecdotal accounts of the creative process frequently describe experiences of ASCs, few empirical studies have explored this. However, indications that there might be a relationship between ASC-proclivity and creativity come from a number of empirical sources. A number of correlational studies have shown a significant relationship between creativity and ASC-experiential variables (Ayers, Beaton & Hunt, 1999; Taft, 1969; Taft & Gilchrist, 1970). Further, from an experimental perspective, Martindale's (1989) association-arousal model indicates that shifting between focused and defocused SCs is an attribute of the creative individual (as discussed in Chapter Two).

The 'positive' dimension of schizotypy, unusual cognitive and perceptual experiences, has been related to creativity (Schuldberg, 1990; 2000-2001). The contents of this dimension include cyclothymia, magical thinking, hallucinatory experiences, other perceptual aberrations, suspiciousness and paranoid ideation (Mason, Claridge & Jackson, 1995). This dimension does not assess any particular ASCs, but unusual, isolated, perceptual-cognitive experiences that may indicate a proclivity to experience ASCs, either adaptive or maladaptive. O'Reilly, Dunbar and Bentall (2001) found the 'unusual experiences' dimension of schizotypy to significantly predict divergent-thinking (DT) scores (TTCT, Torrance, 1974).

However, these effects were cancelled out when the degree subject of the participants was accounted for (humanities versus creative arts). Creative arts students had significantly higher scores on the unusual experiences dimension ($F_{(1,98)} = 8.92$, $p <. 001$). O'Reilly et al. suggested that unusual experiences encourage individuals to engage in creative activities (dance, drama, music and visual arts), and that the relationship between unusual experiences and creativity is motivational rather than cognitive.

MacKinnon (1971) suggests that highly creative individuals may be distinguished from less creative individuals by a greater ease in moving from more conscious and active to more unconscious and passive states. As discussed in Chapter Two, such flexibility was demonstrated physiologically by Martindale and Hines (1975), suggesting that 'creatives' shift between such states as is appropriate to task demands. A related concept, although dressed in psychoanalytical language, is that of 'ego-permissiveness' (Taft, 1969). The 'ego-permissive mind' allows more primary-process thinking to enter consciousness, and controlled experiences of which may be conducive to psychological development and growth. Taft found positive correlations between aspects of ego-permissiveness that might pertain to altered states and scores on the Interest in Creative Activities Scale (Zimmerman & Guilford, 1963), a 15-item scale covering interests in a wide range of areas such as problem-solving, literature, inventions, art and everyday life. These were: *Peak experiences* (characterised by a diminished awareness of self and amplified awareness of the external world, accompanied by intense positive emotion) ($r = .38$, $p < .001$); *Acceptance of fantasy*, imaginative absorption ($r = .13$, $p < .05$); and *'Automatic thought'*, which "expresses a positive attitude towards the solution of problems or the carrying on of a conversation without the engagement of consciousness" (p. 51) ($r = .20$, $p < .001$). Some of these shared variances are very low (ranging between 2 and 14%), however, they indicate some relationship between involvement in a broad range of creative activities (including scientific and artistic endeavours) and entering SCs characterised by fantasy, imaginative absorption and reduced self-control/rationalisation.

Ayers, Beaton and Hunt (1999) tested the hypothesis that ASCs are associated with creativity rather than the personality trait of absorption (an individual's openness to self-altering experiences). Matching individuals for high levels of absorption, they found that a creative group (practising, female exhibiting/performing artists, $n = 19$ or actors, $n = 18$) as compared to a 'non-creative' control group (21 female psychology undergraduates) were more likely to frequently experience positive ASCs. These included waking mystical states ($p = .03$) as measured by the Hood Mysticism Scale (Hood, 1975). In addition there were significant differences between artists, actors and 'non-creatives' on a composite measure of

'positive altered states' (lucid dreams, archetypal-mythological dreams, mystical experience and out-of-body experiences), developed by Hunt, Gervais, Shearing-Johns and Travis, (1992). Artists obtained particularly high scores due to a high incidence of archetypal-mythological dreaming. The three groups did not significantly differ on measures of neuroticism, emotional conflict, childhood trauma or androgyny. Ayers et al. conclude that intense creative work in general is associated with a proclivity to enter ASCs. However, it may be that this proclivity to experience ASCs is associated with artistic involvement rather than a general factor of creative involvement, further research is require to explore this possibility.

Although the empirical literature reviewed so far is suggestive of a link between shifts in the perceptual-cognitive-affective dimensions of consciousness and creativity, there has been little consistency across studies regarding the measures used. All have chosen different and single measures of creativity, which renders comparison/integration of these studies difficult. These were: two measures of divergent-thinking: the TTCT (O'Reilly et al., 2001) and the Alternate Uses Test (Martindale & Hines, 1975); active membership of an artistic profession (Ayers et al., 1999); and involvement in a broad range of creative activities (Taft, 1969). This makes it difficult to identify which aspects of creativity might relate to aspects of ASC-proclivity. Indeed, the latter is also a multidimensional phenomenon. It may be the case that certain dimensions of creativity (e.g. creative personality, divergent-thinking, emotional creativity, involvement in a particular creative profession) might be associated with particular ASCs (e.g. lucid dreaming, daydreaming, positive and negative mystical experiences, the hypnagogic state). Further, different 'creativities' may be associated with ASCs of varying extremity, for example a unitive mystical experience may be a more radical departure from everyday awareness required for daily functioning that a vivid daydream.

Wolfradt and Pretz (2001) did use multi-dimensional creativity measurement: creative personality (Gough, 1979), involvement with creative hobbies, and scores on a creative story-writing test. Arguing that creative inspiration occurs in an ASC, they suggested that depersonalisation and unusual perceptual experiences may be closely related to creativity. Wolfradt and Pretz defined depersonalisation as "the feeling of detachment or estrangement from one's self" (p. 300). The Scale of Depersonalisation Experiences was used, consisting of 20 items described as reflecting a range of depersonalization experiences (e.g. 'I observe myself as a stranger') and derealization experiences (e.g. 'the world around me seems unfamiliar'). It could be argued that this is a narrow assessment of dissociative experiences (Edge, 2001; Krippner, 1999), and it certainly does not encompass a broad range of ASCs (Tart, 1975; Wilber, 1996). Waller, Putnam and Carlson (1996) distinguish between two

distinct types of dissociation, pathological and non-pathological, where: pathological experiences, such as depersonalization and dissociative amnesia are 'taxonic' (class-like; people can be separated into two groups according to whether or not they have had such experiences); and non-pathological experiences of dissociation constitute a continuum, a normally distributed trait, related to absorption (Tellegen & Atkinson, 1974). In Wolfradt and Pretz's study depersonalisation was not found to be associated with any of the creativity measurements, but rather, with a rigid, neurotic personality style. This outcome suggests that creative personality and involvement in creative hobbies is not associated with experiences of estrangement from self and world. As such it does not conflict with Ayers et al (1999) and Taft (1969) where creative interests and professional artistic involvement were associated with 'positive ASCs'. In is unfortunate that this study, the only one to operationalise a wide definition of creativity, did not measure the multidimensional nature of ASC experience. However, it does suggest that creativity is associated with particular ASCs, and not others.

The idea that different kinds of creativity might be associated with different experiences of consciousness was suggested by a follow-up of Taft's (1969) study. Taft & Gilchrist (1970) found significant correlations between ASC experiences and two measures of creativity: 'creative productivity' and 'creative attitudes'. These were mystical unitive states, empathy for others, daydreaming, immersion in nature or art, and telepathic experience. Taft and Gilchrist suggest that the relationship between ASC-proclivity and creativity may be explained by a general openness to intrapersonal and emotional-interpersonal events. However, they found differences between the experiences of those who scored highly only on 'creative productivity' and those who scored highly only on 'creative attitudes'. The latter were "ebullient self-actualizers who express themselves in their external behaviour, and who enjoy controlled regressive experiences" (p. 142). The high 'creative producers' however were characterised by being "disorderly, impractical, and lacking in self-control, an interest in intraceptive activities, such as daydreaming, and the use of imagination, less emotional participation with the environment, and a desire to retreat from reality... unhappiness in childhood and neurotic disorders requiring medical attention" (p. 142). Hence, Taft and Gilchrist delineated two kinds of 'creative', suggesting that those with creative attitudes to life are self-actualizers (Rogers, 1959; Maslow, 1971), while those scoring on highly on creative production alone use creativity as a way to resolve conflict. These findings contradict those of Wolfradt and Pretz and Ayers et al. who found no relationship between creative productivity and neuroticism or emotional conflict.

Although the measurements used in the above studies are inconsistent, and although not all of the studies directly measure experiences of ASCs, taken together they do indicate that involvement in creative activities at least (either professionally or as a hobby) may be

associated with ASC-proclivity and an openness to unusual experiences. However, as no multiple measures of creativity were used in most of these studies, it is difficult to discern whether this is due to some general factor of creativity (motivational, cognitive or trait) or due to specific involvement in particular domains, such as the visual arts, involvement that may not necessarily be 'creative'. Only Martindale's studies explored correlates of SCs during an actual creativity task. Hence, we do not know what role, if any, the ASCs reported by creatives (e.g. by Ayers et al.) actually play in the creative process. It may be the case that they are experienced separately, in which case creativity and ASC-proclivity may be connected by some underlying factor. Alternatively, ASCs may play an important inspirational role in the creative process. Finally, given that 'creativity' and 'ASCs' are both multidimensional constructs, it is possible that different aspects of creativity are associated with different ASCs (Taft and Gilchrist, 1970; Wolfradt and Pretz, 2001). As we have seen in Chapter Two, creativity has generally been associated with openness-to-experience, however, it may be that interaction with different domains encourages openness to different aspects of experience e.g. new ideas, intellectual curiosity, emotional sensitivity or aesthetic-perceptual awareness. This might be reflected in the contents and shifts in the dimensions of consciousness experienced, e.g. an inspirational, noetic rush of ideas, or a heightened aesthetic awareness of an aspect of the environment, which may create a predisposition to particular ASCs. Future studies will need to use a broad range of measures and a wide range of participants (e.g. a broad age range and different domain skills) to attempt to uncover such potential inter-relationships.

In the following sections, the relationship between creativity and particular ASCs will be explored, in order to see if particular ASCs have been associated with particular dimensions of consciousness. Again, this literature is permeated with inconsistent creativity measurement. A review will be made of creativity and: dreams, lucid dreams, hypnagogia, daydreaming and fantasy, hallucinations (which have all been described as ASCs along a sleep-wake continuum) and the 'flow' state, peak experiences and mystical experiences (positive ASCs).

5.4.1 Creativity and Dreaming[3]

Virel (1984) proposes a continuum of dream-thought, from dreaming consciousness to waking states of consciousness with dream-like properties, such as imaginative reverie or spontaneous mental imagery. Several researchers argue for a 'dreaming thought-waking

[3] Although 'dreaming sleep' might be considered too common an experience to be an ASC, the author considers this state to be worth reviewing here, considering that a particularly vivid dream, hypothetically, if remembered, may subjectively be deemed as unusual, and fit the criteria for an ASC.

thought' continuum (Greenfield, 1995; LaBerge & Gackenbach, 2000; States, 2000; Glicksohn, 1989). Hence, rather than there being boundaries between distinct states (dreaming sleep, non-dreaming sleep and waking), a gradual transition from typical sleeping to waking cognition is proposed. Glicksohn (1989) includes states such as hypnagogic and hypnopompic states, lucid dreaming and out-of-body experiences as 'borderland' SCs along a sleep-wakefulness continuum. Hence, ASCs may involve the intrusion of waking thought into dreams (lucid dreaming), or the intrusion of dreaming cognition into waking, everyday thought (oneiric thought, Virel, 1984). States (2000) theorises that the borderland states along the sleep-wake continuum may be particularly facilitative to the creative process

What are the properties of dreaming thought? Brodsky, Esquerre and Jackson (1990-91) assert that dreams allow one to escape the limitations of structured goal-directed reasoning. Stein (1974) suggests that dreaming itself is a creative process, that involves a "relaxation of controls, a lessening of censorship and a consequent recombining of various elements and factors that may have seemed very disparate" (p. 108). States (2000) argues that dreaming allows a wider range of associations and the ability to jump from one class of associations to another. He suggests that this operates in cooperative competition with the dream's meaningful logical sequence, enabling the expansion of cognitive boundaries, and hence the formation of novel associations.

Is there any evidence that creative individuals have an increased ability to harness the creative potential of dreaming cognition? Beginning with phenomenological and anecdotal reports of creative problem-solving and dreaming, Eysenck (1995, p. 181) cites the example of the physicist and Nobel Laureate, Otto Loewi. Loewi apparently awoke one night to find that he had discovered the solution to a long-standing problem concerning nerve impulses to a frog's heart. However, one must be wary of such anecdotal evidence. Baylor (2001) draws attention to the sources for anecdotes, warning against possible 'amplification of rumours'. For instance, in Loewi's case, Baylor was not able to trace any text recounting the dream apart from a comment in a lecture by Loewi 32 years later:

> In the night of Easter Saturday, 1921, I awoke, turned on the light, and jotted down a few notes on a tiny slip of paper. Then I fell asleep again. It occurred to me at six o'clock in the morning that during the night I had written down something most important, but I was unable to decipher the scrawl. That Sunday was the most desperate day of my scientific life. During the next night, however, I awoke again, at three o'clock, and I remembered what it was . . . Careful consideration in daytime would undoubtedly have rejected the kind of experiment I performed, because it would have seemed most unlikely . . . (Loewi, 1953, cited by Baylor, 2001, p. 90).

Baylor stresses that dream recall is highly susceptible to distortion over time, yet despite such criticisms, still adheres to the view that dreams may play an important part in the creative process. He hypothesises that due to preoccupation with a problem, waking thought

processes may continue in dream processes, providing novel associations and potential solutions. In the following paragraphs, empirical evidence regarding the relationship between dreams and creativity will be considered.

A number of studies have explored the attitudes of creative individuals towards dreams. Domino (1982) found that 'creative students' had a higher belief than less creative peers in the importance of dreams, making an effort to remember their dreams and being more likely to believe that dreams could be programmed in order to facilitate creativity. Sladeczek and Domino (1985) used three measures of creativity, from which they derived a global creativity score: a creative personality scale (Domino, 1970); a drawing completion test (Franck & Rosen, 1969); and a divergent-thinking measure (Consequences: Christensen, Merrifield & Guilford, 1958). They found that creatives were significantly more likely to fall asleep quickly ($X^2 = 13.8$, $p < .01$); and to use dreams as a source of problem-solving ($X^2 = 7.95$, $p < .01$). These problems were often described as interpersonal, as well as pertaining to artistic and scientific problem-solving. The latter finding may simply indicate that 'creatives' draw may upon dreaming thought in the creative process, rather than there being any qualitative difference between the dreams of creatives and 'non-creatives'.

Research focusing on the quality or type of dreams experienced by creatives may indicate that they have more bizarre or primary-process content, which may lead to novel associations. Sladeczek and Domino (1985) selected twenty professionals nominated as being especially creative by judges such as art gallery owners and faculty heads (architects, novelists, sculptors, musicians and research scientists). These were matched with twenty individuals not involved in creative professions. Participants kept a dream diary for a week, which were scored blindly by three judges. The dreams of the creative subjects were found to contain significantly more 'regressive dream content' (single, isolated images, incomplete scenes, bizarre or distorted images and dissociation of thought and image), $z = 3.12$, $p < .001$; significantly more dream distortion (departing from waking experience), $t = 12.05$, $p < .001$; and more visual mentation, $t = 6.27$, $p < .001$.

Domino (1976) similarly found a relationship between the amount of primary-process thinking described in dreams and creative achievement (male high school students, nominated by teachers, and scoring above the 50th percentile on both the Remote Associates Test (RAT; Mednick & Mednick, 1967) and the Alternate Uses Test (Wilson, Christensen, Merrifield and Guilford, 1960). Creative versus non-creative students reported dreams (over a period of two weeks) with significantly more (where $p < .01$): condensation (two or more objects fusing together to form a new object); unlikely combination (descriptions of events that are not

impossible but highly unlikely); symbolism (a dream element that is emphasised to an unusual degree); and contradiction (logical inconsistencies within a dream).

Wood, Sebba and Domino (1990) explored the relationship between dream bizarreness (the amount of primary-process thinking and lack of 'everydayness' revealed in dream reports) and four measures of creativity. These were: creative personality (Domino, 1970); aesthetic/figural preference (Barron-Welsh Art Scale); figural originality and appropriateness (the Obscure Figures Test, OFT); and the RAT. They also measured the verbal intelligence of 126 undergraduates, finding that the modest positive correlations between the RAT ($r = .19$, $p < .05$) and OFT ($r = .20$, $p < .05$) scores and dream bizarreness disappeared when verbal intelligence was partialled out (RAT: $r = -.02$, ns; OBT: $r = .14$, ns). Dream bizarreness appeared to be related to verbal intelligence and the length of dream reports rather than creativity. However, the RAT has been found to correlate significantly with verbal intelligence (Davis & Belcher, 1971), indicating that the use of other creativity measures is appropriate in this area, such as creative behaviour. Armitage and Fitch (1988) found that high divergent-thinking scores (TTCT) were significantly related to high dream recall amongst college students. It may be that rather than having more bizarre dreams, in terms of primary-process content, creative individuals may be able to remember more of their dreams, potentially enabling them to make use of any remote associations thus arising productively.

In summary, it appears that creativity is associated with an increased awareness of dreams and a belief in the importance of dreams both in everyday life and as being potentially useful for creativity (Sladeczek & Domino, 1985). In addition the dreams reported by creative individuals appear to be qualitatively different from those of less creative peers, having more primary-process content (inconsistencies, symbolism and unusual combinations), archetypal-mythological content, more visual imagery, more departures from waking reality and greater dream bizarreness (Domino, 1976; Sladeczek & Domino, 1985; Ayers et al., 1999). However, these relationships may be explainable by other means that enable more rich dream reports to be generated. Firstly, by creatives having higher dream recall (Armitage & Fitch, 1988). Secondly, by having a greater ability to express and record dreams due to verbal intelligence (Wood et al., 1990). Thirdly, Domino (1976) suggests that creatives may be more tolerant of unusual dream contents and therefore more likely to report them. Despite these reservations, it appears that creative individuals may be more likely to remember, tolerate and productively utilise 'dreaming cognition'. However, it is not clear if different types or aspects of creativity relate differentially to dream experiences.

5.4.2 Creativity and Lucid Dreams

A lucid dream is defined as occurring when a dreamer becomes aware that they are dreaming, while they are still in a dreaming state. It may then become possible to control the content of the dream. The lucid dream has been found to occur late in the dream cycle, in REM sleep (LaBerge & Gackenbach, 2000) and it is claimed that 58% of the population have experienced a lucid dream at least once in their lifetime (Snyder & Gackenbach, 1988). Gruber, Steffan and Vonderhaar (1995) found lucid dreaming to be associated with mental health rather than psychopathology, arguing that the heightened control displayed in dreams also characterises the high degree of control in various aspects of cognitive, emotional and social functioning while awake.

LaBerge, Phillips and Levitan (1994) suggest that there is a continuation of metacognition between waking and dreaming. This continuation might serve two purposes that facilitate creativity: priming the dream to come up with a possible solution to a problem with which one is consciously striving; and manipulating a lucid dream in order facilitate creativity, "the fantastic and heretofore unruly creativity of the dream state might be brought within our conscious-control" (LaBerge, 1985, p. 3). Malamud (1988) argues that recognising that one is the creative source of one's dreams is a precursor of becoming fully lucid, enabling the manipulation of the dream state as an alternate cognitive model of reality, to assist in one's endeavours in the waking state, as described by LaBerge (1994, 1985) and Garfield (1988).

Brodsky, Esquerre and Jackson (1990-1991) found that lucid dreamers performed better on a creative problem-solving task than non-lucid dreamers. They argue in favour of the dreaming-thought continuum, where dream-like states are available in waking and waking-like states are available in dreaming sleep. They argue that the ability to access these states is associated with creativity. They tested this hypothesis by asking participants (46 introductory psychology students) to solve four problems as if they were dreaming and as if the problems were occurring in a dream. The creativity of responses was assessed by: multiple answers, imagination, originality and fantasy content. Whether responses fit the adaptive criteria of creativity may be questioned, although this criticism applies to tests of divergent-thinking also. However, individuals were able to enter into this state of 'dream consciousness' with differing success, and this was related to dream experiences. Brodsky et al. found that creativity ratings were significantly higher for persons who attached importance to their dreams ($F_{(1,25)} = 6.69$, $p < .05$) and for persons who did lucid dream ($F_{(1,40)} = 6.62$, $p < .05$). No significant differences in creativity ratings were found between participants who dreamt a lot versus those who did not dream a lot. This indicates that one's attitude towards dreams,

and dream type, rather than quantity, is related to the ability to utilise modes of cognition characterised by potentially creative, original, imaginative, fantasy content.

Snyder and Gackenbach (1988) found high figural divergent-thinking scores (TTCT) to be a consistent predictor of lucid dreaming for females, but not for males. Blagrove and Tucker (1994) however, found no significant difference between lucid dreamers (those having one or more lucid dream per month) and non-lucid dreamers on Domino's (1970) Creative Personality Scale (CPS). Blagrove and Hartnell (2000) divided into three groups: frequent lucid dreamers ($n = 21$), occasional lucid dreamers ($n = 15$) and non-lucid dreamers ($n = 20$). To avoid confounding lucid dreaming with the ability to recall dreams, only individuals who recalled at least one dream a week were included in the study. These three groups differed significantly on scores on Gough's (1979) CPS ($F_{(2,51)}=7.74$, $p<.001$)[4]. There was no significant difference in creativity scores to levels of dream recall. Blagrove and Hartnell suggest that these results are explained by the cognitive complexity and flexibility of lucid dreamers, which is associated with: creativity, need for cognition (being intrinsically motivated to engage in complex cognitive tasks), internal control and self-reflectiveness. They argue that the level of awareness while awake may relate to an individual's level of awareness whilst asleep. Alternatively, they suggest that having more complex, bizarre dreams may make one more likely to realise that one is dreaming. Again, this indicates that rather than the amount of dream content recalled, dream *type* is related to creativity, in this case, lucid dreams.

In summary, the empirical evidence linking lucid dreams with creativity is inconsistent. Frequent lucid dreaming was significantly predicted by high figural (but not verbal) divergent-thinking scores, for females, but not for males (Snyder & Gackenbach, 1988); and frequent lucid dreamers scored significantly higher on Gough's (1979) CPS but not on Domino's (1970) CPS. (These two scales are compared in Section 2.6.2). In addition, it appears that having lucid dreams is associated with the ability to enter dream-like waking states, characterised by original, imaginative, fluent and fantasy-like cognition (Brodsky et al., 1990-1991). This perhaps indicates that aspects of creative cognition may be associated with experiences in the 'borderlands' of the sleep-wake continuum. Alternatively, it may be that both lucid dreaming and creativity are characterised by both increased internal sensitivity and awareness, and control mechanisms, such as high or internal locus of control. That is, both may be facilitated by a similar cognitive-style ("self-consistent ways of experiencing", Snyder & Gackenbach, 1988, p. 244), organisation of mind or personality structure. Further multi-

[4] Taking $p = 0.025$ as the Bonferroni adjusted level of significance, frequent lucid dreamers scored significantly higher than occasional lucid dreamers ($t(40) = 3.69$, 1-tailed, $p = .0005$) and occasional lucid dreamers scored significantly higher than non-lucid dreamers ($t(33) = 2.38$, 1-tailed, $p = .0115$).

dimensional research is again required, each of these studies having used only one measure of 'creativity', and on each occasion, a different one.

5.4.3 Creativity and the hypnagogic state

Daniels-McGhee and Davis (1994, p. 158) define a hypnagogic image as "an image of great clarity and detail which appears suddenly in the drowsy state just before sleep. These are most often visual or auditory, but may include other modalities". They define a hypnopompic image as "an image corresponding to the hypnagogic image, but it occurs while awakening from sleep". Buck and Geers (1967) and McKellar (1972) suggest that hypnagogic imagery is experienced by about three quarters of the population. Richardson, Mavromatis, Mindel and Owens (1981) conducted a survey of 600 members of the general population (aged between 20 and 80, 300 males and 300 females). Again, the incidence of hypnagogic imagery was found to be at about 75%. For hypnopompic imagery however, the incidence was found to be 64%.

Schachter (1976), drawing upon phenomenological reports, describes hypnagogic imagery as spontaneous and even intrusive, conjuring the metaphor of being a passive observer at a movie. Hypnagogic cognition becomes increasingly bizarre as one moves deeper into the state, and less amenable to conscious control, with looser patterns of association, and unusual combinations of auditory and visual content (Schachter, 1976). Mavromatis (1987) describes the hypnagogic state as one characterised by a high degree of cognitive 'freedom' and the spontaneous generation of ideas and images and hence a valuable resource for creativity. He describes the anecdote of the technique of Edison, who would apparently manipulate the hypnagogic state when stuck on a particular problem, by dozing in his chair holding steel balls in the palms of his hands, which would fall to the floor if he relaxed into sleep and wake him up. The evidence for a relationship between hypnagogia and creativity is primarily anecdotal, the most renowned account involving the 'discovery' of the ring of the benzene molecule in 1890, by the German chemist, Kekulé:

> I was sitting, writing at my text-book; but the work did not progress, my thoughts were elsewhere. I turned my chair to the fire and dozed. Again the atoms were gambolling before my eyes. This time the smaller groups kept modestly in the background. My mental eyes, rendered more acute by repeated visions of the kind, could now distinguish larger structures, of manifold conformation: long rows, sometimes more closely fitted together; all twining and twisting in a snakelike motion. But look! What was that? One of the snakes had seized hold of its own tail, and the form whirled mockingly before my eyes. As if by a flash of lightning I awoke; and this time I spent the rest of the night working out the consequences of the hypothesis. (Kekulé, cited by Mavromatis, 1987, p. 203).

Hunt (1995) argues that many ASCs, such as hypnagogic states, hallucinations and out of body imaginal states involve access to a common non-verbal mode of cognition, and that such states may have a common underlying structure that is imagistic and holistic in nature. Hunt suggests that abstract geometric imagery, (e.g. as experienced in hypnagogia) may be basic to, or involved in the microgenesis of both non-verbal and verbal thought. Hence, the imagistic symbolic cognition, described above by Kekulé, may enable the cognitive reframing of a creative problem in fluid, spontaneous presentational rather than rigid conceptual representational terms, facilitating a novel associative potential solution. Flowers and Garbin (1989) similarly argue that the decoupling of perceptual mechanisms from the sensory environment may operate upon internal data, forming spontaneous visual images, such as experienced in hypnagogia. Flowers and Garbin argue that transitions from ASCs (e.g. dream states) often present spontaneous visual imagery, where perceptual mechanisms automatically linked to organizing the sensory world (which are normally transparent to our conscious experience) run "on their own", and occasionally construct novel and useful percepts and images from fragments of internal noise and loosely guided consultations with memory.

Unpublished results from Roe, Simmonds and Holt (2003) found that self-perceived creativity was significantly and positively correlated with the frequency of reported hypnagogic experiences in daily life ($r = .44$, $p < .001$, $n = 55$). Self-perceived creativity was also positively significantly correlated with a number of variables related to the hypnagogic experience, experienced in a state of partial perceptual deprivation (the ganzfeld): experiencing a great deal of visual imagery ($r = .406$, $p < .001$); experiencing clear and vivid visual imagery ($r = .248$, $p < .05$); experiencing a complete break with the outside world ($r = .30$, $p < .05$); and surrendering control over one's thoughts ($r = .369$, $p < .01$). This provides some support for the above theories that creativity is associated with the ability to shift into a defocused, non-rational, non-goal-directed SC and to experience hypnagogia and spontaneous, vivid, visual imagery.

There are coherent models (Hunt, 1995, Flowers & Garbin, 1989) to explain the facilitative role that hypnagogic and hypnopompic SCs might play in the creative process, and there is plenty of anecdotal evidence recounting the role of hypnagogia and vivid imagistic experiences in the creative process (Mavromatis, 1987). However, there is minimal empirical evidence relating hypnagogic states to dimensions of creativity, clearly an area that deserves future investigation.

5.4.4 Creativity, daydreaming and imaginative fantasy

Imagination, daydreaming and fantasy facilitate planning for the future, problem-solving and creativity (Lynn, Nuefeld, Green, Sandberg & Rhue, 1996). Singer (1966, p. 3) defined daydreaming as:

> A shift of attention away from an ongoing physical or mental task or from a perceptual response to some internal stimulus. The inner processes usually considered are "pictures in the mind's eye," the unrolling of a sequence of events, memories, or creatively constructed images of future events of various degrees of probability of occurrence. Also included as objects of daydreaming are introspective awareness of bodily sensations, affects, or 'monologues interieurs'.

Daydreaming is non-directed, non-goal-orientated thinking, it is a broad construct that may range from open-ended problem-solving to uninhibited fantasy. It may have a lack of connection to events in the immediate external environment and the contents of consciousness may depart from reality. Eysenck (1995) argues that one quality of creative genius is that daydreams are focused on issues concerned with the creative process rather than e.g. social or romantic speculations.

Hilgard (1970, cited by Lynn & Sivec, 1992, p. 300) describes imaginative involvements, as permitting "a temporary absorption in satisfying experiences in which fantasy plays a large role" – such as may occur in everyday life while reading a novel or listening to music, for instance. Lynn et al. (1996) argue that mental images are the building blocks of daydreams and fantasy. Hence, Shames and Bowers (1992) characterise fantasy-proneness or imaginative involvement as the adaptive ability to "form a mental image, to maintain that image in awareness, and to become involved in the image" (p. 342). Creativity has been related, at low levels, to good imagery skills (as discussed in Chapter Two). Nevertheless, imagistic daydreaming has been argued to play a role in the creative process, and may be more akin to the 'perceptual decoupling' of Flowers and Garbin (1989) or imagistic primary-process cognition. States (2000, p. 186) supports this proposition with the following quote from Einstein (1954):

> The combinatory play [of images] seems to be the essential feature in productive thought – before there is any connection with logical construction in words or other kinds of signs which can be communicated to others... [These] have to be sought for laboriously only in the secondary stage, when the... associative play is sufficiently established and can be reproduced at will.

Lynn & Rhue (1986) evaluated the relationship between fantasy-proneness and hypnotic susceptibility, absorption, vividness of mental imagery, response to waking suggestion and creativity. Creativity was evaluated with the 62-item Barron-Welsh Art Scale (Barron &

Welsh, 1953). Participants were 30 male and 32 female university students. High fantasizers scored significantly higher than low and medium fantasizers on absorption, hypnotic responsiveness, response to waking suggestion, vividness of mental imagery and creativity ($F_{(2,55)} = 10.54$, $p < .0001$). Lynn and Rhue claim that this study reveals that there is a link between fantasy or imaginative involvement and creativity. However, they only used one measure of creativity and it is perceptual in nature, not measuring creativity per se, but evaluating the preference for complex figures, which has been associated with creativity: Plucker and Renzulli (1999) relate this preference to tolerance for ambiguity rather than creativity. As an aesthetic, perceptual aspect of creativity it is not surprising that this measure was related to a construct associated with vividness of mental imagery and imaginative involvement. However, Rhue, Bukh and Henry (1991) replicated this finding with a measure of divergent-thinking, the Consequences Test (Christensen, Merrifield and Guilford, 1958). Ashton and MacDonald (1984) also found that high-hypnotisability as a trait was positively correlated with divergent-thinking (figural and verbal components of the TTCT). Further, Thalbourne, Bartemucci, Delin, Fox, and Nofi (1997) found a significant positive correlation between fantasy-proneness and creative personality (using Thalbourne's (1994) minimally validated 9-item measure). This gives some support to a relationship between hypnotic-susceptibility as a trait and creativity, which, it has been claimed, might be due to a propensity to enter non-hypnotic 'trance-like' states, where critical judgement is suspended, but instead there is 'effortless experiencing' (Bowers, 1979).

In summary, creativity (divergent-thinking, figural-preference and creative personality) appears to be related to the ability to enter into states characterised by imaginative involvement and the manipulation of mental imagery. Again, as there may be many different kinds of creative process, further testing of this with a broader range of creativity measures and populations is recommended to discern whether this attribute is particular to certain aspects of creativity or to creativity in general.

5.4.5 Creativity and hallucinatory states

Slade and Bentall (1988) in a review of the literature on hallucinations, use the following definition:

> Any percept-like experience which (a) occurs in the absence of an appropriate stimulus, (b) has the full force or impact of the corresponding actual (real) perception, and (c) is not amenable to the direct or voluntary control of the experiencer. (p. 23).

Hallucinations may be simple or fragmentary (Reed, 1988). They may take place in one or more of the sensory modalities, and they may or may not be part of a wider ASC. The most

common are visual and auditory hallucinations. Visual hallucinations "range from primitive flickers, flashes and 'stars' to organized, lifelike apparitions and scenes" (Reed, 1988, p. 49). Auditory hallucinations "range from primitive noises, such as bangs and whistles, to organized, meaningful sounds such as speech or music. Most common are voices uttering short but comprehensible phrases" (Reed, 1988, p. 49).

Sidgwick (1894, cited in Bentall, 2000, p. 98) conducted the first investigation of the occurrence of hallucination in non-psychiatric patients (7,717 men and 7,599 women). Excluding individuals with clear symptoms of mental or physical illness, the experience of at least one vivid hallucinatory experience was reported by 7.8% of the men and 12% of the women. Spanos, Ham and Barber (1973) report that 1-2% of adults appear to have the ability to hallucinate in a room when asked to do so without an object being present. Sometimes the hallucination is reported as being 'more real' than perception of the object itself. Hallucinations seem to involve the same mechanisms as ordinary perceptions (Fenwick, 2001; Reed, 1988; Velmans, 2000). Weiss and Heckers (1999, cited by Fenwick, 2001, p. 25) state that the neural systems involved in hallucination seem to involve the same 'modality specific cerebral structures' that are involved in normal perception.

Hallucinations may be placed on a continuum with other perceptual experiences, such as hypnagogic states (Morrison, Wells and Nothard, 2002).[5] The phenomenal differences between images, perceived objects and hallucinations is not always clear, consider for example eidetic images, which appear to have location and extension in three-dimensional space, projected beyond the head. In terms of a reflexive model of model of perception, (initiating stimulus ⇨ perceptual/cognitive processing ⇨ perceived stimulus) hallucinations can be explained as a perceptual projection without the initiating external stimulus, following a 'breakdown' of the usually reliable modelling of 'inner' versus 'outer' events (Velmans, 2000, p. 231). Such an experience may have a number of triggers, including sensory deprivation, the inducement of ASCs, e.g. through psychotropic drugs, expectation effects, stress (Combs, 1997, cited by Bentall, 2000, p. 99), dramatic life events such as bereavement (Grimby, 1993) or the onset of mental illness, and these hallucinations may be adaptive or maladaptive.

If hallucinations occur due to a combination of vivid imagery and failed reality monitoring (Mintz & Alpert, 1972), why would one expect hallucinations to play a role in creativity? It may be the case that creative individuals are more likely to temporarily enter an ASC

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[5] Morrison, Wells and Nothard (2002) report, in a factor analysis of the Launay-Slade Hallucination Scale, three factors: 1) vividness of imagination and daydreaming; 2) a tendency to experience visual disturbances; and 3) hallucinations. This structure provides some support for a continuum between vivid imagination and hallucination, for which Morrison suggest a common inhibitory mechanism, perhaps related to REM sleep, that enables 'dreaming awake'

characterised by failed reality monitoring, only to rationally assess the possible insights so gained subsequently. An extreme case example of hallucination playing a role in the creative process is illustrated by an experience of Edvard Munch (1863-1944), precipitating the painting of 'The Scream'. Rothenberg (2001, p. 136) quotes Munch from his diary in 1891, in which he recorded the initial idea for this painting, which was sketched, carefully considered and developed over the next eighteen months into the now famous image.

> I was walking along the road with two of my friends. Then the sun set. The sky suddenly turned into blood, and I felt something akin to a touch of melancholy. I stood still, leaned against the railing, dead tired. Above the blue black fjord sand city hung clouds dripping, rippling blood. My friends went on and again I stood, frightened with an open wound in my breast. A great scream pierced through nature.

Whitton, Moldofsky and Lue (1978) compared the EEG patterns of hallucinations in schizophrenics and moments of creative insight in 'normals'. Their rationale was that phenomenologically the intrusiveness of hallucinatory experience may be similar or even identical to the "sudden internal experience of perceptual resolution" (p.123) of creative problem-solving. Six unmedicated schizophrenic patients and six 'healthy individuals without psychiatric symptoms' composed the two groups. EEG and EOG recordings were taken for each participant over a number of tests including eyes open and eyes closed, reading out loud and silently, solving arithmetical problems, an unstructured period of 20-30 minutes where participants could discuss any subject, and seven divergent-thinking tasks (Guilford, 1967). Whitton et al. report a similarity in EEG patterns when hallucinations were reported (amongst schizophrenics) and during creative problem-solving (amongst 'normals'), compared to the resting baseline state (the 'eyes open' recording). In both cases, a significant increase ($p < .005$) in the amount of delta and theta waves was observed, and no significant difference for either group in the alpha waves. They suggest that this may be due to internally directed attention, being transiently preoccupied with subjective events and being relatively inattentive to external stimuli.

While, again, there is little empirical evidence directly exploring the relationship between hallucinatory states and creativity, the findings of Whitton et al. concur with a model of the creative process requiring the ability to shift between different SCs.[6] An increase in the amount of theta waves has been associated with waking meditative states, e.g. the deeper stages of Zazen meditation (Kasamatsu & Hirai, 1990). Ikemi (1984) suggests that ASC

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[6] However, these results do differ from those of Martindale and Hines (1975) who found an increase in alpha waves during a DT task for creative individuals. In the Whitton et al. study there was no significant alteration in alpha waves. However, the participants were not divided into low versus high creatives or assessed according to how creative they actually were on the DT task, and there was a very small sample ($n = 6$) from which it is difficult to generalise.

methods such as autogenic training, self-hypnosis and transcendental meditation facilitate the appearance of slow waves (theta and delta) in the waking state, the EEG patterns differing from those observable during sleep or drowsiness. Ikemi suggests that this is linked to upsurges of material from the unconscious or increased access to the unconscious, which encourages both the psychotherapeutic process and creative inspiration.

Hence, these studies are again consistent with the view that creativity may be associated with a proclivity to enter ASCs, perhaps characterised by increased internal awareness. Again there are clear rationales for why creativity might be associated with hallucinations, as another ASC along a reality-imagination or sleep-wake continuum, associated with vivid imagistic cognition, concurring with the evidence in previous subsections (Ikemi, 1985; Hunt, 1995). However, there are very few empirical studies exploring the specific relationship of hallucinatory experience and creativity[7]. Studies revealing how common hallucinations and reality-imagination confusions are in the 'normal population' (Bruce, 1996; Segal, 1970) contribute to the idea that there might be individual differences concerning general openness to unusual experiences and cognitive flexibility (McCrae, 1994; Hartmann, 1991), including pseudo-hallucinations at least, that may be related to the creativity construct.

5.4.6 Creativity and the 'flow' state

Csikszentmihalyi (1992, 1996) has described the experience of a loss of self-awareness in a state of immersed concentration, where action and awareness are merged with the term and metaphor of 'flow'. The 'flow experience' according to Csikszentmihalyi is 'optimal' and 'negentropic', is a state of consciousness unhindered by conflict or dissolution and, rather, is cohesive and harmonious, with intention and performance in dialectic synchrony. One characteristic of 'flow' is intense concentration and complete absorption in one's actions, "people become so involved in what they are doing that the activity becomes spontaneous, almost automatic; they stop being aware of themselves as separate from the actions they are performing" (1992, p. 53). There is a seeming effortlessness about it, e.g. the painting paints itself. Csikszentmihalyi describes this as a balance between different modes of functioning, where highly developed skills are employed without analytical reflection or critical evaluation, and yet consciousness works smoothly, and action follows action seamlessly.

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[7] Since writing this Chapter (in 2002/3) the author came across the work of Tsakanikos and Claridge (2005), alluded to in Section 2.4.1.1. This paper draws on previous work that has shown an association between verbal fluency and hallucinations, where both are explained by increased spreading of activation within semantic networks. In the case of hallucinations, the over-activation of a lexical unit is thought to lead to an auditory hallucination. Whereas, in creativity activation may lead to a loose associative network of e.g. lexical units when writing a poem.

In a study with eminent artists and scientists Csikzsentmihalyi (1996) found the flow experience, a sense of unity with one's action and embodiment in the moment, accompanied with positive emotion to commonly accompany creative work. May (1975/1994) prioritises intensity and absorption in *process*, the partial dissolution of the boundaries between self and not-self, as an essential part of any truly creative process. In creative acts, a loss of self awareness may arise through immersion with the process, may arise through 'merging' with something 'other', may arise through a transcending of the usual sense of self and its limitations and constraints. For instance, Milner (1950, p. 152) uses the term 'creative participation' to describe a loss of self whilst painting, or rather an extension of boundaries of the self to include space and objects, colour and light:

> The process always seems to be accompanied by a feeling that the ordinary sense of self had temporarily disappeared, there had been a kind of blanking out of ordinary consciousness; even the awareness of blanking out had gone, so that it was only afterwards when I had returned to ordinary consciousness that I remembered that there had been this phase of complete lack of self-consciousness.

The flow experience is closely related to Maslow's (1971) 'peak experience' or the 'creative attitude', where there is a detachment from time and space, and an absorption in the activity of the present moment, deep fascination and concentration, an 'innocence of perceiving', loss of ego, receptivity and spontaneity. Maslow delineates two interacting phases of creativity, Primary Creativity which is an inspirational phase and Secondary Creativity which involves the possibly sedulous development and concretization of inspiration, utilising learned skills, techniques and rational analysis.

> The creative person, in the inspirational phase of the creative furvor, loses his past and his future and lives only in the moment. He is all there, totally immersed, fascinated and absorbed in the present, in the current situation, in the here and now, with the matter-in-hand. (Maslow, 1971. p. 63).

Both the flow state and peak experiences relate conceptually to absorption as a state, which has been described in terms of giving total attention to an object and a heightened sense of reality "involving a full commitment of available perceptual, motoric, imaginative and ideational resources to a unified representation of the attentional object" (Tellegen & Atkinson, 1974, p. 274). This state involves a cognitive restructuring, enabling "an appraisal of information in unconventional and idiosyncratic ways" (Roche & McConkey, 1990, p. 91), and the ability to operate diverse representational modalities synergistically (a complex synaesthetic emergent state, Hunt, 1995). This is accompanied by an altered sense of self and its boundaries, where there is reduced awareness of the self-construct, but heightened awareness of the phenomenal-unitive 'self as process'. Tellegen and Atkinson suggest that

this state may be important to creativity, especially of an image-oriented nature. Thalbourne et al. (1997) found a significant positive correlation between absorption (using the 34-item Absorption Scale, Tellegen & Atkinson, 1974) and a measure of creative personality (Thalbourne & Delin, 1994), where $r = .53$, $p < .001$. Gruzelier (2001), working with music students at the Royal College of Music, found that the ability to enter a state of akin to 'flow' or the absorption state while playing music (after neurofeedback training[8]) significantly improved the ratings of creative performance made by blind judges (on imagination, communication, rhythmical accuracy and competence) in comparison to a control group who received no neurofeedback training.[9]

It appears that rather than facilitating the emergence of novel ideas and associations, that is, the inspirational stage of creativity, ASCs may arise through a merging of the self in the creative act, by giving total attention to one's activity. This may arise in painting, playing music, or in immersion in scientific problem-solving. Again, this indicates that creativity is associated with the ability to shift between ASCs and analytical, goal-directed cognitive processes. This suggests that intense creative involvement encourages a restructuring of the cognitive-perceptual-affective dimensions of consciousness, and concurs with Taft (1969) who found a significant correlation between creative activities and both 'peak experiences' and 'intellectual control'. It also supports the idea that creativity, at least of certain forms, is connected with self-exploration and transformation, rather than with psychopathology. However, we must recall that Ayers et al. (1999) found creative involvement in the arts to be associated with positive ASCs when absorption was controlled for, indicating that there is some other factor about either creativity as a general factor or involvement in the creative arts that requires further investigation.

5.4.7 Creativity and mystical states

The final ASCs that will be considered in this chapter are so called mystical experiences. Fenwick (2001, p. 19) suggests that the ability to experience mystical states of consciousness is a "normal part of brain function". He lists the nine main elements of mystical experience as: feelings of unity; feelings of objectivity and reality; transcendence of space and time; a sense of sacredness; deeply felt positive mood; containing paradox; ineffability; transiency; and positive change in attitude or behaviour following the experience. Fenwick focuses on emotionally positive mystical experience. Four fundamental qualities of mystical experience

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[8] This aimed to increase theta over alpha waves in a relaxed wakeful state – frontocentral theta activity has been associated with focused states, meditative concentration and with feelings of well-being (Enger & Gruzelier, 2002).

[9] The subsequent publications report on this study: Edge and Lancaster (2004); Enger and Gruzelier (2003).

(including positive and negative) were described by James (1902/1985). These being: noesis (subsequent feelings of perceiving truth, of certitude); ineffability (having transcended rational logic and linguistic constraints); transience (fleetingness of the experience) and passivity (reduced cognitive control, spontaneous nature of the experience). Clearly, the alterations in affect and self-boundaries described here overlaps with aspects of the flow state and peak experiences discussed above. However, the construct of mystical experience is broader, including positive and negative experiences, immanent and transcendent experiences, and more extreme alterations of the dimensions of consciousness.

Mystical states of consciousness may be described as involving transcendence (connection with a transcendent 'other') as well as immanence in some aspect of daily life (Fontana, 2007; Hardy, 1979; Hood, 1995). Almaas (1988) distinguishes between two types of 'essence': presence and transcendence. Experience of a heightened awareness of *presence* characterises the flow state, and the type of peak experience described in the preceding section. However, this may be experienced with more intensity in mystical states, with a further dissolution of cognitive boundaries, for example between the perceived and the perceiver, leading to a sense of the unity of all things, rather than just e.g. action and awareness. Maslow (1971) actually described two kinds of peak experience, one where there is total absorption in and fascination with a particular object and of this filling the whole of one's awareness, and another where one may identify with a transcendent whole. The latter type of experience aligns with transcendent mystical experiences, with alterations in the sense of self and mental contents that lead to total dissolution of awareness of either. Stace (1960, cited by Wulff, 2000, p. 399) identifies the essence of all mystical experience as the disappearance of all the physical and mental objects of ordinary consciousness, and in their place, the emergence of a unitary undifferentiated, or pure consciousness. This aligns with the formless, nondual level of consciousness described by Wilber (1996), the transcending of all boundaries.

Greeley (1974, p.55) aligns the mystical experience with the creative process: "The ecstatic, like the artist, is not denying the validity of ordinary experience. He claims that his experience enables him to get beyond the appearances of ordinary experience and knowledge, however valid those appearances may be". Happold (1997, p. 37) cites the Indian philosopher Radhakrishan, who called mysticism 'integrated thought', bringing "things together in a new pattern", integrating them, rather than, "as in analytical thought, breaking them into parts"; a description that has clear parallels with associative models of creative cognition. Thalbourne and Delin (1994) found a significant positive correlation ($r = .45$, $p < .0001$) between their own 15-item creative personality scale and mystical experience (a 25-item scale by Thalbourne (1991), which correlated at .72 with Hood's (1975) Mysticism Scale). In addition,

Averill (1999) found emotional creativity to be significantly positively correlated with mysticism on Hood's Mysticism Scale, both on general mysticism $r = .39$, $p < .001$) and religious mysticism ($r = .46$, $p < .001$). The emotionally creative individual was found to be willing to address existential questions ($r = .21$, $p < .05$) and to have high self-esteem ($r = .26$, $p < .05$). Finally, Kennedy and Kanthamani (1995) found a significant positive correlation between the self-reported experience of mystical SCs and persons who rated literary or artistic creativity as a very important aspect of their life ($r = .33$, $p < .05$). Mystical SCs were defined as an overwhelming feeling of peace and unity with the entire creation, or a profound inner sense of divine presence. Hence, it appears that positive mystical experiences are associated with emotional and aesthetic creative explorations. Again, it is not clear if there is an underlying cognitive-style or organisation of mind that enables both creativity and mystical experience, or if creativity of certain types involves such states as a part of the process.

Barron (1968) found that creative writers and architects were more likely to be open to both positive and negative experiences, for example openness to both feelings of awe and feelings of horror and desolation. There have been no empirical studies exploring the relationship between negative mystical experiences and creativity. Negative mystical experiences were related by James (1902/1985) to psychopathology, and described as evil, frightening and restricted to those of "enfeebled or deluded states of mind" (p. 417). Spanos and Moretti (1988, p. 106) refer to these as 'diabolical experiences', such as "a sense of being acted upon by an evil presence, being given messages or being overtaken or possessed by Satan". Spanos and Moretti found positive mysticism (Hood, 1975) to be unrelated to measures of psychopathology, but 'diabolical experiences' to be measures of psychological disturbance (neuroticism and psychosomatic symptoms). They argue that mystical experiences, when experienced in a psychologically unstable self-system, are associated with a propensity to attribute experiences to external sources, perhaps of a diabolical nature. It is unclear whether the construct of diabolical experiences would be associated with creativity. However, this is only one description of 'negative mystical experiences'. Quekelberghe, Alstotter-Gleich and Hertweck (1991) include experiences such as a fear of disintegrating and losing control over oneself and a fear of dying as parts of the construct. Further research is required to see if a sensitivity and openness to negative mystical experiences is associated with the creative process or personality.

5.5 Summary of the creativity and ASC literature

Various dimensions of the creativity construct appear to be associated with a multifarious ASC experiences. These include experiences along the sleep-wake continuum, such as high

dream recall (Armitage & Fitch, 1988), lucid dreams (Blagrove & Hartnell, 2000), daydreaming (Rhue et al., 1991), hypnagogia (Roe et al., 2003), and hallucinations (Whitton et al, 1978). Facets of creativity have also been associated with 'positive ASCs' related to loss of self-awareness, such as the flow state (Csikszentmihalyi, 1996), peak experiences (Taft, 1969), and mystical experience (Kennedy & Kanthamani, 1995). However, while the ideas and empirical findings in this chapter can be aligned with a coherent explanatory model, this is only possible in a rather piecemeal fashion. The research is permeated with a lack of consistency in the operational definition of and measurement of creativity. In addition, the range of samples used varies widely, from psychology undergraduates to professional artists and actors. In this section I will briefly review the findings by clustering types of creativity test together. (A table summarising these findings is displayed in *Appendix 5*).

In support of a *cognitive model*, where cognitive expansion is related to ASC-proclivity, single measures of both verbal and figural divergent-thinking have been used in five studies, each using a different test. Verbal divergent-thinking has been significantly associated with adaptively flexible cortical arousal (Martindale & Hines, 1975), fantasy-proneness (Rhue et al, 1991) and as revealing similar EEG patterns to hallucinations (Whitton et al., 1978). Figural divergent-thinking has been associated with lucid dreaming (for females) (Snyder & Gackenbach, 1988) and dream bizarreness (but not when verbal IQ was accounted for) (Wood et al., 1990).

Involvement in the creative arts has been used as a measure of creativity in three studies. With creative arts students, this was correlated with 'unusual experiences' (O'Reilly et al., 2001). With practising professionals this was associated with an openness/sensitivity to positive and negative unusual emotional/aesthetic experiences (Barron, 1968); and with positive mystical experience (Ayers et al, 1999). With the general population this was associated with mystical experience (Kennedy & Kanthamani, 1995).

Involvement in a range of creative activities, including scientific pursuits has been used as a measure of creativity, again with students and professionals. Amongst students, creative activities (hobbies) were associated with peak experiences, automatic thought and imaginative fantasy (Taft, 1969), but not with depersonalisation experiences (Wolfradt & Pretz, 2001). Amongst peer rated professionals from a range of creative activities (e.g. musicians, artists and research scientists) this was associated with increased primary content of dreams and the amount of visual mentation in dreams (Domino, 1976). However, it is not clear whether involvement in each of these domains is independently associated with ASCs.

Self-perceived creativity has been used in three studies. This was associated with: hypnagogia and in perceptual isolation (the ganzfeld) experiencing: a subjective ASC, loss of

control, and a large amount of vivid visual imagery (Roe et al., 2003); and having a belief in unconscious processes (Kumar et al., 1997). Self-perceived creativity was not found to be associated with out-of-body experiences (Alvarado et al, 1999).

Several measures of creative personality have been used: Domino (1970), Gough (1979), Thalbourne (1994) and Holman and Kumar (1997). Domino's CPS was not associated with dream bizarreness or lucid dreaming (Wood et al, 1990; Blagrove & Tucker, 1994). Gough's CPS was not associated with depersonalisation experiences (Wolfradt & Pretz, 2001) or belief in unconscious processes (Kumar et al, 1997), but was associated with lucid dreaming (Blagrove & Hartnell, 2000). Thalbourne's CPS was associated with fantasy-proneness, absorption and mystical experiences (Thalbourne et al., 1997; Thalbourne & Delin, 1994).

Finally, a few other measures of creativity have been used. A creative story task was not associated with depersonalisation experiences (Wolfradt & Pretz, 2001). Dream-thought problem-solving was associated with the importance of dreams to one's life and frequent lucid dreaming (Brodsky et al., 1991). Emotional creativity was associated with mystical experience (Averill, 1999). Aesthetic figural preference was associated with fantasy-proneness (Lynn & Rhue, 1996). Remoteness-of-associations was associated with dream bizarreness, but this was partialled out by verbal IQ (Wood et al., 1990). In two studies, composite creativity measures were used, which makes it difficult to observe which aspects of creativity related to dream experiences.

It appears that the most consistent relationship between creativity and ASCs comes from studies assessing actual creative behaviour, that is, involvement in creative activities and professions. It is however, not clear in these studies if ASC-proclivity is associated with involvement in the creative arts or with creativity across all domains.

The rationale of future studies would be to investigate processes, structures and experiences of consciousness that are 'non-linear' and that may, by the nature of their departure from consensual structures of everyday consciousness, facilitate departures from usual patterns of thinking, and hence enable unusual, potentially creative solutions or ideas. Through a factor analysis using a broad range of instruments to measure creativity, different clusters of relationship between dimensions of creativity and configurations of consciousness may emerge. This may help to delineate particular types of creativity, or creativity-consciousness configurations, which may be applied to further research questions. For example, in considering the relationship between psi and creativity, it would be possible to compare particular types of creativity to psi-outcome.

5.6 Conclusions

ASCs may be important for creativity, allowing insights and ideas, modes of perception and cognition to be experienced that are beyond the 'culturally endorsed', hence introducing novel associations into the reflective sphere of consciousness (Harman & Rheingold, 1984; Walsh & Vaughan, 1993; Neumann, 1974). Alternatively, or additionally, it may be that a proclivity to experience ASCs is an outcome of developing particular forms of creativity, such as involvement in the visual arts (Ayers, Beaton & Hunt, 1999; O'Reilly, Dunbar & Bentall, 2001). It may even be that a common personality trait or organisation of the mind, such as boundary-permeability (MacKinnon, 1971; Thalbourne, 2000; Levin, Galin & Zywiak, 1991; as discussed in Chapter Four) or emotional openness (Taft & Gilchrist, 1970) underlies both the proclivity to enter ASCs and creativity. Finally, it may be the case that certain forms of creativity are neither facilitated by nor associated with ASCs (Boden, 1994; Weisberg, 1989). The research reviewed in this chapter raises all these issues, providing no clear answer. This leads the way for research projects focusing on unravelling some of these conceptual strands. This would be facilitated by operationalising a multidimensional approach to both creativity and ASC measurement.

5.7 A note on anomalous experiences

This review has focused on ASCs. However, a related term is that of 'anomalous experience', defined as: "an uncommon experience (e.g. synaesthesia) or one that, although it may be experienced by a substantial amount of the population (e.g. experiences interpreted as telepathic), is believed to deviate from ordinary experience or from the usually accepted explanations of reality" (Cardeña, Lynn & Krippner, 2000, p. 4). As such, an anomalous experience might not arise in an ASC (e.g. synaesthesia) or it might arise in an ASC (e.g. a near-death experience). Anomalous experiences might involve an anomaly of perception (e.g. sense of presence), attention (e.g. 'time-gap' experiences), recall (e.g. photographic memory), recognition (e.g. cryptomnesia), judgement or belief (e.g. delusions) in addition to anomalies of the experience of self (e.g. blurring of ego boundaries) and consciousness (Reed, 1988). Hence, ASCs might be considered to be one sub-type of anomalous experience. Taxonomies of anomalous experiences include, in addition to the altered states included in this chapter: synaesthesia (e.g. Marks, 2000); out-of-body experiences (e.g. Alvarado, 2000); near-death experiences (e.g. Greyson, 2000); subjective paranormal experiences (e.g. Targ, Schlitz & Irwin, 2000); past-life experiences (e.g. Mills & Lynn, 2000); alien abduction experiences (e.g. Appelle, Lynn & Newman, 2000); and anomalous healing experiences (e.g. Krippner & Achterberg, 2000). While anomalous experiences per se are not the focus of this thesis, one

category, that of subjective paranormal experiences, in addition to anomalous cognition, apparent ESP-performance in controlled laboratory studies, will be considered in relation to creativity in subsequent chapters.

CHAPTER SIX

Creativity and altered states of consciousness: Empirical study two

This chapter consists of an empirical study exploring the relationship between creativity and ASCs. The preceding chapter reviewed the literature in this area, summarising the key studies and rationale that inform the current research (Sections 5.4, 5.5 and 5.6). The central impetus was to comprehensively study the relationships between multiple dimensions of both creativity and ASCs. By assessing a range of altered states it was hoped to explore the relationship between creativity more fully than previous studies, neither using composite measures of 'unusual experiences' which may obfuscate relationships between creativity and specific states (e.g. O'Reilly et al., 2001), nor using a measure for a specific ASC that may be too narrow (e.g. Wolfradt & Pretz, 2001). In addition, with the use of multiple creativity measures, this research sought to delineate whether any relationship is best understood through a cognitive expansion model (e.g. Martindale, 1989), openness to emotional events (Taft & Gilchrist, 1970), a common experiential-trait (boundary-permeability) (Thalbourne, 2000) and/or involvement in the arts (Ayers, Beaton & Hunt, 1999; O'Reilly, Dunbar & Bentall, 2001). Further, while involvement in creative activities have been found to be associated with 'positive ASCs', such as mystical experiences and archetypal and lucid dreams (Ayers et al., 1999; Taft, 1969) no studies have as yet studied whether creativity is related to 'negative ASCs', such as fear of dissolution of self and the dark night of the soul, which will be included in this study (although Wolfradt and Pretz's measure of depersonalization might tap into a negative dimension).

The selection of creativity measurements was extended (from those used in Study One) by including a 'scientific interest and involvement scale' and two cognitive creativity measures': a figural-DT task and a remoteness-of-verbal-associations task. Hence, the creativity scales sought to measure: emotional creativity, creative personality, creative involvement (music, visual arts, performance arts, writing, domestic crafts and science), self-perceived creativity, the importance of creative involvement, figural-DT and remoteness-of-verbal-associations. The altered state dimensions assessed were self-reported experiences of: positive mystical experiences, negative mystical experiences, hallucinations, hypersensitivity, unusual dream states, vivid imagination, altered experiences of time and space and dissociative states, as well as parapsychological experiences, esoteric practices and 'extraordinary' thought processes. These dimensions will be described in more detail in the methods section.

In addition, a further variable was introduced – ego-strength – in order to assess whether creativity is facilitated by 'controllable oddness' (Barron, 1993). As discussed in Section 2.5.1 creativity has been evaluated as the outcome of an interaction between aspects of psychopathology (e.g. psychoticism and overinclusive-thinking) and mental health (e.g. control and resilience) (Eysenck, 1995; Fodor, 1995; Schuldberg, 1990). Hence, in this study it was proposed that high scores on both ASC-proclivity and psychological adjustment might facilitate creativity.

In order to explore whether any link between creativity and ASCs is consciously manipulated by participants – that is, whether ASCs are *used* in the creative process – the Creative Cognition Inventory was used (see Chapter Three). This assessed the extent to which individuals reported using different cognitive-styles and experiences in the creative process, such as rational thinking, daydreaming, meditation, losing track of time, a sense of channelling information etc. By so doing it was hoped to shine light on whether ASCs are incidentally or functionally related to dimensions of creativity.

Based on the aims delineated above, several hypotheses were made:

1) The components of creativity that emerge from a Principal Components Analysis of all the creativity measures will all be positively associated with general ASC-proclivity.

2) Artistic involvement will be related to ASC-proclivity to a greater extent than scientific involvement (based on the speculations of Albert and Runco (1987) (discussed in Section 2.5) and the findings of Ayers et al (1999) and O'Reilly et al. (2001)).

3) Affective dimensions will be related to ASC-proclivity to a greater extent than cognitive dimensions (based on Taft and Gilchrist's (1970) openness-to-affect hypothesis and the outcomes of Study One, where emotional creativity correlated at moderate levels with boundary-permeability, whereas previous studies using cognitive measures obtained null outcomes).

4) All components of creativity will be positively predicted by both ASC-proclivity and ego-strength.

Remaining analyses, specified in the design section, were exploratory. Planned analyses were corrected for the possibility of Type I errors arising from multiple analyses, using the Bonferroni method. Exploratory analyses were not thus corrected.

6.1 Method

6.1.1 Design

This study adopted a correlational design, and it was planned to conduct a principal components analysis (PCA) in order to uncover dimensions of creativity and determine their relationship to ASCs and ego-strength. Additional exploratory analyses were to examine the relationship between components of creativity and components of the CCI; and to conduct hierarchical linear regression analyses (with components of creativity as dependent variables) and dimensions of ASCs, ego-strength and components of the CCI as predictors, to control for shared variance. The presentation of measures was counterbalanced to minimize order effects, with the figural-DT task always in the middle, to act as break from answering questions.

6.1.2 Materials

The creativity measures were chosen to more completely assess aspects of creativity delineated in the Quadrant Model of Creativity (*Figure 2.1*). These included aspects of the: 'creative process' – cognitive expansion (figural DT and remote associates) and affective expansion (EC); 'creative person' – creative personality and self-perceived creativity; and 'creative product' an interest and involvement in the creative arts and science. Further, for the purposes of this study the author included the Creative Cognition Inventory in order to assess the reporting of the use of different epistemologies in the creative process. Transliminality and boundary thinness measures were also included in order to both attempt a replication of Study One and partial out their effects in regression analyses of the relationships between creativity and ASCs.

The Emotional Creativity Inventory, Averill (1999). (Described in Section 3.1.3).

Creativity Checklist, (Griffin & McDermott, 1998). (Described in Section 3.1.3). A 14-item scientific activities subscale was included, based on Hocevar's (1979) Creative Behavior Inventory. It was decided to separate out items referring to 'music', performance of which was previously embedded in the 'performance arts' and writing of which, which was previously embedded in the 'writing' subscale.

Gough's Creative Personality Scale, CPS (1979). (Described in Section 3.1.3).

Self-perceived creativity and the importance of creativity. (Described in Section 3.1.3).

Remoteness of Associations, a verbal divergent-thinking task. (Described in Section 3.1.3).

Shapes, a figural divergent-thinking task. (Described in Section 3.1.3).

The Creative Cognition Inventory, CCI. A 29-item scale, with a five point Likert response scale, developed by the present author to assess the import that different modes of cognition play in an individual's creative process. The CCI has six sub-scales: *heightened internal awareness*, involving paying attention to visual, auditory and kinaesthetic imagery, and to both positive and negative emotional experiences. It also involved meditating and drawing on experiences that seemed to come from beyond the self or from 'deeper' aspects of self (α = .91); *intuitive cognition*, which included hunches, following intuition and experiencing sudden moments of inspiration or insight (α = .73); *playful, absorbed cognition*, which included playing with ideas and losing track of time when being creative (α = .70); *use of analogy,* the recombination of existing elements in novel ways and non-verbal cognition (α = .63); *oneiric cognition*, which included ideas arising in dreams, hypnagogia/hypnopompia, or when daydreaming (α = .73); and *linear cognition*, which included the use of rational, logical thought, the careful selection of ideas and working with a goal in mind (α = .74). Construct, discriminant and convergent validity data are described in Chapter Three.

The Assessment Schedule for Altered States of Consciousness, (ASASC) short-form, van Quekelberghe, Altstotter-Gleich, and Hertwick (1991). (Described in Section 3.1.3).

Barron's Ego-strength Scale, BESS, (1968), updated MMPI-2 version (Schuldberg, 1992; Stein & Chen-Lin, 1967). A 45-item scale with a true/false response scale and five subscales measuring: physiological stability and good health, a strong sense of reality, feelings of personal adequacy, anxiety and phobias, seclusiveness and psychasthenia. Barron (1968) describes ego-strength as a general factor for personality integration. Barron (1953) found BESS to distinguish between individuals who made a good versus a poor recovery from psychotherapy and to correlate significantly with vitality, drive, self-confidence, poise, breadth of interests, and an open-minded cognitive-style. It has been argued that BESS measures a non-specific absence of psychopathology, various studies having found the scale to distinguish between 'normal' and clinical populations (see Frank (1967) for a review). BESS correlated significantly with abasement – experiencing fewer feelings of guilt and inferiority, dominance – the tendency to express one's viewpoints and behave forcefully towards others, and with tolerance – accepting and non-judgmental social beliefs and attitudes (Harmon, 1980). BESS was found to be related to coping styles that rely on personal resourcefulness (Schill & Tata, 1988); with efficacy – the ability to bring about instrumental results (Schuldberg, 1992); with autonomy, intellectual efficiency and with an internal locus of control (Ittenbach & Harrison, 1990). In a factor analysis of various self-measures, BESS was found to load on 'elasticity' – the degree to which a person

adapts to adversity, is sensitive to contextual constraints and perseveres through demanding situations. BESS correlated with ego-resilience, control, agitation and dejection (Gramzow, Sedikides, Panter & Inkso, 2000). Sprock and Bienek (1998) report that the scale has a test-retest reliability of .76 and odd-even internal reliability of .76.

The Transliminality Questionnaire: Form B, Thalbourne (1998). (Described in Section 3.1.3)

The shortened Boundary Questionnaire, BQ18 (Kunzendorf, Hartmann, Cohen & Cutler, 1997). (Described in Section 3.1.3).

6.1.3 Participants

Opportunity sampling and the snowball technique were used, drawing upon colleagues at the University of Northampton (30), friends (36), contacts at other universities (29) and snowballing through these (48). Posters were placed around several city centres (e.g. in libraries) (27) an advert was placed in the *Paranormal Review* and flyers were left at interdisciplinary conferences related to consciousness (41).

Of these 211 participants, 101 were males and 108 were females (2 did not disclose gender). Ages ranged from 18 to 70+, with the most common age groups being 21-30 (51) and 31-40 (51). 36 were professional artists (4 musicians/composers, 10 fine artists, 1 actress, 1 experimental artist, 1 sculptor, 3 theatre/film/TV directors, 2 poets, 2 photographers, 1 stained glass artist, 8 writers/journalists, 1 illustrator/animator, 2 designers) and 27 were professional scientists (10 physicists, 6 chemists, 7 engineers, 2 ecologists, 1 seismologist and 1 astronomer). Other participants were from a wide range of professions, categorized as: organizational administrative and management roles (27), psychologists (22), academics (not practicing artists or 'scientists') (19), caring professions (e.g. nurses and support workers) (14), school teachers (8), housewives (6), accounting/finance (6), manual jobs (6), sales (3), librarians (3), building surveyors (2), A' level students (3), researchers (3), art dealers (2), IT (2), retired (2), not specified (13) and miscellaneous (5) (animal welfare, medium, driving instructor, chef and tour guide).

85 participants described practicing some form of 'mental discipline', described as: meditation (38) (including Buddhist (4), biblical (1) and Krishnamurti (1)), yoga (13), prayer (14), creative visualization (8), martial arts (5) (including tai chi, kyudo and qi gong), self-hypnosis (4), autogenics (2), breathing exercises (2), shamanism (2), tarot/runes (2), pagan magical rites (1), spiritualism (1), NLP (1) and reiki (1).

6.1.4 Procedure

When an enquiry was made, potential participants were given by hand, emailed or posted a questionnaire with an introductory letter and instructions about the study. British Psychological Society ethical guidelines were adhered to, participants were informed as to the nature of the study and the type of questions asked, and how long they could expect the questionnaire to take to complete. Respondents could do this in whatever environment they chose and theoretically could take as long as they liked to answer questions and complete the word association task and the figural-DT task. A guideline of 'five minutes' was given for the latter. For the remoteness of associations task, participants were simply asked to respond as quickly as possible to the stimulus words. It was made clear that they were under no pressure to complete the questionnaire and that if they wished they could omit questions that they did not wish to answer. They were told that there were no right or wrong answers and asked to answer questions quickly and intuitively based on their personal experiences and beliefs. Respondents could maintain total anonymity if they wished and could receive feedback about the study's outcome. A freepost address was provided for the return of completed questionnaires. Participants were assured that responses would be treated with utmost confidentiality and would be used for research purposes as part of the author's PhD only. The name and contact details of this author were given should they wish to ask any questions about the study or topic area. A copy of the entire questionnaire package including is reproduced in *Appendix 6.2.*

6.2 Results

6.2.1 Treatment of data

Data was screened for accuracy, for the impact of missing variables, for univariate and multivariate outliers, normality and linearity. For the treatment of the data regarding these issues, please refer to *Appendix 6.3*. As a result of these preliminary analyses, it was decided to use distribution free correlations and some variables were transformed to best approximate the normal curve for the main principal components analysis (PCA).

6.2.2 Reliability analyses of scales and sub-scales

Kline (2001) argues that adequate internal consistency is demonstrated when α>.70, however, Hair, Anderson, Tatham and Black (1998) suggest that for exploratory purposes in scale development, α>.60 is adequate. From the internal consistency coefficients of scales, displayed in Table 6.1 it was decided that all scales demonstrated adequate internal reliability.

Table 6.1

Cronbach's alpha coefficients for creativity, ASC and ego-strength measures

Scale	Cronbach's alpha
Creative interests and activities	.83
Performance art	.74
Visual art	.81
Music	.77
Writing	.78
Domestic crafts	.77
Science	.86
Emotional creativity	.90
Creative personality (Gough)	.77
Heightened internal awareness	.91
Intuition and inspiration	.73
Linear cognition	.74
Playful cognition	.70
Use of analogy	.63
Oneiric cognition	.73
Assessment schedule for altered states of consciousness	.97
Extraordinary mental processes	.80
Parapsychological experiences	.81
Esoterics	.75
Positive mystical experiences	.94
Negative mystical experiences	.94
Imagination	.78
Dreams	.83
Dissociation	.70
Hallucinations	.87
Hypersensitivity	.76
Space and time	.84
Transliminality	.86
Boundary thinness	.69
Ego-strength	.68

Note. For dichotomous scales, this is equivalent to the Kuder-Richardson coefficient.

6.2.3 Convergence between the total scores of the seven 'creativity measures'

The total scores of the creativity measures all correlated positively with each other, mostly at small to moderate levels, reflecting the low convergent validity commonly found between different creativity measurements (Hocevar, 1981). These correlation coefficients are displayed in Table 6.2. All correlations are significant except for that between remoteness-of-verbal-associations (RA) with both emotional creativity and figural-DT. All creativity measures correlated significantly with the cumulative creativity score (the total score on all creativity

measures), indicating that all tap into a related construct, yet with varying degrees of convergence.

The creativity measures that form the strongest relationships with other creativity measures are self-perceived creativity, emotional creativity and scores on the Creative Cognition Inventory (CCI). RA forms the weakest correlations with the other measures.[1]

Table 6.2

Correlations between creativity components and the cumulative scores of the creativity measurements (Spearman's rho, 2-t)

	SP	CA	Imp	EC	RA	CP	DT	CCI
Self-perceived creativity (SP)	1	**.42**	**.80**	**.37**	.19	**.35**	**.28**	**.45**
		.000001	**.000001**	**.000001**	.008	**.0004**	**.001**	**.000001**
Creative activities (CA)		1	**.40**	**.27**	.14	.26	**.31**	**.40**
			.000001	**.00009**	.05	.0001	**.0002**	**.00001**
Importance of creative involvement (Imp)			1	**.35**	.26	**.32**	.23	**.44**
				.00004	.0002	**.0001**	.007	**.000001**
Emotional creativity (EC)				1	.10	.23	.21	**.65**
					.19	.001	.01	**.000001**
Remoteness of associations (RA)					1	.15	.08	.15
						.04	.39	.03
Creative personality (CP)						1	**.25**	.18
							.003	.009
Divergent-thinking (DT)							1	**.33**
								.0001
Creative Cognition Inventory (CCI)								1
Cumulative Creativity Score	**.62**	**.59**	**.61**	**.76**	**.35**	**.39**	**.51**	**.85**
	.000001	**.000001**	**.000001**	**.000001**	**.0004**	**.00001**	**.000001**	**.000001**

Note. Correlations in bold are significant when corrected for multiple analysis. However, as these correlations were exploratory, some of these creativity measures (e.g. emotional creativity and divergent-thinking) never having been compared with each other in the previous literature, the term 'statistical significance' will be used to refer to correlations where $p < .05$.

Emotional creativity correlated significantly with psychometric (CP, *rho* = .32, $p = .001$) and cognitive measures of creativity (DT, *rho* = .23, $p = .007$; but not with RA) giving some support to models linking trait affect with creative cognition (Getz & Lubart, 1999) and the 'creative person' (Schuldberg, 1994) and supporting the concept as emotional constructs as materials and products of the creative process (Averill, 1999).

[1] Some construct validity for RA, however, is acquired by the meaningfulness of the sub-scales with which it forms significant correlations: the use of analogy in the creative process (*rho* = .25, $p = .0004$, 2-t); artistic writing (*rho* = .23, $p = .001$, 2-t); and originality on the divergent-thinking measure (*rho* = .18, $p = .02$, 2-t). Some construct validity is also obtained for the 'Shapes' measure of figural-DT, which is significantly correlated with involvement in creative activities (*rho* = .31, $p < .0002$) and Gough's CPS (*rho* = .25, $p = .003$).

Although the creativity measures show varying degrees of convergent validity, it was deemed appropriate to consider them all as contributing to the 'creativity construct', and hence to include them all in subsequent analyses.

6.2.4 Principal components analysis of the creativity measures

A PCA was conducted as this analyses all of the variance in the variables, which was considered suitable for the creativity construct, which has low convergence between its dimensions (factor analysis only examines shared variance). There were, however, sufficient correlations between the variables for the PCA to be appropriate, with a Kaiser-Meyer-Olkin measure of sampling of .70, and when the sampling adequacy of each individual variable was assessed, all reached acceptable levels (Hair et al., 1998; Tabachnick & Fidell; 1996); although 'science' had a sampling adequacy coefficient of only .50, it was decided to keep it in the PCA in order to represent all of the domains of creativity. Seven components were extracted, accounting for 68% of the variance. An oblique rotation was selected, in order to uncover more realistic components, in that they may be related to each other. The pattern matrix for the oblique rotation can be seen in Table 6.3. This displays component loadings, showing how much each variable contributes to each component. The correlations between the variables and components (the structure matrix) can be seen in Table 6.4.

'Emotional creativity': the first component accounts for 14% of the variance, and loads primarily upon the sub-scales of Averill's (1999) emotional creativity measure: emotional effectiveness, preparedness, authenticity and novelty. That is, a willingness to explore one's emotional experiences, the awareness of experiencing personally novel combinations of emotions, and the ability to authentically express these to others and use them adaptively on both a personal and an interpersonal level. The structure matrix shows that this component correlates positively with artistic writing (.35), self-perceived creativity (.32) and the importance of creative practice (.30). It is associated with flexibility of response (.21) rather than originality of response (.05) on the divergent-thinking task.

'Artistic creative personality': accounts for 12% of the total variance, and is so named because it loads most highly upon items relating to creative personality and artistic involvement: self-perceived creativity, the importance of creative involvement in one's life, involvement in visual art (e.g. sculpture, painting, drawing and photography), creative personality, and figural expressiveness – drawing across the edges of the shaded background upon which each shape was placed in the figural-DT task. This component correlates with artistic writing (.39) and

performance arts (.28), emotional novelty (.38) and is associated with originality (.15) rather than flexibility (.06) on the divergent-thinking task.

Table 6.3

Pattern Matrix for the oblique rotation, showing seven components of creativity

	Emotional creativity (14%)	Artistic creative personality (12%)	Figural divergent-thinking (10%)	Scientific creative personality (8%)	Music and performance (8%)	Crafts and visual art (7%)	Writing and remote verbal associations (8%)
Self-perceived creativity	.08	**.83**	.03	.14	.03	.01	.14
Importance of creative practice	.07	**.76**	.00	.07	.03	-.02	*.24*
Academic writing	.14	-.06	.02	**.33**	-.08	.17	**.66**
Artistic writing	*.20*	*.20*	.10	-.11	*.22*	.06	**.52**
Visual art	.04	**.55**	.06	-.11	.17	**.41**	-.05
Performance arts	.14	.12	.03	-.08	**.67**	.09	-.11
Domestic crafts	-.02	.05	.08	-.01	.02	**.89**	.05
Music	-.15	-.10	.06	.10	**.87**	-.04	.03
Science	-.16	-.10	.02	**.79**	.02	.04	.03
Emotional novelty	**.62**	.16	.04	-.06	*.21*	*-.27*	.07
Emotional preparedness	**.82**	-.08	.03	-.04	.06	-.12	.12
Emotional effectiveness	**.86**	.07	.06	.02	-.12	.04	-.11
Emotional authenticity	**.74**	-.03	.03	.01	-.07	*.20*	-.03
Remoteness-of-verbal-associations	-.16	*.26*	.09	-.12	-.08	-.16	**.61**
Creative personality	.14	**.38**	.02	**.73**	.03	-.10	-.07
Originality	-.06	.04	**.85**	.01	.00	-.00	*.24*
Flexibility	.13	.16	**.89**	.04	.07	-.08	-.05
Drawing across the boundary	.00	**.41**	**.49**	-.05	-.06	-.02	**-.35**

Note. Component loadings that are considered significant (> .32) (Hair, Anderson, Tatham & Black, 1998; Tabachnick & Fidell, 1996) are in bold, and trends (> .20 < .30) are italicized. Underlining indicates the component that each creativity measure loads highest upon. Percentages in parentheses in the top row indicate the total amount of variance that each component accounts for.

'*Figural divergent-thinking*': accounts for 10% of the variance and is composed solely of the three scoring categories of the 'Shapes' task: originality of response (i.e. how unusual the concept of the drawing was in relation to the rest of the sample); flexibility (the total number of conceptually different ideas produced); and figural expressiveness or 'drawing across the boundary'. This component correlates most highly with artistic writing (.20) of all the domains of creative involvement.

'Scientific creative personality': accounts for 8% of the variance and loads upon academic writing (magazine and journal articles), involvement in science (e.g. solving mathematic problems, devising new experiments) and creative personality. The highest correlation it forms

with other creativity measures is with the importance of creative involvement (.20). It is negatively correlated with artistic involvement.

'Music and performance arts': accounts for 8% of the variance and loads upon involvement in writing and performing music and involvement in drama, comedy, video productions and dance. This correlates positively with 'novel' emotional experiences (.33), artistic writing (e.g. plays, poetry, short stories) (.35) and visual art (.32).

Table 6.4

Structure matrix for the oblique rotation (correlations between each variable and each component)

	Emotional creativity (17%)	Artistic creative personality (16%)	Figural divergent-thinking (11%)	Scientific creative personality (8%)	Music and performance (9%)	Crafts and visual art (7%)	Writing and remote verbal associations (9%)
Self-perceived creativity	**.32**	**.87**	.16	.15	*.20*	.05	*.27*
Importance of creative practice	**.30**	**.81**	.17	*.20*	*.20*	.06	**.35**
Academic writing	.18	.07	.06	**.42**	-.03	.15	**.68**
Artistic writing	**.35**	**.39**	*.20*	-.05	**.35**	.08	**.56**
Visual art	*.26*	**.60**	.07	-.11	**.32**	**.46**	-.01
Performance arts	.28	*.28*	.07	-.14	**.72**	.18	-.06
Domestic crafts	.11	.12	.08	.04	.11	**.89**	.00
Music	-.03	.04	.11	.05	**.82**	.02	.08
Science	-.17	-.13	.01	**.80**	-.07	.05	.10
Emotional novelty	**.68**	**.38**	.18	-.08	**.33**	-.18	.16
Emotional preparedness	**.81**	.18	.13	-.03	.18	-.02	.17
Emotional effectiveness	**.86**	*.29*	.17	.01	.04	.14	-.05
Emotional authenticity	**.73**	.17	.05	.02	.06	*.28*	.00
Remoteness-of-verbal-associations	-.06	*.29*	.15	-.04	-.02	*-.22*	**.63**
Creative personality	*.24*	**.41**	.14	**.71**	.07	-.02	.09
Originality	.05	.15	**.85**	.07	.08	.03	*.28*
Flexibility	*.21*	.06	**.88**	.07	.15	-.09	-.01
Drawing across the boundary	.14	**.44**	**.54**	-.07	.04	.01	*-.28*

Note. Component loadings that are considered significant (> .32) (Hair, Anderson, Tatham & Black, 1998; Tabachnick & Fidell, 1996) are in bold, and trends (> .20 < .30) are italicized. Percentages in parentheses in the top row indicate the total amount of variance that each component accounts for.

'Domestic crafts and visual art': accounts for 7% of the variance and loads upon involvement in domestic crafts (e.g. interior decorating, inventing new recipes, gardening, making clothes, restoring furniture) and visual crafts (e.g. making decorative objects, painting, sculpture, photographic art). This correlates negatively with both having novel emotional experiences (-.18) and with making remote verbal associations (-.22), but positively with authentic expression and experience of emotions (.28).

'Writing and remoteness-of-verbal-associations': accounts for 8% of the variance and loads upon: artistic writing (poetry, plays, short stories, novels) and academic writing (magazine and journal articles); remoteness-of-verbal-associations, i.e. thinking of an unusual word in response to a stimuli (e.g. apple) in comparison to the rest of the sample; and a lack of figural expressiveness. This component correlates positively with rating involvement in a creative activity as important to one's life (.35), self-perceived creativity (.27) and upon originality of responses on the figural-DT task (.28).

Some of the seven components are correlated with each other, with small effect sizes, as displayed in the correlation matrix of Table 6.5. Only three of these have an effect size above .20, the strongest being between emotional creativity and artistic creative personality (sharing 8% variance) and the lowest being between artistic creative personality and both figural-DT (sharing 4% variance) and music and performance arts (also sharing 4% variance). 'Writing and remoteness-of-verbal-associations' shares more variance with 'scientific creative personality' (1.4%) than with 'artistic creative personality' (0%), presumably due to the publishing of experimental results in journal articles.

Table 6.5

Component Correlation Matrix

Component	Emotional creativity	Writing and remote associations	Figural divergent-thinking	Artistic creative personality	Domestic crafts and visual art	Music and performance	Scientific creative personality
Emotional creativity	1	.07	.13	*.28*	.12	.17	.00
Writing and RA		1	.05	.14	-.06	.06	.12
Figural divergent-thinking			1	*.20*	-.01	.09	.03
Artistic creative personality				1	.06	*.20*	.01
Crafts and visual art					1	.09	.05
Music and performance						1	.07
Scientific creative personality							1

6.3 Results and discussion

For descriptive statistics, including the mean and standard deviations of scores on ASC, creativity and ego-strength measures, according to gender, please refer to *Appendix 6.4*.

6.3.1. Relationship between creativity components and ego-strength

An analysis was made of the relationship between ego-strength and creativity, in order to partial out the effects of ego-strength if necessary. Ego-strength correlated significantly with scientific creative personality (*rho* = .26, p = .0001) and negatively with music and performance arts (*rho* =

-.22, p = .001) but not with any other measures of creativity. This suggested that ego-strength was weakly associated with creativity and in certain domains only. It was decided to use partial correlations between ASCs and creativity components in an attempt to remove aspects related to a lack of 'psychological adjustment'.

Table 6.6

Correlations between creativity components and ego-strength

	Emotional creativity	Writing and RA	Figural divergent-thinking	Artistic creative personality	Domestic crafts and visual art	Music and performance arts	Scientific creative personality
Ego-strength	-.12 (.09)	.03 (.70)	.03 (.67)	-.12 (.10)	.02 (.76)	-.22 (.001)	.26 (.0001)

Note: Spearman's rho, two-tailed.

6.3.2 Relationship between creativity components and altered states of consciousness

In an analysis of group differences (refer to *Appendix 6.4*) and in Section 6.3.1, the possibility was raised that some of the relationships between creativity components and ASCs may be influenced by other factors: ego-strength, gender and age. For instance, younger participants had more negative mystical experiences and a higher involvement in music and performance. Secondly, females scored higher on both emotional creativity and ASC-proclivity and lower on scientific creative personality and ego-strength[2]. As these relationships may confound those between creativity components and ASCs, it was decided to conduct partial correlations controlling for ego-strength, age and gender, the outcome of which is displayed in Table 6.7.

Five out of the seven creativity components correlated significantly with overall ASC-proclivity ($p < .01$), six in a positive direction. Hypothesis one, that all dimensions of creativity would be positively related to ASC-proclivity was rejected. Different dimensions of the creativity

[2] The correlation matrices between creativity components and dimensions of ASC were similar for males and females when analysed separately. However, gender differences were observed for remoteness-of-verbal-associations. Total ASC scores correlated significantly and positively with emotional creativity (*rho* = .534, $p <$ .000001, females; *rho* = .409, p = .00003, males), artistic creative personality (*rho* = .446, $p <$ .000001, females; *rho* = .235, p = .019, males) and involvement with music and performance arts (*rho* = .192, p = .048, females; *rho* = .267, p = .008, males). Non-significant correlations were observed for domestic crafts and arts (*rho* = -.028, p = .774, females; *rho* = .042, p = .681, males) and scientific creative personality (*rho* = .064, p = .513, females; *rho* = -.107, p = .291, males). However, for the latter, positive mystical experiences formed a small significant correlation for females (*rho* = .215, p = 026) and negative mystical experiences correlated negatively with scientific CP for males (*rho* = .199, p = .048). Only one difference emerged in the general pattern for males and females, where for females, but not males, remoteness-of-verbal-associations was significantly correlated with ASC-proclivity (*rho* = .284, p = .003, females; *rho* = .072, p = .482, males), while for males, but not females, figural-DT formed a number of significant correlations with ASC dimensions, overall ASC scores correlating at *rho* = .072, p = .453 for females and *rho* = .194, p = .055 for males. Perhaps this reflects general gender abilities with verbal and figural-spatial information.

Table 6.7

Correlations between creativity components and ASCs, controlling for gender, age and ego-strength

	Emotional creativity	Writing and RA	Figural divergent-thinking	Artistic creative personality	Domestic crafts and visual art	Music and performance	Scientific creative personality
Extraordinary mental processes	**.34** **.000001**	.07 .35	.08 .29	.24 .001	-.02 .75	.17 .02	-.07 .19
Parapsychological experiences	**.30** **.00001**	-.01 .86	.08 .29	.20 .005	.05 .45	.19 .008	.03 .69
Esoterics	**.31** **.00001**	.00 .96	.09 .21	.19 .009	-.07 .37	.14 .05	.04 .57
Positive mystical experiences	**.42** **.000001**	.23 .001	.19 .009	**.36** **.000001**	-.00 .96	.10 .15	.12 .10
Negative mystical experiences	**.30** **.00001**	.13 .07	.10 .15	.07 .33	-.15 .04	.02 .81	-.03 .72
Imagination	**.31** **.00001**	.13 .07	.21 .003	**.49** **.000001**	.04 .55	.16 .03	.03 .66
Dreams	**.42** **.000001**	.15 .04	**.26** **.0001**	**.34** **.000001**	.08 .05	.17 .02	.08 .25
Dissociation	**.39** **.000001**	.00 .99	.17 .02	**.33** **.00001**	.05 .48	.11 .13	.13 .08
Hallucinations	**.41** **.000001**	.19 .01	.11 .14	**.29** **.00001**	-.01 .87	.10 .21	.05 .48
Hypersensitivity	**.37** **.000001**	.13 .07	.08 .27	.20 .005	-.06 .37	.21 .003	.00 .95
Changed feelings of time and space	**.27** **.0001**	.15 .03	.14 .05	**.27** **.0001**	-.05 .53	.18 .02	.11 .14
Total score on the ASASC	**.50** **.000001**	.18 .01	.20 .005	**.38** **.000001**	-.03 .70	.19 .009	.07 .34

Note. Correlations in bold are significant when corrected for multiple analysis using the Bonferroni method, ($p < .0004$), while those underlined are significant when $p < .05$. Refer to Appendix 6.6 for a spearman's rho coefficient matrix of ASC and creativity variables (with no effects partialled out). The outcome is highly similar.

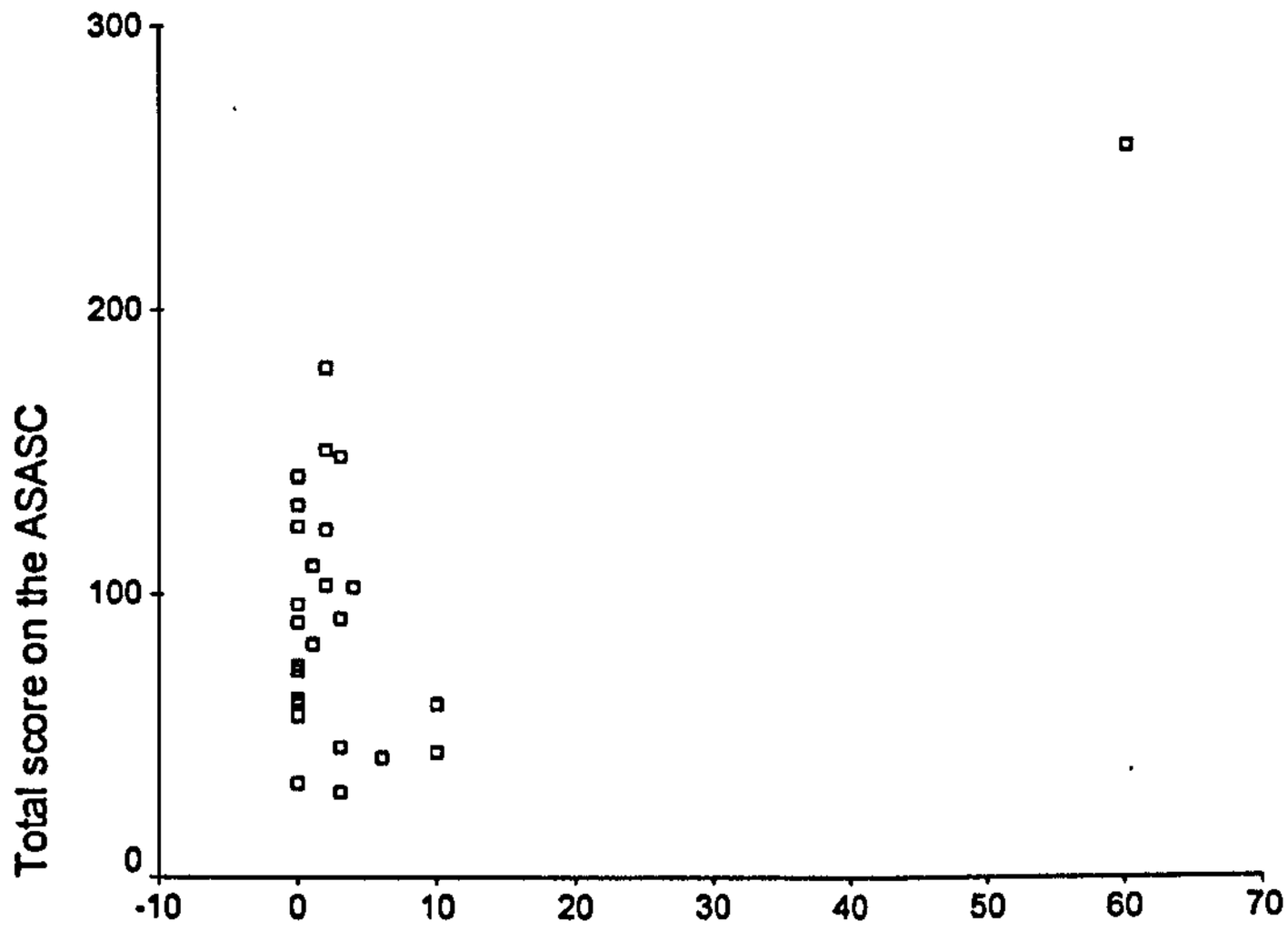
construct relate differentially to the reporting of ASCs. Emotional creativity correlated most strongly with overall ASC-proclivity ($r = .50$, $p = .000001$), followed by 'artistic creative personality' ($r = .38$, $p = .000001$); both significant when corrected for multiple analyses. Writing and remote-verbal-associations ($r = .18$, $p = .01$), figural-DT ($r = .20$, $p = .005$) and music and performance arts ($r = .19$, $p = .009$) also correlated significantly with ASC-proclivity, albeit with small effect sizes. 'Involvement in domestic arts and crafts' and 'scientific creative personality' showed non-significant correlations, with effect sizes close to zero, with ASC-proclivity. The latter suggests that ASCs are not related to creativity via domain involvement.

In terms of hypothesis two, that involvement in the arts would be more strongly associated with ASC-proclivity than involvement in science, 'artistic creative personality' was significantly associated with ASC-proclivity, while 'scientific creative personality' was not. Hence, hypothesis

two is supported. While this concurs with the hypothesis that artists are 'experts in the subjective' and scientists 'the objective' (Albert & Runco, 1987) it seems counter-intuitive when considering the anecdotal claims of eminent creators that ASCs inform their creativity (for example the hypnagogic visions of Edison, see Section 5.4.3). The 'interest and involvement in science' sub-scale measures just that, and not cultural creative achievement or eminence. Following Feist (1999) who, in a meta-analysis of studies examining the traits of scientists, found that creative and eminent scientists scored higher on openness-to-experience than less creative peers, a post-hoc analysis tested the relationship between ASC-proclivity and 'achievement' in science. While there was no objective way to assess eminence, as responses were anonymous, participants had been asked: 'in the last 12 months how many writings have you published', which may act as a crude index of achievement in science, in terms of published papers. As can be seen in the scatterplot below, there was one extreme outlier, high on both ASC-proclivity and productivity.

Figure 6.1

Are high achieving scientists prone to ASCs? Scatterplot of the number of publications by scientists and total ASC scores (N=27)



There was no significant relationship between 'achievement in the last year' and ASC-proclivity amongst scientists (*rho* = -.117, p = .570, 2-tailed, outlier removed), and indeed negative relationships between ASC-proclivity and both 'interest in science' (*rho* = -.399, p =

.039, 2-tailed) and the 'practice of science' (*rho* = -.340, p = .083, 2-tailed). This post-hoc analysis does not support the link between ASC-proclivity and achievement amongst scientists. However, this sample of scientists may be insufficient to answer such a question. It might be that, as Medawar (1945, cited by Shaw, 1994, p. 38) comments: "science itself is various enough to satisfy all temperaments. Among scientists are collectors, classifiers and compulsive tidiers-up; many are detectives by temperament and many are explorers; some are artists and other artisans. There are poet-scientists and philosopher-scientists and even a few mystics". The latter categories may however, be less common.

Hypothesis three, that affective creativity components would be more strongly associated with ASCs than cognitive components of creativity, was confirmed. When examining the sub-components of the figural-DT measure, neither originality nor flexibility of response correlated significantly with ASC-proclivity (*rho* = .108, p = .164, 2-tailed; *rho* = .118, p = .126, 2-tailed). The measure of figural expressiveness, the degree to which participants crossed the boundaries when drawing on the shapes, was responsible for the overall significant positive relationship with ASCs (*rho* = .255, p = .003, 2-tailed). Remoteness-of-verbal-associations likewise was correlated with ASC-proclivity at a low level (*rho* = .187, p = .008, 2-tailed). However, when comparing scores on the five abstract words with scores on the five concrete words, remoteness of the prior correlated more highly with ASCs (*rho* = .237, p = .001, 2-tailed; *rho* = .085, p = .230, 2-tailed). This might suggest that the ability to respond in an unusual way to ambiguous, abstract stimuli (e.g. 'command', 'mind') rather than everyday, concrete stimuli (e.g. 'apple', 'foot') is associated with alterations in SCs, perhaps requiring or enabling more imaginative, unusual responses. In summary, this outcome provides only weak and mixed support for Martindale's (1989) cognitive model, which proposes that the ability to form remote associations is underpinned by lability of arousal, defocused states of consciousness, and, by extrapolation, a proclivity to experience ASCs. However, as predicted, affective components correlated at higher levels with ASC-proclivity, especially the novelty of emotional experience (*rho* = .612, $p < .001$), but also with 'preparedness', exploring and analyzing affect (*rho* = .477, $p = < .001$) and the authenticity and effectiveness of one's emotional expression (*rho* = .390, $p < .001$).

A regression analysis was conducted to test which of the creativity components were direct and indirect predictors of ASC-proclivity, following O'Reilly et al. (2001) who found that the effect of divergent-thinking was partialled out when controlling for domain of involvement (arts versus humanities). Direct predictors of ASC-proclivity accounted for 51% of its variance (Adjusted R^2 = .507, $F_{(3,194)} = 68.423$, $p < .001$) and included: emotional creativity (β = .386, $p <$

.001), ego-strength (β = -.434, p < .001) and artistic creative personality (β = .224, p < .001). This gives support to O'Reilly et al.'s contention that the link between 'unusual experiences' is not a cognitive one. It appears to be the case that the relationship between cognitive and domain dimensions of creativity and ASC-proclivity is indirect, and may be mediated by emotional creativity and artistic creative-personality, the latter being a mixture of: belief one's own creativity and its importance to one's life, an interest and involvement in the visual arts, figural expressiveness, and a flexible, imaginative, resilient personality (according to Gough's CPS). Involvement in the artistic domains of music and performance, domestic crafts and visual arts and writing alone did not directly predict ASC-proclivity. ASCs appear to be directly predicted by affect and personality factors of creativity, which are associated with artistic domains. This does not preclude a motivational model, but suggests that the relationship between artistic involvement and ASC-proclivity is not as simple as O'Reilly et al. suggest – particular 'artistic-person-configurations' appear to relate to ASC-proclivity.

In the following sections, each creativity component will be examined in terms of its relationship to the ASC and CCI dimensions – forming the planned exploratory analyses.

6.3.3 Exploring the relationship between creativity components and different classes of ASC and cognitive-style

This section will explore the more complex relationships between components of creativity, dimensions of ASCs and creative cognitive-styles (based on the CCI). The purpose of this section is to explore how different components of creativity might be related to different experiences of consciousness, and to test if these are mediated by styles of being creative, and thus whether, ASCs might play a functional role in the creative process. Further, trait measures of boundary-permeability are included to test whether these measures of sensitivity to internal cues mediate the relationship between ASCs and creativity. Following a brief analysis of the CCI and some statistical considerations, each creativity component will be considered separately.

The CCI was used in order to examine what kinds of cognition or experiences were reported to be *actually used* in the creative processes. The correlations between the subscales of the CCI and the components of creativity can be observed in Table 6.8, where, a glance shows that the pattern of correlations mirrors that of Table 6.7, where emotional creativity and 'artistic creative personality' are associated most strongly with the use of non-linear cognition in the creative process.

Table 6.8

Correlations between components of creativity and sub-scales of the CCI controlling for gender, age and ego-strength

	Emotional creativity	Writing and remote verbal associations	Figural divergent-thinking	Artistic creative personality	Crafts and visual art	Music and performance	Scientific creative personality
Heightened internal	**.55**	.08	.20	**.37**	-.06	.18	-.08
awareness	**.000001**	.26	.004	**.000001**	.38	.01	.24
Intuition, hunches and	**.43**	.16	**.28**	**.44**	.06	.14	.19
inspiration	**.000001**	.03	**.0001**	**.000001**	.38	.06	.009
Loose, playful, absorbed	**.43**	.13	.21	**.58**	.05	.25	.18
cognition	**.000001**	.07	.002	**.000001**	.45	.001	.01
Combining, analogy,	**.34**	**.30**	.20	**.44**	-.07	.15	.25
non-verbal cognition	**.00001**	**.00001**	.006	**.000001**	.36	.04	.001
Dreaming, day dreaming	**.33**	.20	.12	**.42**	.01	.18	.08
and hypnagogia	**.00001**	.005	.11	**.000001**	.90	.01	.26
Linear, goal-directed	-.08	-.06	-.03	-.13	.17	.01	.18
cognition	.29	.42	.70	.07	.02	.93	.02

Note. Correlations in bold are significant when corrected for multiple analysis using the Bonferroni method, ($p <$ .0004), while those underlined are significant when $p < .05$.

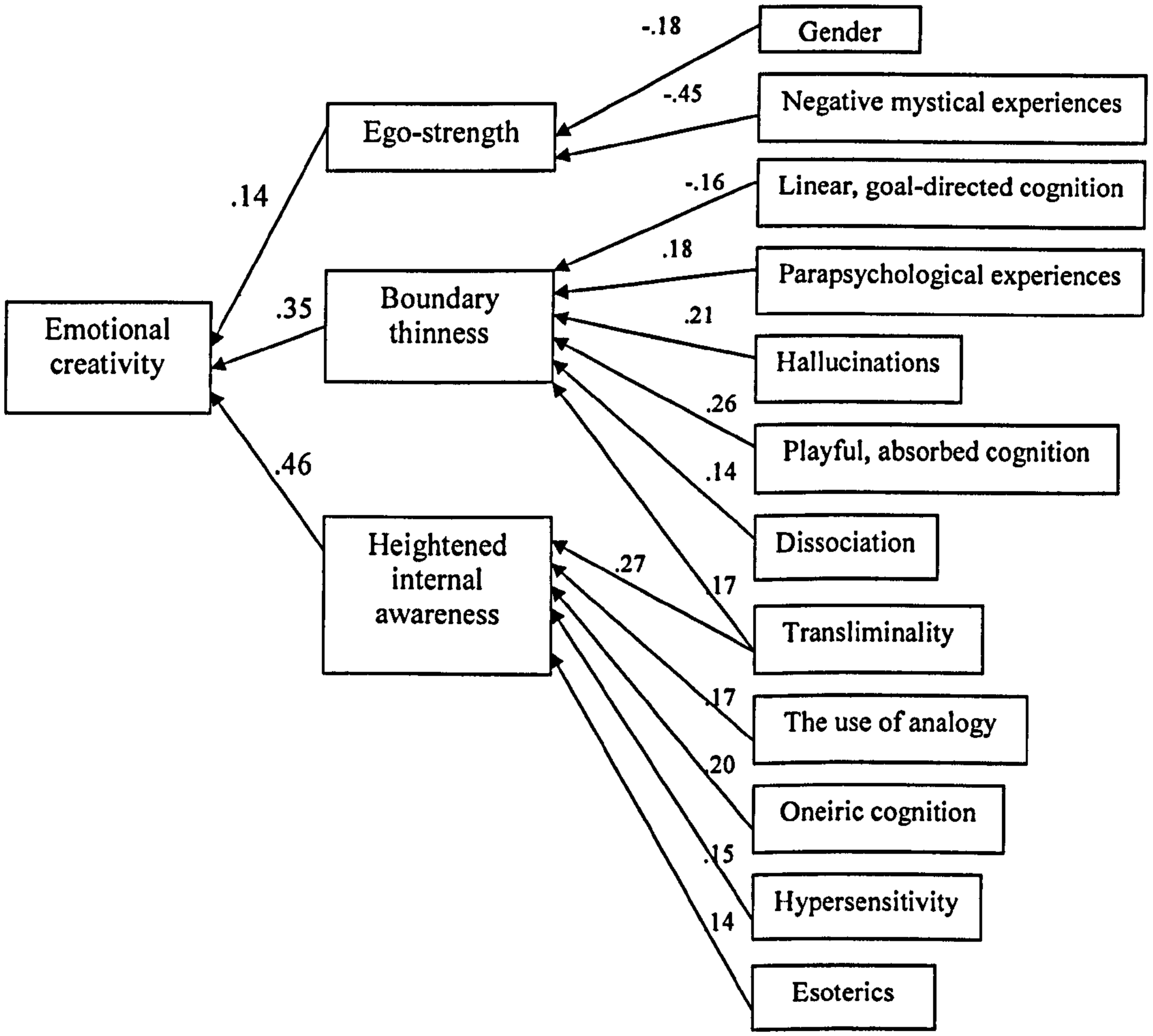
In the following sections, considerations of the relationships between dimensions of creativity and ASCs are based on the matrix of correlations in Table 6.7. In addition, stepwise hierarchical multiple regressions were conducted, including the seven components of creativity as the criterion variables, and the ASASC subscales, the CCI components, transliminality, boundary thinness, ego-strength, gender and age as predictor variables. Analyses were only conducted up to three levels in order to avoid unnecessary complexity. All standardized Beta coefficients in the path diagrams below are significant at the $p < .05$ level. Due to the exploratory nature of these analyses, they are *illustrative only*, seeking to clarify and simplify the patterns of inter-correlations shown the tables by partialling out shared variance between constructs.

6.3.3.1 Emotional creativity

Emotional creativity (EC) correlated at a significant level with all types of ASC and parapsychological experiences, thus appearing to be associated with a proclivity to unusual experiences in general. However, EC formed the strongest correlations with positive mystical experiences (e.g. unitive/ecstatic states and peak experiences), dreams (an awareness of one's dream life, lucid dreams, archetypal dreams and hypnagogic states) and hallucinations (hallucinatory images and delusions). This supports and extends Averill's (1999) finding that EC is correlated significantly with mystical experiences (Hood, 1975). However, it appears not to be associated just with extreme affective states (e.g. the ecstasy of mystical union) but with unusual

Figure 6.2

Path analysis predicting emotional creativity with ASCs, boundary-permeability, ego-strength, age and gender



cognitive and perceptual experiences also. Further, EC was the only creativity component to correlate significantly with negative mystical experiences (which include 'dark night of the soul' symptoms and fears of the self falling apart, of the existential abyss and of being persecuted by negative mystical forces). This suggests that the 'horror' of the creative process (in terms of fear or anxiety over a loss of guideposts and nightmarish loss of boundaries, as suggested by Schuldberg, 1994) is less associated with creativity per se than with EC or affective openness. In Section 5.4.7 it was pointed out that Averill (1999) found EC to be related to the willingness to address existential questions. Emotionally creative individuals may be open to both positive and negative experiences of consciousness, being psychologically minded – interested in intrapersonal experience. This interpretation is strengthened by the findings that people who

practiced a mental discipline scored higher on emotional creativity – indicating an interest in psychological development or introspection. The path diagram in *Figure 6.2* shows that direct predictors of emotional creativity were heightened internal awareness (β = .46), boundary thinness (β = .35) and ego-strength (β = .14), which explained 41% of the variance in EC (Adjusted R^2 = .414, $F_{(3,193)}$ = 47.078, $p < .001$). Hence, the relationship between emotional creativity and ASCs appears to be mediated by openness and sensitivity to internal experience, boundary-permeability and an absence of psychopathology.

That EC might mediate (in addition to artistic-CP) the relationship between ASCs and cognitive and domain based creativity measures, concurs with Taft and Gilchrist's (1970) assertion that the link between creativity and ASCs is explained by a general openness to intrapersonal and emotional-interpersonal events. It could be argued that the relationship between EC and ASCs tells us more about the relationship between emotional experience/awareness and mystical experience than creativity and ASCs. However, that the EC component correlated positively with other creativity components ('artistic-CP' and figural-DT) and with other creativity sub-components (as seen in the structure matrix – Table 6.4) suggests that EC can be construed as part of the creativity construct.[3] This provides some support for both the arguments that awareness of and interest in emotions might: motivate artistic expression of them (Averill, 2005); or/and might help form idiosyncratic affect-based associations on a divergent-thinking task (Getz & Lubart, 1999).

6.2.3.2 Figural divergent-thinking

Figural divergent-thinking correlated significantly, but at low levels with several ASCs: dreams, vivid imagination and visualization ability, positive mystical experiences, dissociation and changed feelings of space and time (e.g. floating above one's own body, feeling that time has stood still, and feeling that one's body has shrunk or grown). These ASCs indicate a rich fantasy life, the ability to become absorbed in concentration and positive affect. It is worth noting that the sub-scales with which figural-DT forms the two highest correlations, dreams and vivid imagination, together formed a factor referred to by van Quekelberghe et al. (1991) as imagination, high scorers on these sub-scales alone being referred to as the 'imaginative type'.

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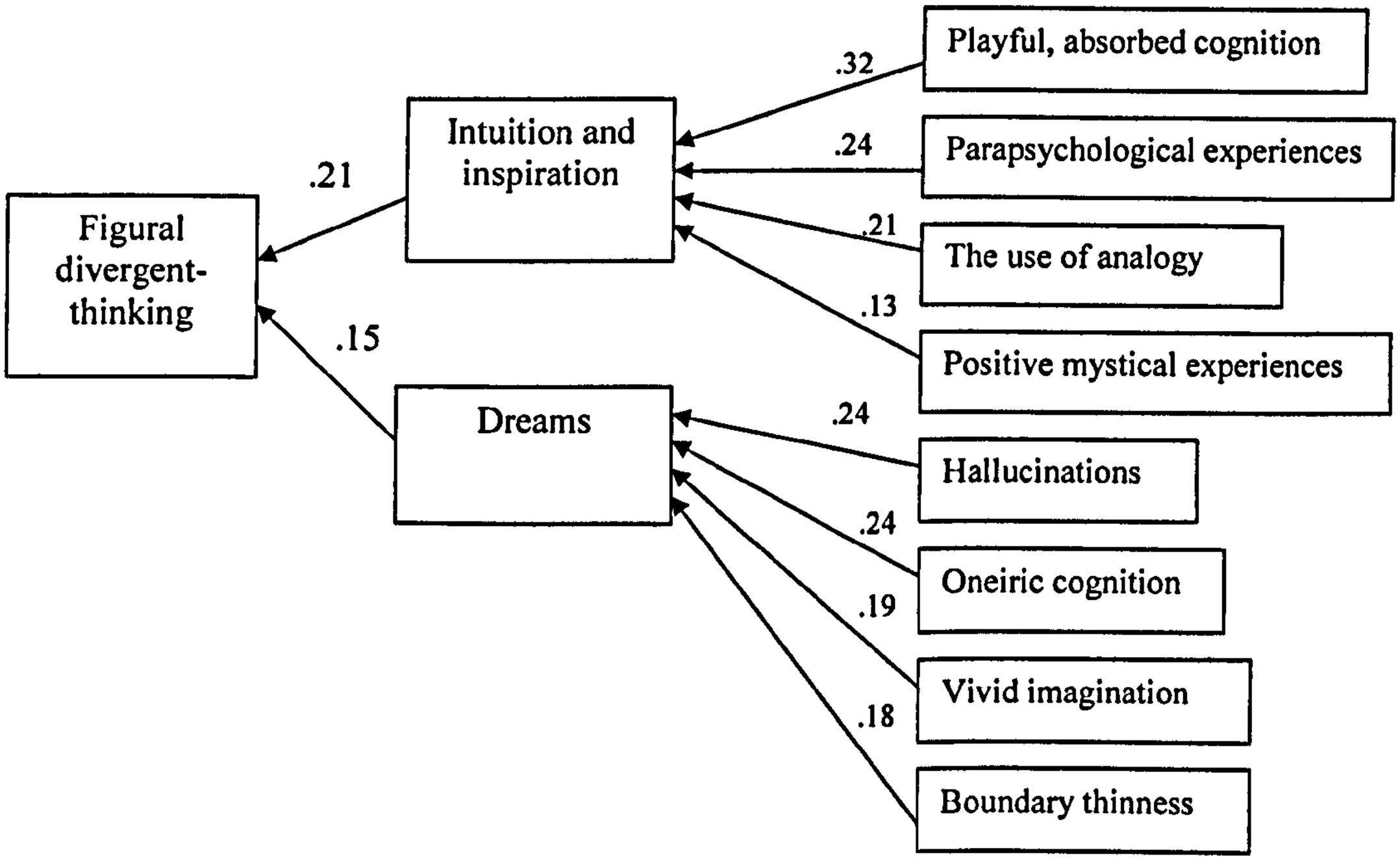
[3] A recent study reports that EC is associated with artistic creativity, writing a Haiku (r = .30, $p < .001$), but not with cognitive measures of creativity: divergent-thinking (Consequences, TTCT) (r = .16, ns) and the Remote Associates Test (r = .24, ns) (Ivcevic, Brackett & Mayer, 2007).

Figure 6.3

Path analysis predicting figural divergent-thinking with ASCs, boundary-permeability, ego-strength, age and gender



However, only dreams remained significant when correcting for multiple analyses. This concurs with research considered in Section 5.4.1, where divergent-thinking was related to dream bizarreness (Wood, Sebba & Domino, 1990) and high dream recall (Armitage & Fitch, 1988). The latter suggested that creatives might remember more primary-process associations arising in dreams, which might be used creatively. The ASASC dream scale also includes having: lucid dreams, thus supporting the research of Snyder and Gackenbach (1988) (discussed in Section 5.4.2); and hypnagogic/hypnopompic experiences (see Section 5.4.3), supporting the view that this scale taps into states that fall along an oneiric continuum – borderland states (as discussed in Section 5.4), access to which, in the form of primary-process cognition, might facilitate performance on divergent-thinking tasks.

Figural-DT correlated most highly with intuitive cognition on the CCI – following hunches and experiencing moments of inspiration during the creative process, and at lower levels, which were not significant when corrected for multiple analysis, with heightened internal awareness, playful, absorbed cognition and the use of analogy. However, divergent-thinking was not significantly associated with either the use of linear or oneiric cognition in the creative process.

The latter is surprising due to the moderate correlation between figural-DT and the ASASC subscale 'dreams', suggesting that although high scorers on divergent-thinking may report awareness of dreams and unusual dream experiences, these are not actively used as a resource for creativity.

The ASC and cognitive-style variables only accounted for 8% (Adjusted $R^2 = .082$, $F_{(2,194)} = 9.791$, $p < .001$) of the variance in figural-DT scores, the direct predictors (shown in *Figure 6.3)* being: 'intuition and inspiration' ($\beta = .21$) and 'dreams' ($\beta = .15$). In extrapolation, performance on figural-DT tasks would appear to be facilitated by following intuitions and having moments of inspiration, where numerous original and varied ideas enter consciousness, which are then figurally expressed. Thus, figural-DT may be associated with spontaneous irruptions of dream-like imagery into consciousness rather than the deliberate use of oneiric cognition. Indeed, 'dreams' mediates links with figural-DT and vividness of imagination, hallucinations, oneiric cognition and boundary-thinness, which may reflect a blurred distinction between waking and dreaming states (Glicksohn, 1989; Virel, 1984). (Such a model fits well with Hartmann's boundary-thinness model, discussed in Section 4.1.1).

6.3.3.3 Writing and remoteness-of-verbal-associations

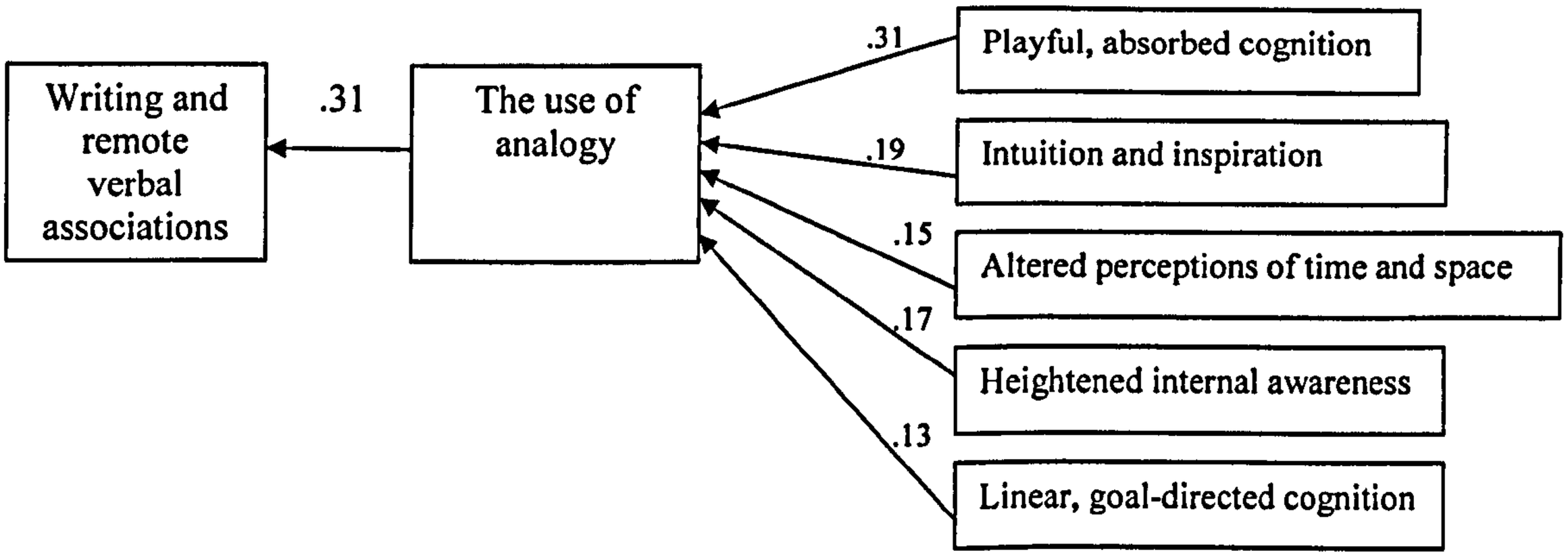
Writing and remoteness-of-verbal-associations correlated at a significant level with four ASC subscales: positive mystical experiences, changed feelings of space and time (which are both states of expanded awareness and may be linked to the 'flow state'), dreams and hallucinations (both associated with experiences along the sleep-wake continuum). These are similar to the significant correlations observed for figural-DT. However, none were significant when correcting for multiple analyses. Writing and remoteness-of-verbal-associations was most strongly associated with the use of analogy and the recombination of existing elements on the CCI, but also with oneiric cognition and intuitive cognition. ASC and cognitive-style variables accounted for 9% of the variance in writing and RA (Adjusted $R^2 = .091$, $F_{(1,195)} = 20.693$, $p < .001$), and the only direct predictor was the use of analogy in the creative process ($\beta = .31$).

It may be that writing and remote-verbal-associations is (like the RAT, discussed in Section 2.6.1.2) associated with high verbal intelligence as well as originality – a large vocabulary would help on this task. However, that it is predicted by making analogies and re-combining existing elements in new ways fits well with the idea of playing with words and making novel combinations as one would for example in poetry. The use of analogy is linked directly with linear, goal-directed cognition as well as with variables associated with heightened introspection

and absorbed states. Such relationships might reflect that, in the process of writing, combining words in novel ways and the use of metaphor may be facilitated both by playful, inner-directed absorbed states, involving a loss of sense of time, and goal-directedness.

Figure 6.4

Path analysis predicting writing and remote verbal associations with ASCs, boundary-permeability, ego-strength, age and gender

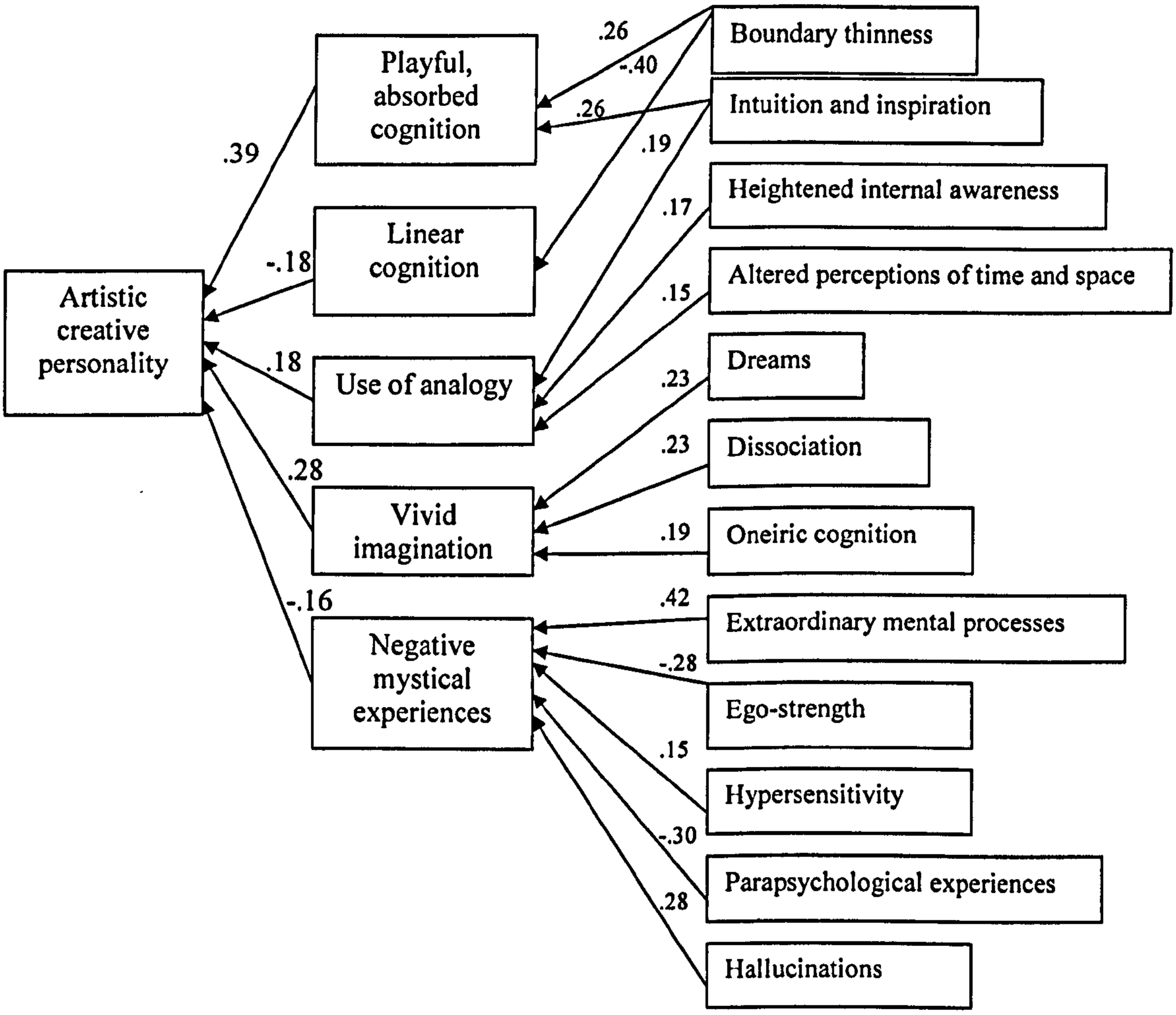


6.3.3.4 Artistic creative personality

Artistic creative personality correlated significantly with all ASC sub-scales except negative mystical experiences. That artistic creativity is associated with positive and not negative altered states concurs with Ayers et al. (1999) but not with Barron (1968) who found creative architects and writers were open to feelings of horror and desolation, nor with Schuldberg's (1994) description of horror, including fear of dissolution of the self as part of the creative process. Such experiences appear to be linked to creativity depending on the degree of emotional creativity/awareness involved in the creative process/person, but not with artistic-CP *per se*. Artistic-CP correlated significantly with six dimensions of ASC when correcting for multiple analyses: vivid imagination (being easily able to form mental images and a propensity to daydream), vivid dreams, hallucinations, positive mystical experiences, dissociation (e.g. becoming absorbed in activities and being able to relax at will) and changed feelings of time and space. This suggests that artistic-CP is associated primarily with ASCs that involve vivid spontaneous imagery, positive emotions and absorption, and to a lesser degree with unusual cognitive experiences and beliefs (extraordinary mental processes and parapsychological experiences). This is a similar pattern, albeit with larger effects sizes, as that found for the cognitive creativity components.

Figure 6.5

Path analysis predicting artistic creative personality with ASCs, boundary-permeability, ego-strength, age and gender



Artistic creative personality correlated significantly with all of the subscales of the CCI except linear cognition, and most highly with playful, absorbed cognition. This suggests that artistic-CP is associated with being playful and unconstrained in order to be creative – and with variables that fit with the 'flow state' Csikszentmihalyi (1996), surrendering to the creative process – what Milner (1950) called creative participation (as discussed in Section 5.4.6). ASC and cognitive-style variables accounted for 44% of the variance in artistic creative personality (Adjusted $R^2 = .441$, $F_{(5,191)} = 31.904$, $p < .001$).

The path diagram in *Figure 6.5* shows that artistic-CP is related directly to negative mystical experiences ($\beta = -.16$) and that ASCs appear to be mediated by two primary routes: 'visualisation

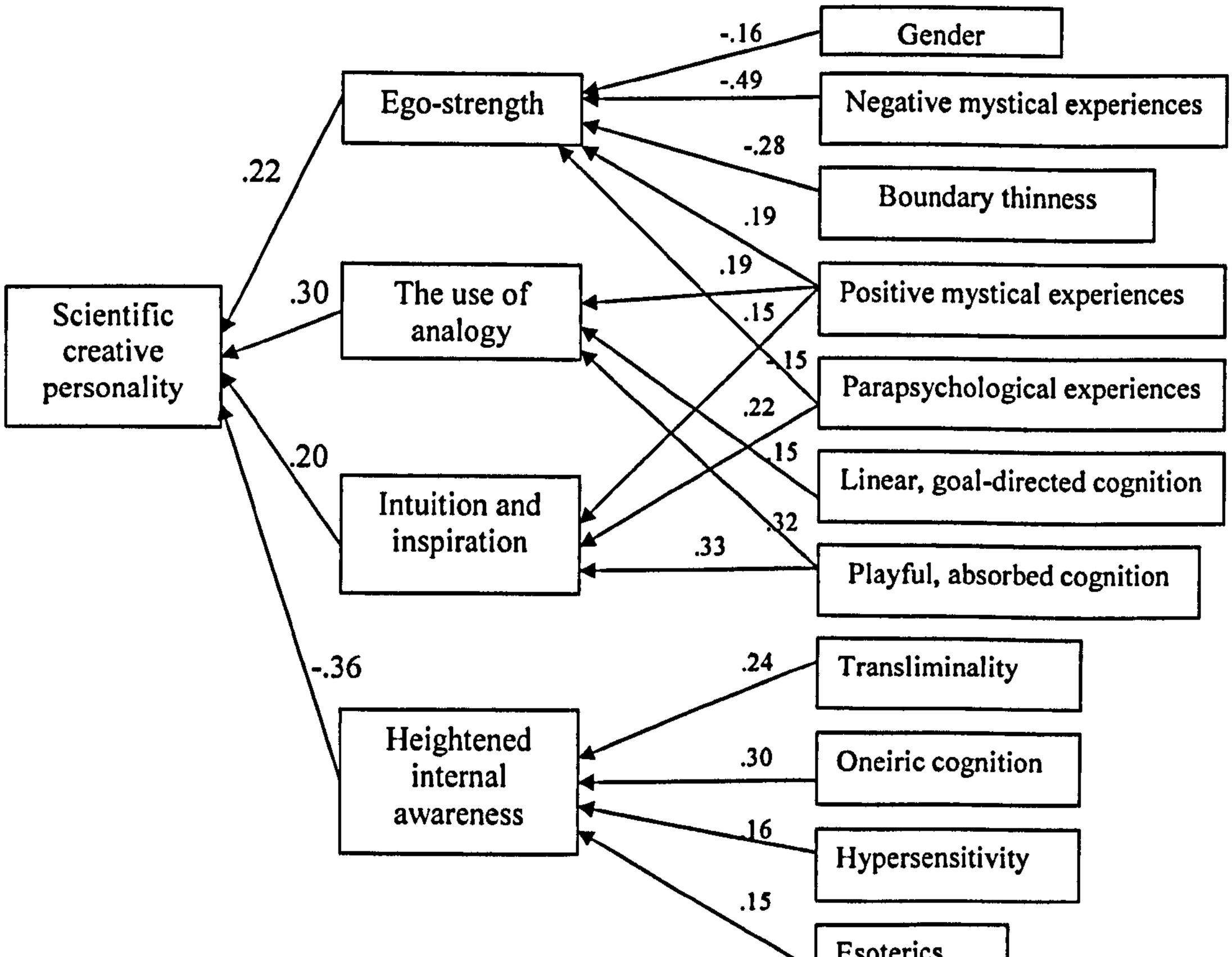
and imaginative ability' (β = .28); and the use of playful, absorbed cognition (β = .39) and analogy (β = .18) in the creative process. That it is also directly predicted by a lack of rational purposeful, goal-directed cognition (β = -.18) indicates that being immersed in the moment and experimenting with the unknown and the ambiguous is a valued resource to artistic-CP. At the trait level, this concurs with Feist's (1999) meta-analytic findings that artistic-CP is associated with low conscientiousness and goal-directed behaviour.

6.3.3.5 Scientific creative personality

Scientific creative personality did not correlate significantly with any of the ASC subscales, but did so, at low levels with four subscales of the CCI: the use of analogy, intuitive cognition, linear cognition and playful, absorbed cognition. None were significant when correcting for multiple analyses. The hierarchical multiple regression for scientific-CP accounted for 19% of its variance

Figure 6.6

Path analysis predicting scientific creativity with ASCs, boundary-permeability, ego-strength, age and gender



(Adjusted R^2 = .188, $F_{(4,192)}$ = 21.333, p < .001). The path analysis (*Figure 6.6*) is interesting in that of the four direct predictors, three are positively associated with scientific creative personality: ego-strength (β = .22), the use of analogy (β = .30) and the use of inspiration and intuition (β = .20) in the creative process; and one is a negative predictor: heightened internal awareness (β = -.36). This indicates that while spontaneous non-linear forms of cognition are considered important to and experienced as a part of scientific creativity (following hunches, intuition and having inspirational breakthroughs) these occur in the absence of heightened internal awareness or intrapersonal openness/exploration. This concurs with the view of the scientist as being disinterested in subjective realms (Albert & Runco, 1987) but suggests that 'non-linear' forms of cognition are still involved in scientific creativity/involvement, although extreme subjective shifts in states of consciousness are not experienced/reported in general.

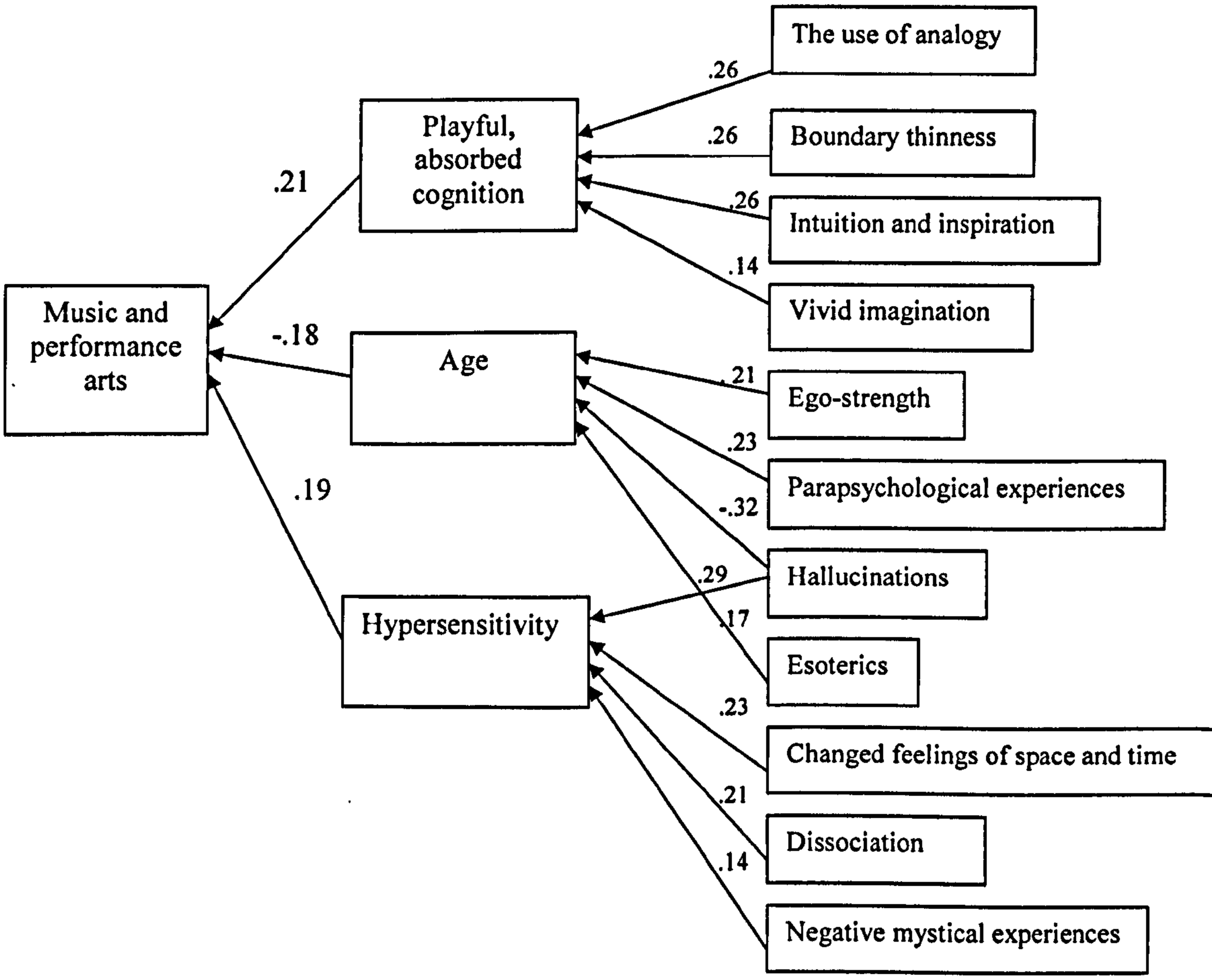
6.3.3.6 Music and performance arts

In addition to correlating significantly with vivid imagination, dreams and changed feelings of space and time, music and performance arts correlated significantly with a slightly different range of sub-scales on the ASASC, those pertaining to unusual cognitive experiences and interests: parapsychological experiences, esoterics and extraordinary mental experiences (e.g. feeling that one has unusual thoughts or experiences, impulsive urges, thoughts rushing very quickly, and a sense of unreality about one's experience); and hypersensitivity (a heightened awareness of sensory stimuli (e.g. light or sound) and internal cues (e.g. physical sensations) and synaesthetic experiences. However, none of these remained significant when correcting for multiple analyses.

The hierarchical multiple regression for music and performance arts accounted for 14% of its variance (Adjusted R^2 = .142, $F_{(3,193)}$ = 11.830, p < .001). As the path diagram (*Figure 6.7)* shows, there were three direct predictors: playful, absorbed cognition (β = .21), hypersensitivity (β = .19) and age (β = -.18). The use of absorbed, playful unconstrained thinking in the musical creative process can be related to the research of Gruzelier (2001) who, working with musicians at the Royal College of Music, found that neurofeedback training to assist the entrance into absorbed states while performing facilitated performance (as discussed in Section 5.4.6). Further, it is suggested that a heightened awareness of sensory stimuli, the core of the hypersensitivity construct, which subsumes perceptual unusual experiences, such as auditory-visual synaesthesia, is a direct predictor of involvement in music and performance arts.

Figure 6.7

Path analysis predicting music and performance arts with ASCs, boundary-permeability, ego-strength, age and gender



6.3.3.7 Domestic crafts and visual arts

Domestic crafts and visual arts only correlated significantly with two ASC/CCI variables, which were both direct predictors in a hierarchical multiple regression analysis: negative mystical experiences ($\beta = -.15$) and linear, structured cognition ($\beta = .15$); accounting for 9% of its variance (Adjusted $R^2 = .092$, $F_{(3,193)} = 7.586$, $p < .001$). Involvement in domestic activities (e.g. gardening, renovating antiques and interior decoration) and some visual arts (e.g. making decorative items, such as greeting cards) may be practical and goal driven, meeting functional demands of everyday existence and being related to a lack of existential anxiety and negative experiences such as being afraid of losing one's self-identity.

6.3.3.8 Summary of ASC-CCI-creativity inter-correlations

These path-analyses are valuable in indicating that different components of creativity are directly predicted by different experiences of consciousness, traits and cognitive-styles. Different factors of ASCs might contribute to different kinds of creativity. In addition, they suggest that ASC-creativity relationships are mediated by creative cognitive-styles of the CCI (e.g. the association between EC and ASCs appears to be mediated by heightened internal awareness). This supports the view that the relationship between creativity and ASCs is, at least in part, functional, in that ASCs may be employed in stages of the creative process.

A summary of the direct predictors of the seven components of creativity can be seen in Table 6.9. Each component is predicted significantly by a different combination of ASC (state), CCI (cognitive-style) and boundary-permeability (experiential-trait) variables. Emotional creativity and artistic creative-personality have the largest amount of their variance explained by these variables[4]. Of key interest is that the relationship between ASCs and EC and artistic-CP is mediated by different variables: heightened internal awareness and boundary thinness for EC, and playful, absorbed cognition and vivid imagination for artistic-CP. There appear to be two routes between ASC-proclivity and creativity: 1) through intrapersonal awareness and sensitivity; and 2) through vivid mental imagery and playful, absorbed creative involvement. The prior, related to EC, appears to be correlated with unusual experiences in general and may be related to boundary-permeability, psychological mindedness or a tendency towards introspection. Hunt and Chefurka (1976) argue that introspective sensitization alone can elicit ASCs, arguing that all ASCs involve a hypersensitivity to subjective details that are normally in the background of consciousness. This argument would imply that affective, intrapersonal creativity would necessarily lead to ASC-proclivity by nature of the attention given to subjective experience in this construct. This view is supported by Glicksohn (1989) who suggests that introspective people are more likely to be aware of alterations in their state of consciousness. The potential second route, associated with artistic-CP is associated with 'positive' ASCs only. Artistic-CP significantly correlated with ASCs that appeared to fit into two conceptual strands: vivid imagistic experiences, perhaps along a sleep-wake continuum (hallucinations, hypnagogia, vivid dreams and vivid waking imagination)[5]; and absorbed/expanded states, perhaps related to flow states (dissociation, positive

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[4] It was seen in Section 6.3.2 that EC and artistic-CP mediated the relationships between ASC-proclivity and other creativity variables.

[5] Morrison, Wells and Nothard (2002) suggest that a reduction of internal focus of attention correspondingly reduces external attribution biases in hallucinating patients – thus forming a link between internal attention and a proclivity to have hallucinatory experiences.

Table 6.9

Direct ASC and CCI predictors of creativity components

Creativity Component	Adj. R^2	Positive predictors	Negative predictors
Emotional creativity	.41	Heightened internal awareness (β = .46) Boundary thinness (β = .35) Ego-strength (β = .14)	
Artistic creative personality	.44	Playful, absorbed cognition (β = .39) Vivid imagination (β = .28) The use of analogy (β = .18)	Negative mystical experiences (β = -.16) Linear, goal-directed cognition (β = -.18)
Figural divergent-thinking	.08	Intuition and inspiration (β = .21) Rich dream life (β = .15)	
Writing and remote verbal associations	.09	The use of analogy (β = .31)	
Scientific creative personality	.19	Ego-strength (β = .22) The use of analogy (β = .30) Intuition and inspiration (β = .20)	Heightened internal awareness (β = -.36)
Music and performance arts	.14	Playful absorbed cognition (β = .21) Hypersensitivity (β = .19) Age (being young) (β = .18)	
Domestic crafts and visual arts	.09	Gender (being female) (β = .26) Linear, goal-directed cognition (β = .15)	Negative mystical experiences (β = -.15)

mystical experiences and changed feelings of space and time). However, it is directly predicted only by variables associated with visualization ability, daydreaming, and playful, loose, absorbed, non-verbal thinking. This suggests that involvement in the arts is particularly associated with ASCs along an oneiric (Glicksohn, 1989) or perception-hallucination continuum (Fischer, 1973).[6]

The adjusted R^2 values for the other creativity variables are low. However, a number of findings are of interest, in particular that: 1) figural-DT is predicted directly by having a rich vivid dream life and valuing following hunches and having moments of inspiration in the creative process, appearing to be related to particular ASCs (hypnagogia, archetypal dreams, lucidity) only; and 2) Scientific-CP is also associated with inspiration and following hunches in the creative process, and negatively with heightened internal awareness, suggesting that both linear and non-linear cognitive-styles are employed in the scientific creative process, but the prior is not associated with introspection or more extreme shifts in phenomenal awareness.

[6] In consideration of these potential 'two routes' between ASCs and creativity, Fischer's (1973) and Newberg and d'Aquili's (2000) arousal models of 'quiescent' states (meditative and calm) versus hyper-aroused states (which have been associated with hallucinations) might be further considered and expanded.

It is surprising that linear, rational, systematic thinking did not correlate positively with all creativity components, as theoretically, the stages of preparation and the evaluation of possible solutions, products, actions or performances are an important stage of the creative process. However, the constraints of this form of cognition may be more prevalent in some forms of creativity than others, perhaps being used in a post hoc fashion. Alternatively, this finding may relate to implicit perceptions of what the 'creative process' consists of – linear thinking styles may not be considered 'creative' from a lay perspective.

The final consideration pertains to the 'controllable oddness' hypothesis. Only emotional creativity was significantly predicted, in a positive direction, by both aspects of ASC-proclivity and ego-strength. Hence, Fodor's (1995) finding that creativity scores (on cognitive and scientific problem-solving measures) were highest for participants who scored highly on both psychoticism and ego-strength was not conceptually replicated in this study. This outcome suggests that creativity in the emotional realm might profit from an amalgam of ASC-proclivity and psychological resilience, but not other forms of creativity (cognitive, trait and domain based).

6.4 Summary and conclusions of the relationship between creativity and ASCs

The main finding of this study was that different components of creativity relate to different experiences of consciousness. When correcting for multiple analyses only emotional creativity ($r = .50$, $p < .00001$) and artistic creative personality ($r = .38$, $p < .00001$) correlated significantly with overall ASC-proclivity. ASC-proclivity was associated with 'artistic-CP' but not 'scientific-CP' and was directly predicted by affective rather than cognitive components of creativity.

Significant dimensional ASC-creativity configurations were between: emotional creativity and all ASCs subscales (including unusual cognitive experiences and negative mystical experiences); artistic creative personality and ASCs that involved vivid imagination, positive affect and absorption (imagination, positive mystical experiences, dreams, dissociation, hallucinations and changed feelings of time and space); and figural-DT and dreams.

The CCI scale was used to test if ASC-related cognitive-styles were actually used in the creative process. Emotional creativity and artistic creative personality were significantly correlated with all 'non-linear' cognitive-styles, in particular with 'heightened internal awareness' and 'playful, absorbed cognition' respectively. Writing and remoteness-of-verbal-associations was only significantly associated with the use of analogy, and figural-DT with intuition and inspiration. This suggested that ASCs played a functional role in the creative

process for EC and artistic-CP, but that 'dreams' were not deliberately used to facilitate the creativity associated with figural-DT scores, rather spontaneous irruptions of 'inspiration'.

It appears that, in this sample, the experience of a wide range of altered states is not essential to creativity, but is associated with particular forms of creativity, in particular emotional creativity and artistic creative personality.

Thus far, individual ASCs have not been discussed separately, following the sections of 5.4. In brief, support has been found for the propositions that: creatives (for EC, artistic-CP and figural-DT) may be more likely to tolerate, remember and productively use 'dreaming/dream-like cognition' (Section 5.4.1); that creativity (EC and artistic-CP) involves imaginative involvement and vivid mental imagery (Lynn & Rhue, 1986; Rhue, Bukh & Henry, 1991) (Section 5.4.4). That creativity (EC and artistic-CP) is related to hallucinatory experiences, supporting Whitton et al. (1978) who related this to internally directed attention (Section 5.4.5); and that creativity is associated with positive mystical experiences (EC and artistic-CP), supporting Ayers et al. (1999) and Averill (1999) (Section 5.4.7).

Possible explanatory models for a relationship between creativity and ASCs that were considered in Chapter Five were: 1) *The cognitive model* (e.g. Martindale, 1989), which suggests that the making of remote-associations/originality in all domains is directly related to, or enabled by, shifts into defocused states of consciousness with low cortical arousal. Such states might constitute ASCs in their own right and might also be associated with a proclivity to experience and broader range of ASCs; 2) *The motivational model* (O'Reilly et al., 2001) argues that artistic creativity is driven by a need to express unusual experiences of consciousness, and as such the relationship is mediated by domain involvement, constrained by attributes of domain that requiring idiosyncratic and subjective accounts to predominate; 3) *The intrapersonal-sensitivity trait model* (e.g. Thalbourne, 2000), which proposes that both creativity and ASCs are enabled by an experiential-trait characterised by "awareness of, large volumes of imagery, ideation and affect" (Thalbourne et al., 1997) and an openness to and interest the subjective realm (psychological mindedness), which might lead to both unusual (and possibly creative) thoughts and experiences; 4) *The affective model* (Taft & Gilchrist, 1970; Schuldberg, 1994). As seen in Chapter Two, Russ (2001) proposes that in addition to a cognitive dimension (as described above) an affective dimension facilitates creativity by: positive affect states increasing the flow of ideas; and by idiosyncratic affect-laden fantasy/associations. As such, the process has been hypothesised to be facilitated by emotional awareness (Getz & Lubart, 1999). It has also been suggested that such intense positive affective states and emotional awareness may be related to

ASCs (e.g. positive mystical states and peak experiences) (e.g. Taft & Gilchrist, 1970).

This study provided only weak/indirect support for the cognitive model and motivational models. Neither cognitive (figural-DT, remoteness-of-verbal-associations) nor domain involvement ('writing', 'music and performance arts' and 'domestic crafts and visual art') predicted ASC-proclivity directly. Although artists were significantly more likely to experience ASCs than non-artists, this relationship appeared to be mediated by additional 'person' variables rather than involvement in the arts *per se*. A particular configuration of domain-person-motivational factors directly predicted ASC-proclivity – the creativity component 'artistic-CP': a mixture of involvement with visual art, high importance of creative involvement (motivation) and creative personality, self-perceived creativity and figural expressiveness.

This study found support for the affective model, in as much that EC was most strongly and directly associated with ASC proclivity, and mediated, as did artistic-CP, links between ASC-proclivity and other creativity components. This concurs with Taft and Gilchrist's (1970) suggestion that a general openness to emotional experience explains the link between creativity and ASCs. Perhaps ASCs and creativity have in common intense or unusual affective states. The relationship between EC and ASCs was mediated by the cognitive-style of 'heightened internal awareness' and boundary thinness. This suggests that awareness of internal events in general is central to understanding this link.

Hence, when considering overall ASC-proclivity: the 'pure' cognitive model is rejected; the 'pure' motivational model is rejected; an interactive model of domain-person-motivational variables is proposed for artistic creativity and ASCs; and the affective and intrapersonal-sensitivity models are accepted (the latter two appear to overlap).

Finally, the current study suggests that there are different routes between artistic creativity and ASC-proclivity, based on: affect (EC), absorbed states (EC and artistic-CP) and oneiric, vivid imagistic states (artistic-CP). Ayers et al. (1999) controlled for absorption and yet still found that artists reported significantly more positive ASCs than non-artists – especially archetypal dreams. They postulate that some other factor that might explain the link. One suggestion is a proclivity to 'borderland' spontaneous vivid imagistic states, associated with a continuum of oneiric cognition (Glicksohn, 1989; States, 2000). This was suggested by the path analysis and inter-correlations for artistic-CP, which had two predictors: absorbed, playful cognition (and correlations with dissociation, positive mystical experiences and changed feelings of time and space); and vividness of imagination (and correlations with hallucinations and vivid dreams).

Further, figural-DT appeared also to be significantly associated with such sleep-wake imagistic 'borderland' states.[7]

6.5 Additional comments

Since conducting this research, the author came across a theoretical paper, which draws upon current knowledge of the functional neuroanatomy of normative information-processing to develop a model of creativity, which is pertinent to the study reported above. Dietrich (2005) proposes four 'types of creativity', based on different neural circuits. These have either: deliberate or spontaneous 'processing modes'; and process either emotional or cognitive content. The deliberate and spontaneous processing modes are analogous to the linear-goal-directed and non-linear cognitive-styles described in this chapter. The cognitive and emotional content is analogous to the distinction between cognitive and affective forms of primary-process cognition (Russ, 2001 – discussed in Section 2.4.1.2).

The 'processing mode' depends upon mental functions associated with activation of the prefrontal cortex (PFC), which enables higher cognitive functions, such as self-reflective consciousness, planning, temporal integration and sustained focused attention – possible because of the sustained buffering of information that is held 'on-line' and integrated in working memory. Creativity, Dietrich argues may arise either through 'insight, inspiration, and defocused states' (e.g. Martindale, 1989) or deliberate or methodological problem-solving (e.g. Weisberg, 1993). The difference between 'spontaneous' and 'deliberate' modes, he argues, is that in the latter, the search for insights is instigated from the PFC, and thus, information retrieved conforms to preconceived, structured 'search criteria', while in spontaneous modes, information that is represented in WM is less filtered or structured, is not driven by the PFC, and typifies the loose associative processes discussed in Chapter Two.

The emotional and cognitive processes, following LeDoux and Damasio, are described as interacting but separate neural systems: 'an emotional brain', which adds 'value tags' to

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[7] Further potential models have not been considered in this chapter: 5) *The apophenia model* (e.g. Gianotti, Mohr, Pizzagalli, Lehmann & Brugger, 2001) suggests that creatives might elaborate upon experiences retrospectively and be prone to delusions regarding events, being more prone to making cognitive misattributions, and might thus report more anomalous experiences, due to seeing 'meaning' in randomness; 6) Finally, comes the *disclosure explanation.* It might be that creatives, or creatives in particular domains, are more open to or more willing to admit, reflect upon, thus label and share unusual experiences. The veridicality of experiences is more pertinent to psi-phenomena, and will be considered in subsequent chapters. More problematic is the issue of reporting bias, which has not been assessed in this study. It may be that certain personalities e.g. those characterised by 'openness' were more willing to share experiences for example. However, the complex nature of the correlations observed in this study, where unusual experiences relate differentially to creativity dimensions mitigates against this explanation.

information; and a parallel system that enables detailed feature analysis, the representations of which are the blocks of cognitive processes.

The four 'types' of creativity, in brief, are described below (these may all be used in a creative process, or particular types only. All of these 'types' end up with the assessment and development of the novel idea in WM, accompanied by activation of the PFC):

Deliberate processing mode – cognitive structures: the PFC instigates a task-relevant search of long-term memory (in temporal, occipital and parietal regions, TOP). This information is then brought into WM and manipulated.

Deliberate processing mode – emotional structures. The PFC instigates a task-relevant search of "affective memory that is stored in affective structures" (p. 1019)[8], e.g. as might occur in psychotherapy, or in emotional creativity/solving interpersonal problems.

Spontaneous processing mode – cognitive structures. The functions of the PFC are inhibited, and an idea has its origin in the associative networks of the TOP, during defocused states of cognitive expansion, as described above. Importantly for this chapter, Dietrich relates this to ASCs, in which many of the PFC's functions are absent: e.g. self-reflection, time distortion, volitional control, abstract thinking and focused attention. Dreaming, he argues, is the extreme form of the spontaneous processing mode, and is characterised by hypo- PFC activation. This reasoning provides extra material with which to support the link between figural-divergent-thinking, artistic-CP and 'borderland' states along a 'sleep-wake' continuum.

Spontaneous processing mode – emotional structures. Again, the PFC is inhibited, and information processed in the emotional structures is spontaneously presented in WM. As these are often 'markers for important biological events, they make loud signals', argues Dietrich, and may make a distinct impression on the phenomenological state – similar to an epiphany or a religious state, with a sense of noesis and meaningfulness. Such a model helps to explain links between emotional awareness and positive mystical and peak experiences.

This model has been simplified, and the reader is referred to the paper for full descriptions of the mechanisms. While simplistic, hypothetical merely, and not describing the interaction between emotion and cognition (Isen, 1999; Getz & Lubart, 1999), the paper gives some theoretical support for the findings presented in this chapter, where different components of creativity may primarily involve different processing modes and content. For example, scientific

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[8] These are described as likely based on complex social emotions rather than 'basic' emotions, based on neuroarchitecture (that is, links are more direct between the PFC and cingulated cortex, rather than the limbic system).

creativity may be described as primarily involving 'cognitive content' (deliberate and non-extreme spontaneous), which Dietrich relates to 'knowledge based creativity' and artistic creativity as involving (in addition or primarily) 'emotional content', which, Dietrich suggests, requires relevant-skills to *express*. Further, this suggests a cognitive-perceptual link between creativity and ASCs (spontaneous-cognitive) and a separate emotional link (spontaneous-emotional) concurring, broadly, with the findings discussed in the conclusion above. However, this interpretation of the results of study two is highly speculative.

As a final comment, Dietrich suggests that better measures of creativity be developed that reflect the different processing modes – it might be that the CCI performs this function.

CHAPTER SEVEN

Creativity and anomalous cognition

> It comes as no surprise therefore that, even in their sane periods, many of our authors were adherents of the so-called paranormal ... [Sylvia] Plath, for example, considered that from an early age she had had psychic powers, including precognitive ability ... [John] Ruskin had revelatory dreams ... How far, for example, are we justified in dismissing them as merely irrational? Or can we allow of the possibility, like the subjects themselves, that they are genuine paranormal experiences? (Claridge, Pryor & Watkins, 1998, p. 218-220).

7.1 Introduction

Thus far in this thesis components of creativity have been found to be associated with boundary-permeability (Chapter Four) and with the reporting of subjective parapsychological experiences (SPEs) (Chapter Six). Boundary-permeability and the reporting of SPEs also appear to be related to each other, leading Hartmann, Harrison and Zborowski (2001) to question, akin to Claridge et al. (1998), whether 'weak stimulus barriers' might be associated with genuine parapsychological experiences, a vivid imagination, or a hyperawareness of subtle cues that are misinterpreted as having a paranormal source. The remainder of the current thesis considers the putative association between creativity and veridical parapsychological experiences (e.g. Dalton, 1997). In the current chapter the existing 'creativity and SPEs' and 'creativity and ESP' (extrasensory perception) literature is reviewed, while in Chapter Eight an empirical study is presented that further explores the potential links between creativity and ESP.

Over a hundred years of sporadic theoretical and empirical research has been devoted to the links between creativity and psi within the history of psychical research. Myers (1903) theorised that a 'subliminal uprush' of ideas into conscious awareness was central to both creative and psi experiences (mediated in imagistic form). He postulated a mechanism of increased permeability between 'subliminal' and 'supraliminal' awareness to explain both conscious psi and creative inspiration, an idea developed in recent years by Thalbourne (2000) with the concept of transliminality. Prince (1928) illustrated such links by gathering descriptions of SPEs by eminent individuals from various professions, including artistic creatives such as Mark Twain, Robert Schumann and Goethe. However, Prince only collected SPEs of culturally esteemed persons (including successful businessmen, lawyers or clergymen), whom he assumed were reliable witnesses due to their status. Therefore, it cannot be concluded from this study that eminent creatives are more likely to have psi experiences than other people. Links between creativity and psi were made by Rhine (1934, p. 195), who speculated that psi is associated with 'good abstraction', a tendency to daydream,

imaginativeness and artistic interest and ability. However, these ideas were not explored empirically. Interestingly, Rhine outlined five areas of parapsychology, one of which was labelled 'parapsycho-artistic', exemplified by the psychic art of Patience Worth. Hence, artistic inspiration from an ostensible paranormal source was delineated as being of particular interest. The next resurgence of interest in the parallels between creative inspiration and psi experiences in the published literature arose following a lull of a few years. This was a collection of theoretical papers composing the Parapsychology Foundation's 1969 annual conference: 'Psi Factors in Creativity'. In the late 1960s and early 1970s there was a spate of experimental research that used psychometric measures of creativity as predictors of psi scoring in the laboratory. However, the most striking outcome of this period was that artists appeared to perform better than non-artists in free-response ESP designs. This was explored further in experimental research focusing on the apparent psi-conduciveness of artistic populations in the 1990s in a series of ganzfeld studies at Edinburgh University. Collectively this experimental work has raised more questions than it has provided answers, and has illustrated complexity rather than simplicity. Considering this body of work and its intricacies will form the focus of the current chapter.

The terms psi and SPEs will be defined and introduced. The anecdotal links between creativity and psi will be discussed, and theoretical perspectives that draw parallels between creativity and psi will be reviewed. These models will be evaluated in light of correlational studies that have compared the incidence of SPEs with creativity, including correlations between SPEs and the creativity components that were introduced in Chapter Six.

The focus will then shift to 'objective psi' and the efficacy of ESP paradigms will be briefly evaluated. This will lead to the central part of this chapter: a review of the empirical literature working with artistic populations and psychometric measures of creativity as predictors of psi-performance. The outcomes of these studies will be evaluated and criticised. This will prepare the theoretical underpinnings for Chapter Eight, where the creativity-psi relationship will be tested in an empirical study.

7.2 Psi: An operational definition

'Psi' is an umbrella term to include a range of parapsychological phenomena including ESP (extrasensory perception) and psychokinesis ('mind over matter' – micro or macro). The focus in this thesis will be on ESP. Irwin (1999, p. 6) defines an extrasensory experience as: "one in which it appears that the experient's mind has acquired information directly, that is, seemingly without either the mediation of the recognized human senses or the processes of logical inference". Thalbourne (1982) defines ESP as "the acquisition of information about an

external event, or influence (mental or physical; past, present or future) otherwise than through the known sensory channels". Irwin stresses the exclusion of logical inference and Thalbourne the external event to which the ESP information pertains, both of which the present author feels are important defining aspects of ESP.

ESP may be divided into three types: telepathy, clairvoyance and precognition. These are descriptive (of SPEs or sometimes of experimental design) not mechanistic definitions. Telepathy refers to direct mind-to-mind communication (Irwin, 1999), the exchange of information without the use of the ordinary five senses, between two or more minds (Radin, 1997), "the paranormal acquisition of information concerning the thoughts, feelings, or activity of another conscious being" (Thalbourne, 1982, p. 18). Clairvoyance, which derives from the French for 'clear seeing', refers to direct awareness of sensory inaccessible events (not necessarily just visual) (Irwin, 1999), the "paranormal acquisition of information concerning an object or contemporary physical event; in contrast to telepathy, the information is assumed to derive from an external physical source ... and not from the mind of another person" (Thalbourne, 1982, p. 11). Precognition refers to information received without the use of the ordinary five senses about future events, where this information could not be predicted or inferred by ordinary means (Radin, 1997). Precognition is ESP that is displaced in time (Irwin, 1999), where "the target is some future event that cannot be deduced from normally known data in the present" (Thalbourne, 1982, p. 55). These three basic manifestations of ESP may overlap, in many cases there may be no way of isolating one descriptive type. Hence, this thesis will mainly refer to psi or anomalous cognition, where the descriptive constituents are not differentiated.

7.3 Subjective parapsychological experiences

Subjective parapsychological experiences (SPEs) are defined in phenomenological terms as those which appear to a percipient to involve psi. Reports of SPEs are prevalent cross-culturally, although proportions of types of SPE, and amounts of concurrence with these types, varies, as indicated by surveys (e.g. Glicksohn, 1990). Cross-culturally, the most commonly reported experiences appear to be of telepathy (33 to 50%) and clairvoyance (20%) (see Targ, Schlitz & Irwin, 2000, for a review).

7.4 Creativity and psi: Similar psychological processes?

Unusually for mainstream creativity research, Davis and O'Sullivan (1980, p. 154) cite, in a review of traits and experiences of creative persons, that they "are likely to have had

psychical experiences". A brief perusal of spontaneous creative and parapsychological experiences illustrates that similarities in their phenomenology may be observed. For example, when comparing the experience of telepathy quoted below with Nikola Tesla's description of a moment of creative inspiration (quoted in Section 5.4), it is noticeable that both involve a flash of visual imagery and a sense of noesis.

> I was with my husband at the Hollywood Bowl when complete scenes from the movie *King Solomon's Mines* flashed before me, and I knew my husband was thinking about the movie. Without realising what I was saying, I turned to my husband and said, "I saw King Solomon's mines too". He was shocked. "How did you know I was thinking about that?" *(An example of telepathy taken from Radin, 1997, p. 61).*

Models aligning creativity and psi largely originate from the period 1962 to 1969 and are descriptive in nature, where both processes were described as: being facilitated by altered states (Krippner, 1962-63); being spontaneous and difficult to control; having a 'strong need to know' (Anderson, 1962); involving an amalgam of positive motivation, relaxation and dissociation (Murphy, 1966); requiring flexibility between modes of cognition (Murphy, 1966); and changes in the field of attention, allowing breakthrough (Barron & Mordkoff, 1968).

Murphy (1963; 1966) proposed that creativity and paranormal capability would be expected to occur together, claiming that both are rooted in the unconscious, to which creative individuals may have increased access. Irwin (1999, p. 44) elucidates that psi's association with dreams, hallucinations and intuition (Rhine, 1961) suggests that the "content of the experience has its origins deep in the subconscious levels of the human mind". Similarly, experiential reports of the illumination phase of creativity are often described as a 'bubbling up' of previously unconscious elements into conscious awareness (Claxton, 1988). It is therefore not surprising that Wallas' (1926) model of creativity (refer to Chapter Two) has been used as an analogue to the experience of psi phenomena (Anderson, 1962; Dalton, 1997a; Krippner, 1962/63; Sondow, 1986). Do both creativity and psi occur through a similar psychological process whereby spontaneous associations enter conscious awareness? While analogous experiential reports do not necessarily imply common underlying mechanisms, the early models will nevertheless be reviewed because they have provided a rationale for subsequent empirical research (e.g. Dalton, 1997).

Anderson (1962) and Murphy (1966) both suggest that relaxation and dissociation are common to creative and psi processes. Creativity has been enhanced, increasing inspirational 'breakthroughs', by entering an inner-directed, relaxed, altered state of consciousness (Harman et al, 1966; Krampen, 1997). This is analogous to the noise reduction model of Honorton (1977), where a reduction in somatic, perceptual and cognitive noise may enable psi

cognitions to become conscious, if indistinguishable from other spontaneous associations that may arise in a hypnagogia-like or unstructured state. Murphy argues that relaxation (a period following preparation characterised by physical and mental relaxation, or passivity/receptivity) is not homogenous but dissociative, "there is a part of the mind which is actively concerned and all the rest is like a glazed surface, like ground glass, and capable only of a passive and fragmented type of activity" (p. 10). There is both activity and passivity. Murphy argues that ASCs are a bridge connecting creativity with the paranormal and speculates that it is not a particular state that is conducive in and of itself to either creativity or SPEs, but rather the *rapid movement* from one state to another, "from an unmotivated to a motivated state; or from a relaxed to a highly active state; or from a highly integrated to a very dissociated state" (p. 20). Barron and Mordkoff (1968) argue that the conditions favouring creativity and ESP are similar, as they both involve: changes in the field of attention, resulting in diffusion of attention through most of the field, with intense focus at a particular point so that breakthrough occurs; and abrogation of usual perceptual constancies, so the system is less construct bound and unusual associations may form. Similarly, Anderson (1962) argues that both creativity and psi are analogous to a focused beam of light rather than a diffuse light, that is, there is an element of searching, of scanning, of focus on a particular need, rather than a passive openness. There is a goal, and the transformation of mental content from imagistic, intuitive non-verbal modes into a synthesis and a communicable form. Again, this view is reiterated by Moriarty and Murphy (1967, p. 204), who paradoxically associate psi-hitting with both concentrated focus and ASCs, analogous to the flow experience (Csikszentmihalyi, 1996), describing the psi-conducive state as "both selective attention toward certain stimuli and selective withdrawal from other stimuli".

Moriarty and Murphy stress the constraints required to enable successful navigation and integration of psi states, to enable the 'focused beam' within the unstructured state described above. Myers (1903) also argued that genius (creative and psychic) depended upon an increased ability to *control* access to potentially 'supernormal' realms of consciousness. Hence, there are two reciprocal attributes, a capacity for dissociability and goal direction, a self-system that may 'regress' to primary cognition, but that has high "ego strength and cognitive effectiveness" (Moriarty & Murphy, 1967, p. 204). This of course is also a mind-set that has been associated with creativity (Barron, 1968/1993; Fodor, 1995) and stresses flexibility of cognitive states. Moriarty and Murphy cite five factors as being important to creative functioning in daily life: openness to the external world; openness to the internal world; capacity for dissociability (the ability to use primary-process thinking without losing reality boundaries); capacity for structuring (the selective attention and orderly association of ideas); and capacity for communication (the coherent clear expression of ideas). For both psi

and creativity, they argue that the optimal psychological environment includes the above five factors in a stable self-system where diffuse thinking can occur without anxiety, where the difference between reality and unreality is clearly demarcated, although rich, imagistic, absorbed states are achievable. Healy (1983, p. 113) similarly describes the personality profile of psychics in general as having 'mixed dominance', being able to operate in thinking and feeling modes at the same time, writing that: "psychics seem to share some of the abilities of very creative people, as well as some of the superficial signs of schizophrenia", in addition to well-defined ego boundaries. Healy relates the ability to synthesise secondary processes with sensory and extrasensory modalities to both psychics and creatives.

Another factor that might induce focus, rather than control, is need or motivation. Anderson (1962) stresses the need factor of creativity, the motivation or drive to achieve a satisfactory creative product. In psi experiences (e.g. Stanford's (1974) PMIR model) need is also an important factor determining the occurrence of psi. Anderson describes this as the "need or desire to know" (p. 285). Murphy (1966, p. 9) likewise argues that positive motivation is important to both psi and creativity. By positive motivation is meant a "deep, strong, clear need to make contact with distant material ... which cannot be reached through the normal sensory functions".

7.4.1 Summary and analysis

From these early theoretical papers, emerges the following picture of creativity and psi. Driven by intrinsic motivation or a 'need to know', creativity and psi follow a multi-phase process, involving the integration of information gained in an intentional, relaxed ASC characterised by fluid associative imagistic cognition with rational linear thought, whereby this content is scrutinised and verified as either creative or psychic. This takes place within a stable psychological environment, with a strong ego, enabling navigation and synthesis of the content of these stages and potential application.

While these models draw interesting parallels and delineate possible areas of overlap, they have not been embedded in empirical evidence, rendering them descriptive only. No specific models relating creativity and psi appear to have been developed since, the focus having been on exploring relationships between the constructs experimentally. These models have been used to explain positive correlations between creativity and psi-outcome, without being investigated thoroughly. For example, Braud and Loewenstern (1982) speculate that creative individuals may find it easier to relax and enter ASCs that may facilitate psi-performance, and that the common variable between psi and creativity might be spontaneous imagery in such states.

These models appear to the author to be rather simplistic and unsatisfactory, in that they reduce both creativity and psi to particular forms: *conscious* ESP experiences that are recognised and applied productively in an individual's life, and creativity as always involving an ASC and an up-rush of imagistic cognition. The relationship between creativity and psi may be more complex. Both creativity and psi may be multi-dimensional constructs. As discussed in Chapter Two, there may be 'creativities' rather than 'creativity'. Likewise, there may be a range of psi experiences, for example, some psi occurrences may be non-intentional, non-conscious and may therefore not meet the criteria for creativity, being automatic responses based on anomalous information (Stanford, 1974). Murphy (1963, p. 211) asks the following question in response to his own hypotheses about the relationship between creativity and psi: "But what if it should turn out that there are many independent kinds of creativity and many independent kinds of ESP?" This author would suggest that this is indeed the case. Some types of creativity and types of psi may overlap, perhaps being facilitated by common neurological processes and having similar phenomenological qualities, as in the models described above. Alternatively, a matrix of outcomes may emerge, where the processes may involve the same mechanisms at key stages, but be functionally distinct. For example, sometimes, the creative process may involve psi content at an unconscious level. Stevens (2001) has suggested that psi may be a subset of imagination, part of the microgenesis of 'ordinary' cognition. In this model, the randomness or novelty introduced into the creative process may sometimes have a parapsychological origin. Margenau (1969) suggests that psi occurs in creativity during ambiguous phases of unknowing; this may occur as unconscious guiding information, akin to Decision Augmentation Theory (May, Utts & Spottiswoode, 1995) or the Psi-Mediated Instrumental Response model (PMIR, Stanford, 1974)[1]. On the other hand, sometimes psi processes, when conscious, may be a particular form of creativity, where novel information is synthesized into an adaptable outcome, e.g. at an interpersonal level.

In the next section, correlations between SPEs and various psychometric measures of creativity will be considered. This will help us to understand which aspects of creativity may be associated with conscious subjective experiences of ESP in daily life. For example, might

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[1] To elucidate concerning the PMIR model, it is assumed that psi can operate at a non-intentional level, where an organism may unconsciously use ESP to scan the environment for need-relevant stimuli. These needs may span the hierarchy of needs, from instinctual to actualisation needs (Maslow, 1971). This information may be used 'instrumentally' to unintentionally guide the organism towards or engender (via non-intentional PK) a favourable outcome (Stanford 1975/76). This model suggests that the most common manifestation of psi occurs at a non-conscious level. Stanford's (1974) exposition of the PMIR model suggests various mechanisms via which the instrumental response may occur, including behavioural spontaneity and cognitive associations (sudden thoughts that alter behaviour). Factors such as rigidity, inhibited or stereotypical behaviour may block the instrumental response. Hence creativity may be related to psi, via spontaneity of thought and behaviour that enable non-intentional instrumental responses to be manifested.

SPEs be linked with the ability to make remote, divergent cognitive-perceptual associations, to emotional creativity, to involvement in various creative domains or to creative personality?

Following this, the relationship between creativity and psi scoring in the laboratory will be considered – which may not necessarily be associated with SPEs, but with lower levels of the cognitive micro-genesis of psi-cognition in these contexts.

7.5 Creativity and SPEs: Correlational studies

Two studies have examined this purported relationship between creativity and SPEs through self-report questionnaires. Kennedy, Kanthamani and Palmer (1994) reported significant correlations between SPEs and creativity, using a 'life experiences questionnaire' with 105 college students. Rating 'artistic creativity as an important purpose in life' was significantly correlated with the frequency of having anomalous experiences (r = .20, p = .04), psychic experiences (r = .20, p = .04), temporal lobe symptoms (r = .31, p = .001), and with absorption (r = .41, p < .0001). In a follow up study (Kennedy & Kanthamani, 1995) found that this relationship reached significance only for particular samples. For a sample of high school students the correlation was not statistically significant (r = .12). However, the relationship was significant for college students (r = .20, p = .04, 2-tailed) and two samples obtained primarily from individuals with an interest in the paranormal with a wider age range, where r = .29 in both instances (p = .004; p < .0001). This small relationship between artistic creativity and SPEs, if replicable, raises several questions. Are they equally enabled by similar personalities/organizations of mind? Do they arise through a similar cognitive microgenesis? Do they involve similar states of consciousness (SCs)? Are they mediated by another factor to which they are both linked, such as affective states?

The relationship between creativity and SPEs has not been explored further in the literature. However, in Chapter Six seven components of creativity were correlated with the parapsychological experiences scale of the ASASC, which consists of six items relating to experiences of ESP. Three components of creativity correlated significantly with SPEs: artistic creative personality (r = .20, p = .005); involvement with music and performance arts (r = .19, p = .008); and emotional creativity (r = .30, p = .00001). Only the latter remained significant after correcting for multiple analyses. However, the effect sizes for the artistic involvement and personality components are similar to that reported by Kennedy et al. (1994/1995). Figural divergent-thinking, scientific creative personality, writing and remote verbal associations and involvement in domestic crafts and visual arts did not correlate significantly with SPEs. Of particular interest was the observation that cognitive originality and flexibility did not correlate significantly with incidence of SPEs. As discussed in Chapter

Two, Russ (2001) delineates two dimensions of primary-process cognition: the cognitive dimension and the emotional dimension. That incidence of SPEs appears to be associated with emotional creativity and not with cognitive expansion appears to suggest that conscious psi experiences are associated with increased awareness of affect laden cognition, and perhaps with neurological pathways that underpin emotional awareness (e.g. Lane, 2000). This is a highly speculative interpretation of the data, but one that nevertheless warrants further exploration.

Amongst the components of the CCI, SPEs were significantly correlated with heightened internal awareness (r = .43, p = .000001), intuitive cognition (r = .42, p = .000001) and oneiric cognition (r = .41, p = .000001) when correcting for multiple analyses, but not with playful or analogical cognition, as seen in Table 7.1. This suggests that cognitive-styles associated with internal awareness and with irruptions of imagery into waking consciousness are associated with SPEs, but to a lesser extent playful and fluid forms of cognition associated with linking remote ideas together.

Table 7.1

Correlation coefficients for the relationships between SPEs and sub-scales of the CCI

Component of the CCI	SPEs
Heightened internal awareness	**.43** (**.000001**)
Intuition, hunches and inspiration	**.42** (**.000001**)
Loose, playful, absorbed cognition	.20 (.004)
Combining, analogy, non-verbal cognition	.16 (.03)
Dreaming, day dreaming and hypnagogia	**.41** (**.000001**)
Linear, goal-directed cognition	.04 .62

Note. Partial correlations were conducted (controlling for gender, age and ego-strength). Associated 2-tailed probabilities are in parentheses. Emboldened entries are significant when correcting for multiple analyses using the Bonferroni method.

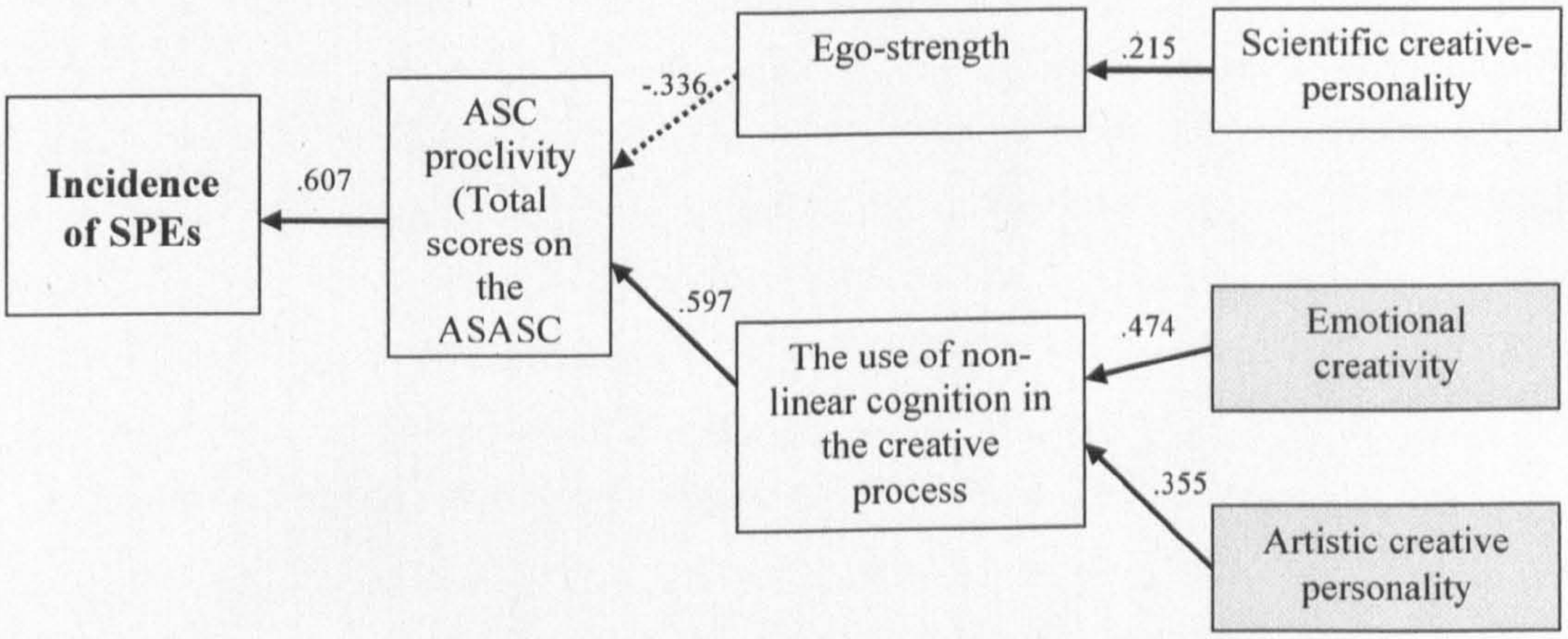
In summary, the aspects of creativity that related most strongly to SPEs were the use of non-linear cognitive-styles (e.g., following intuition, having moments of inspiration) in the creative process, heightened internal awareness (paying attention to internal imagery and emotions) and emotional creativity. Hence, flexible and original cognitive associations do not appear to be related to SPEs, rather spontaneous insights, introspection and affective awareness.

An exploratory hierarchical multiple regression analysis was conducted, in order to see if the above effects were mediated by a proclivity to report/experience ASCs. The path diagram for which is depicted in *Figure 7.1*. In this diagram, the shared variance between the variables

in each column is not shown in order to focus on direct and indirect horizontal significant predictors of SPEs. The path arrows indicate unique predictive effects of each variable on another, holding the effects of the other variables constant, but do not indicate causality.

Figure 7.1

Exploratory path analysis predicting SPEs with components of creativity, CCI and ASC proclivity (minus SPEs), age, gender and ego-strength



Note. A dashed arrow indicates a negative relationship. The values on each arrow represent the standardized Beta coefficients, all of which are significant at the $p < .001$ level.

The path diagram shows that dimensions of creativity (emotional creativity and artistic creative personality) predict SPEs indirectly, through the variables of overall ASC proclivity and the use of non-linear cognition in the creative process. This may suggest that the relationship between creativity and SPEs seen in the correlations above can be explained through shared variance with constructs involving an openness to and exploration of 'psychological space'. This concurs with the idea that people who have 'internal sensitivity' are more likely to have psi experiences (Honorton, 1972). Although artistic populations may be more likely to possess such a 'cognitive-style', mere involvement in the arts alone (e.g. music and performance arts or domestic crafts and visual arts) does not appear to predict SPEs to a significant degree. This interpretation is reinforced by there being no significant difference in the incidence of SPEs between professional artists and 'other professions' (as can be seen in the group comparisons in *Appendix 6.4*)[2].

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[2] Professional artists (36 musicians, fine artists, actors, film directors, poets and photographers) reported significantly more SPEs than professional scientists (27 physicists, chemists and engineers) ($z = -2.3$, $p = .02$), but not more than 'other professions' ($z = -1.01$, $p = .31$). 'Other professions' however, reported significantly more SPEs than scientists ($z = -2.3$, $p = .04$). These samples were not matched (e.g. according to age, gender or other variables, such as interest in the paranormal), so that the results cannot be extrapolated to such populations in general.

In summary, it appears from this path analysis that emotional creativity and artistic creative personality are independent and unique predictors of the use of non-linear cognitive-styles. In turn, this is related to general ASC proclivity, which predicts the incidence of SPEs. From this we can conclude that it is not creativity per se that is associated with SPEs but the degree to which the creative process involves ASCs.

While such correlational studies illustrate clusters of relationships between experiential and personality and cognitive variables, they are a useful starting point only, highlighting areas of potential interest, without attributing mechanisms or causality. Furthermore, these studies do not assess any link between 'veridical psi' and creativity. The correlations may simply indicate that individuals with particular personality types, perceptual styles or belief systems are both more likely both to engage in artistic activities and to label certain experiences as 'paranormal'. The reasons for this and causal links are unknown. It may be that certain people are more likely to disclose SPEs. It may be that certain forms of creativity, associated, for example, with finding meaning in randomness and the blurring imagination-reality boundaries, are linked to the interpretation of certain experiences as paranormal.

Experimental approaches may explore correlates of 'objective psi', that is, psi-performance under controlled conditions. The performance, on 'objective' psi tasks, of individuals with creative attributes and controls may be compared, or correlations between creativity and psi-success may be calculated. Alternatively, from a psychometric perspective, the attributes of those who are most creative and those who are most successful at psi tasks may be compared, to see if there are any common intrapersonal variables (personality, motivation, belief, SC or cognitive-style). The findings of such research will be discussed in subsequent sections.

7.6 Exploring the empirical evidence for psi: ESP paradigms

This section will briefly review a number of ESP experimental paradigms in order to contextualize the subsequent discussion relating these to creativity, both in terms of types of methodology (forced-choice versus free-response) and overall efficacy. For comprehensive reviews and meta-analyses of psi research the reader is referred to Delanoy (1993), Radin(1997), Rao (2001) and Utts (1991).

Experimental laboratory-based research into ESP began in the early twentieth century (Estabrooks, 1927; Rhine, 1934; Richet, 1923). These early tests to some extent reflect the prevailing scientific and psychological zeitgeist of the time, behaviourism. Rhine (1934) is typically hailed as being the popularist of the experimental and statistical analysis of psi-outcomes (Mauskopf & McVaugh, 1980), using forced-choice card guessing procedures in

which the subject was aware of the possible target choices, selecting a constrained response in a psi-guessing protocol. For example, Rhine, with the help of Dr Zener, created the 'Zener cards', a pack of 25, depicting one of five symbols (circle, square, wavy lines, star, cross). A number of procedures were developed for using these cards experimentally, enabling the statistical significance of guessing the correct symbol above or below chance to be analysed (mean chance expectation [MCE] = 5). For example, in the 'down through' method of clairvoyance, the shuffled, cut pack of Zener cards remain 'unopened' until after 25 'calls' are made, down through the pack, after which the accuracy of the recorded calls can be checked by an experimenter (Rhine, 1934, p. xi). Two recent meta-analyses of clairvoyant and precognitive forced-choice studies from 1935 onwards have both obtained statistically significant effect sizes, indicating overall above chance scoring (Honorton & Ferrari, 1989; Steinkamp, Milton & Morris, 1998).

In the 1960s-70s there was a drive towards developing an experimental procedure to study ESP that was more open-ended, spontaneous and engaging for participants, attempting to increase ecological validity and hence psi-conduciveness with a return to 'introspection' (Braud, 1978; Honorton, 1977; Honorton & Krippner, 1969). This reflected a general trend in psychology to rebuke the constraints of behaviourism, renewing interest in areas such as states of consciousness and creative experience. In 'free-response' paradigms, the percipient or 'receiver' generally reports upon the ongoing content of consciousness, usually through a stream of verbal 'mentation' at a particular time. Simultaneously, sometimes a 'sender' will focus on a randomly selected visual image, the 'target', and attempt to transmit information about its content to the receiver, with whom non-anomalous communication is prevented. This is followed by the 'judging stage' where the receiver is often shown a set of four images, one of which is the target, and rates each image with a confidence percentage according to similarity with the impressions they experienced. This culminates in a ranking of orthogonal images in terms of perceived likelihood of being the target. In some studies, blind independent judges rate the receivers mentation to the set of four images instead. To reflect reports of subjective cases of ESP, which appeared to occur more frequently in dreams, meditation and waking hallucination/hypnagogic states (e.g. Rhine, 1961) some ASC inductions were developed in psi methodologies e.g. hypnotic trance, REM sleep, and sensory isolation.

Thirteen dream ESP studies were conducted at the Maimonides Medical Center between 1962 and 1978 (Ullman, Krippner & Vaughan, 1973). Typically, the receiver would be sleeping in a sound-attenuated laboratory, attached to EEG-EOG monitoring equipment, meanwhile a target would be randomly selected (usually an art print) and given in a sealed

envelope to a sender who then entered an isolated room. When the receiver entered REM sleep the sender would be 'buzzed' and would open the envelope and 'transmit' the target. At the end of the REM period, the receiver was awakened and asked to describe their dreams. The overall success rate of 450 trials, with a hit-rate of 63% (MCE = 50%) was highly significant (Radin, 1997). Sherwood and Roe (2003) conducted a quantitative review of dream ESP research. The combined effect size for Maimonides studies (r = .33, 95% C.I. 0.24 to 0.43) was significantly higher ($p < .05$) than subsequent dream ESP studies (Sherwood & Roe, 2003). These latter studies however, still demonstrate an effect, where independent judges correctly identified target clips significantly more than would be expected by chance (r = .14, 95% C.I. 0.06 to 0.22). Sherwood and Roe suggest one reason for this is that recent studies have been conducted with dreamers sleeping at home, rather than in a sleep lab, where they cannot be awakened from REM and hence may not recall as many of their dreams that occurred throughout the night.

The use of the 'ganzfeld' (whole field) in psi research was independently adapted from perceptual psychology by Braud, Wood and Braud (1975), Honorton and Harper (1974) and Parker (1975). "The impetus for this research involved converging evidence that anomalous communication effects were frequently associated with internal attention states characterised by reduced perceptual processing" (Honorton, 1995, p. 132). The ganzfeld paradigm attempts to reduce the threshold between imagination and reality, between waking and dreaming, and encourages free-association and primary-process cognition. The ganzfeld environment consists of a 'homogenous perceptual field', reclining in a comfortable position, with halved ping-pong balls over the eyes, which being semi-translucent, enable an even pink glow from a red light shone in front of one, in otherwise darkness, to be perceived. The auditory analogue of this unpatterned visual field consists of listening to 'pink noise', randomised frequencies of audible wavelengths that sounds like a gentle hissing. Meta-analyses of psi-ganzfeld studies have been monitoring its ability to produce and replicate a psi effect for over twenty years. Discussions have proliferated at three key-stages: the Hyman-Honorton meta-analyses (1985/86), the Bem and Honorton meta-analysis (1994) and the Milton and Wiseman meta-analyses (1997/1999). Ten completed ganzfeld studies were run between 1983 and 1989 at the Psychophysical Research Laboratories (PRL) by eight experimenters (Honorton, Berger, Varvoglis, Quant, Derr, Schechter & Ferrari, 1990). In a meta-analysis of these Bem and Honorton (1994) found a direct hit-rate of 32% (MCE = 25%) which was statistically significant (z = 2.89, p = .002, 1-tailed). The most recent meta-analysis of post-PRL studies, conducted by Bem, Palmer and Broughton (2001) yielded an overall hit-rate of 30%, p = .005, 2-tailed. Deviations from the original PRL protocol were shown to be associated with less successful studies in this heterogeneous database. The standard replications had an overall hit-

rate of 31% (Stouffer $z = 3.49, p = .0002$, 1-tailed), while the non-standard replications had an overall hit-rate of 24% (Stouffer $z = -1.30$, ns). As meta-analyses have consistently found a lack of correlation between study flaws and psi-success, this supports the hypothesis that smaller effect sizes in recent databases are due to non psi-conducive experimental protocol. However, in thirty years of ganzfeld research it is not clear exactly what these psi-conducive variables are, due to inconsistent findings. The 'ganzfeld psi effect' occurs in a rich matrix of variables, few of these being fully understood or explored (Wezelman et al, 1997).

Not all free-response ESP studies have employed ASC inductions. Milton (1997) conducted a meta-analysis of 78 waking SC, free-response ESP studies (2,682 trials), from 1964 to 1992 by 35 senior authors. Milton found an overall significant effect size of .065 (Stouffer $z = 5.72$, $p < 5.4 \times 10^{-9}$, 1-tailed). She found no significant correlation between overall study flaws (18 criteria) and study outcome, suggesting that the degree and number of methodological flaws (e.g. potential sensory cues, uncorrected multiple analyses) were not associated with outcome. Utts (1995) assessed the evidence for anomalous cognition in remote viewing research at the Stanford Research Institute (SRI) (1973-1988) and the Science Applications International Corporation (SAIC). The SRI studies consisted of 770 sessions with 227 participants. The effect size was .209, $p<10^{-20}$. Utts concludes that "anomalous cognition is possible and has been demonstrated ... based on commonly accepted scientific criteria" (p. 132).

Clearly the results of these meta-analyses are open to interpretation of probable causation. Extreme interpretations ascribe the effect solely to unknown flaws and fraudulent/'sloppy' experimenters, or to 'proof of psi' (for recent debates refer to Alcock, 2003; Palmer, 2003; Parker, 2003; Milton, 1999; Schmeidler & Edge, 1999). However, the fact remains that across the ESP paradigms discussed above, there is a consistent, small, highly significant effect, which does not appear to be explained by methodological flaws. Rather than adopting a black or white stance, this author argues that the accumulated evidence for ESP phenomena is such that the existence of anomalous cognition is a viable working hypothesis and that process research seeking to uncover optimal conditions for this phenomenon is pivotal in developing a contextual understanding of its principles. Perhaps a key to understanding more about the process of psi is learning more about its links with creativity[3].

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[3] Reflecting upon other experimenter's experiences with psi research (e.g., Dalton, 1997; Blackmore, 2003), and the 'experimenter effect', this author considers that opinions concerning the validity of psi amongst some continuing and abandoning psi researchers, are influenced by the outcomes they personally attain. That this author has personally obtained a hit-rate in line with the meta-analyses of the ganzfeld described above (across four formal ganzfeld studies), in which she is certain sensory leakage and other flaws were adequately controlled for, supports her belief in the efficacy of its protocol (HR=31.4%, (22/70), p =.049, exact binomial, 2-tailed).

7.7 Experimental research: Is creativity 'psi-conducive'?

This section will be divided into two main subsections. The first will focus on early studies employing forced-choice methodologies and the second on later studies developing open-ended methodologies. Research exploring the relationship between creativity and psi-performance experimentally has produced conflicting results, which may partly be due to the complexity of the constructs explored. Palmer (1978) draws attention to the contrasting definitions of creativity used in psi literature, which makes comparison of results difficult. When considering this evidence, it is important to be aware that operational definitions of creativity vary widely, from mere professional involvement in a particular occupation, such as visual art, to high scores on tests of divergent-thinking. The problems inherent in creativity measurement and the complexities this can introduce when interpreting the literature were discussed in Chapter Two.

7.7.1 Forced-choice studies: Creativity and psi

Early psi studies (1962-1977), using forced-choice ESP techniques, found mixed relationships between creativity and psi-success (refer to Table 7.2 for a summary). There are four significant positive outcomes, three non-significant positive trends, one significant negative outcome and two negative trends. A deeper analysis of these studies reveals that some of these significant findings are due to low creativity being associated with psi-missing.

Levine and Stowell (1963) found positive but nonsignificant correlations between clairvoyance scores (using geometric forms as targets) and 'fluency' and 'flexibility' of thought in two studies (using Guilford's Classes of Uses Test). In the second study, they predicted that believers in the paranormal would demonstrate a positive correlation between psi-performance and creativity, as they would be more accepting and affirmative of a psi task, and 'non-believers' a negative correlation, as they would be more 'rejecting'. Such a hypothesis suggests that more creative individuals will have a closer correspondence between their overall attitude and beliefs about the psi task and their performance on that psi task. The results were in the predicted directions, but did not reach statistical significance (no statistics were reported). Both studies obtained psi scores at the chance level. Immediately, this study suggests that interactions of creativity with other intrapersonal variables are important, but this has rarely been considered.

Honorton (1967) used two measures of creativity as key correlates in five series of a precognition task using Zener symbols with 300 high school students. The Personal-Social Motivation Inventory (PSMI, Torrance, 1963) was used in all five series, this measure has been found to consistently distinguish between individuals identified by peers as more or less

Table 7.2

Creativity and ESP: The statistical outcomes of forced-choice paradigms

	Creativity Measurement				
	Divergent thinking (DT)	Independence of judgement	Creative Motivation/ personality	Artistic vs. non-artistic population	Teacher's rating of pupils' creativity
Levine & Stowell (1962)	Ns, positive trend, $n = 69$ (no statistics cited, so r taken as 0, and $z = 0$)				
Anderson (1966)					High creativity: $p = .005$, *-t, $n = 145$. Sporadic creativity: $p = .001$, *-t, $n = 361$. 'No creativity', ns, $n = 85$ (estimate for high vs. low df = ∞, $p = .01$, 2-t, then $t = 5.576$, $r = .209$, $z = 3.17$, $n = 230$)
Honorton (1967)	High scorers near chance ($n = 22$) vs. low scorers psi-missing ($n = 39$): $\chi^2 = 23.17$, $p < .00001$, *-t ($z = 4.814$, $n = 61$)		High scorers near chance ($n = 144$) vs. low scorers psi-missing ($n = 156$): $\chi^2 = 16.40$, $p < .006$, *-t ($r = .234$, $z = 4.05$)		
Pang & Frost (1967)			Positive relationship with psi-hitting for males only ($n = 6$) (no stats cited, $n = 16$, estimate $r = 0$, $z = 0$)		
Honorton, Carlson & Tietze (1968)			High vs. low psi scorers, $p = .01$, $n = 110$ (estimate $r = .244$, critical value, 2-t, $z = 2.56$)		
McGuire, Percy & Carpenter (1973)			Significant (positive) No statistics cited, $n = 33$ (estimate, $r = .325$, $n = 35$, $p = .05$, 2-t, $z = 1.87$)		
Schmeidler (1963)	Pooled creativity score: $r = -.34$, $p =$ *, *-t, $n = 25$ ($z = -1.7$)				
Schmeidler (1964)	$r = -17$, ns, *-t, $n = 42$ ($z = -1.102$)	$r = -.33$, $p = .04$, *-t, $n = 42$ ($z = -2.139$)			
Jackson et al. (1977)				ns (no t-test cited, musicians ($n = 20$) 578 hits, non-musicians ($n = 40$) 557 hits, $r = 0$, $z = 0$	
Cumulative r' (Fisher's z')	$r' = .143$** $z = 1.965$, $p = .049$ (2-t)	$r' = -.347$ $z = -2.70$ $p = .007$ (2-t)	$r' = .240$ $z = 4.845$ $p < .0001$ (2-t)	$r' = .000$ $z = .000$ $p = 1.00$ (2-t)	$r' = .212$ $z = 3.17$ $p = .016$ (2-t)
$r' = .175$, $z = 5.727$, $n = 883$, $p < .001$, 2-t (for psychometric measures) $r' = .000$, $z = .000$, $p = 1.000$, 2-t (for artist populations versus controls)					

Note. * Indicates that this statistic was not cited in the report. Underlined results indicate a negative direction, non-underlined a positive direction. Bold lines around a result indicate it is statistically significant. ** Includes pooled Schmeidler (1963) result.

creative, especially in terms of possessing an inquiring, searching, reaching-out and courageous attitude. The Ice Questions Test (Burkhart & Bernheim, 1963) was used in two series; this is a divergent-thinking measure, where the aim is to think of as many original questions about ice as possible, scored for 'fluency' of thought. There was an overall psi-missing trend throughout the series (exact binomial, CR = 2.53, p = .06). However, high scorers on the divergent-thinking task scored significantly better than low scorers (χ^2 = 23.17, p < .00001). This pattern was also found for the PSMI (χ^2 = 16.40, p < .006), where high scorers tended to score above MCE and low scorers below MCE on the ESP task[4]. However, Honorton does not stress in his study that the overall psi effect was mainly due to the 'low-creatives', who scored significantly in the psi-missing direction. There were no significant deviations from chance for 'high creatives'. This rather suggests that low creativity is associated with psi, rather than the conclusion that Honorton draws, that high creativity is associated with psi-hitting.

This relationship was replicated by Honorton, Carlson and Tietze (1968), between scores on Torrance's Creative Motivation Scale and scores on a precognition task by 110 high-school seniors. Of four other measures taken (paranormal belief, expansiveness of drawings, anxiety and interest in a range of activities [non-specified]) creative motivation was the variable that most distinguished high and low scorers on the psi task (p = .01, no further statistics cited). The overall outcome of the study is not reported, however, a graph shows that low creativity was associated with a mean run score of 4.76 (MCE = 5) and high creativity with a mean run score of 5.04, indicating that overall scoring was at chance level with a trend towards psi-missing. Composite scores distinguished between high and low scorers to the greatest degree (p < .01), where high-creative, expansive drawers, who had mid-range degree of interests and who were sheep, scored the highest (no statistics cited). However, again, this report does not highlight the fact that low creatives achieved the greatest deviation from chance scoring.

In a brief report, Pang and Frost (1969) state that they found a relationship between creativity as measured by the Barron-Welsh Art Scale and ESP scores on a card-guessing task (no further specifications given). In general females scored higher on the creativity measure, and the positive relationship between psi-performance and creativity was stated to be particularly evident for males (n = 16, no statistics cited). McGuire, Percy and Carpenter (1973), used the Welsh Figure Preference Test (Welsh, 1952) as a correlate of psi-success on a clairvoyance task. 'Type 2' personalities, characterised as 'creative and intuitive' (having a

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[4] Stanford (1993) retrospectively combined the z-scores for the creativity-group contrasts across the five series, using the method described by Rosenthal (1991), finding that for divergent-thinking z = 4.06, p < .00006 and for PSMI, z = 3.19, p < .002. Stanford shows that low-creatives scored significantly below the MCE (z = -3.44, p = .0006, 2-tailed), while high-creatives did not differ significantly form the MCE, z = .062, p = .792, 2-tailed.

liking for conceptual change and cognitive abstractness) were found to be significantly correlated with psi-hitting (no statistics cited). This had a positive loading in a subsequent regression analysis, while negative loadings were made by dominance and intellectual efficiency, achievement via conformity, well-being and social presence, as measured by the California Personality Inventory. This suggests that a cognitive-style that is abstract and novelty-seeking, not controlled rigidly by goals and rationality, and non-conformist, is associated with psi-success.

Together, these studies tentatively suggest that dimensions of creativity may be associated with 'psi-hitting'. However, in a pilot study, Schmeidler (1963) found no significant correlations between divergent-thinking or Barron's Scale (a measure of independence of judgement and preference for complexity, 1958) and ESP scores on a clairvoyance task, furthermore, these were in a negative direction, pooled creativity scores correlated at $r = -.41$ with psi-hitting. As the divergent-thinking tests were done before the ESP tasks, Schmeidler speculates that those who were enjoying these and doing well on them, resented having to change to the new task, and hence did not perform as well as others, who may have welcomed the change. Alternatively, she suggests that there might be an experimenter effect, affecting more sensitive 'creatives', as the experimenter in this study was described as "unsympathetic to parapsychology" (Schmeidler, 1988, p. 141). In a follow up study, Schmeidler (1964) correlated creativity scores on Barron's Scale and Guilford's Classes of Use test (measuring original ideas for uses of a brick and a wire coat hanger) with performance on a precognition task where 26 ESP calls were made on clock cards. Barron's Scale correlated nonsignificantly and negatively with ESP ($r = -.17$), while 'originality' correlated significantly and negatively with ESP ($r = -.33, p = .04$). These two creativity tasks correlated moderately with each other at .43, but still sharing little variance (18.5%). Almost all of the participants in this study were 'believers in the paranormal', contradicting the trend of Levine and Stowell. Schmeidler suggests that when overall scores are at psi-missing, creativity will correlate negatively with psi, and when overall scores are psi-hitting creativity will correlate positively with psi. However, Honorton (1967) found psi-missing overall, and an improved psi score for creatives, which does not concur with Schmeidler's model. Alternatively, Schmeidler suggests that creative subjects found the psi task too restrictive and resented the task. Schmeidler speculates that if participants see a task as lively and imaginative, they are more likely to do well on it, and suggests that this will be a stronger effect for more creative participants. This may explain why Jackson, Franzoi and Schmeidler (1977) found no difference in psi-success between psychology and music students (a hypothesised 'creative population') on a forced-choice clairvoyance test. Psi scores were at chance overall, musicians obtained an approximate hit-rate of 19.3% (MCE = 25%) and non-musicians

18.6%. The relationship between free-response ESP tests and creativity will be considering in the following section.

Palmer's (1997) magnitude and direction model may explain some of the contradictory results in the experimental creativity-psi literature. Based on previous ideas (e.g. Schmeidler, 1964) Palmer theorises that both the magnitude of the psi effect (overall squared summed deviations from chance) as well as the direction (positive or negative deviation from chance) are influenced by state, trait and contextual factors in the ganzfeld and other psi research paradigms. For example, Palmer found that overall psi in a study encouraging out-of-body experiences was at chance, but there was a large magnitude effect, participants tending either to get a hit or an extreme miss. Palmer argues that linear thinking blocks psi and spontaneity of cognitive-style facilitates psi (as argued by: Stanford 1990; Braud, 1980). Spontaneity and task motivation, he suggests, are correlates of magnitude. As far as creativity goes, then, we might expect aspects of this complex construct that are associated with spontaneity of thought to affect magnitude of the psi-outcome, such as fluency and flexibility of cognition in the ganzfeld, perhaps as revealed on tests of divergent-thinking. Palmer suggests that direction is affected by 'comfort' and anxiety during the testing procedure. This model would explain the mixed results of the forced-choice studies above, by arguing that creativity is associated with the strength of a psi-effect, which may manifest in either psi-hitting or psi-missing depending on situation variables, such as the experimenter effect or task demands. This model does not fully account for low creatives accounting for the psi effect in Honorton's studies. If they were more comfortable with a repetitive task one would expect them to score in a positive direction. Perhaps they were more likely to be 'non-believers in the paranormal' and hence psi-miss?

Anderson (1966) reports a forced-choice clairvoyance study within a fantasy setting. This involved the 'launching of a rocket' (produced through psi-hitting on various 'rocket launching procedures') with children at an elementary school (591 pupils, in grades 1-6, taught by 22 teachers). Defining creativity as behaviour that is: original, spontaneous, fresh and unstructured, Anderson asked teachers to rate each pupil as displaying either: high creativity; sporadic signs of creativity; or no signs of creativity. The study obtained overall psi-hitting (no statistics cited), the rocket being successfully launched, amongst much excitement. Interesting trends with teachers' creativity ratings emerged. The 'highly creative' group obtained significant psi-hitting (p = .005) (no test-statistics cited). The 'sporadically creative' group obtained significant 'psi-missing' (p = .001). Psi-missing may be thought of as the repression of psi, probably by unconscious psychological processes, although unless replicated, it may simply reflect chance variation around the mean. The group displaying 'no

signs' of creativity scored at chance. Anderson does not discuss the implications of this effect, rather she focuses on the importance of creating a psi-conducive atmosphere in terms of motivation, enthusiasm, fantasy involvement and expectation of success.

This study raises the question whether *degree* of creativity or consistency of creative performance may play a role in psi-hitting, as well as *type* of creativity. Further consideration of the moderating variables of creative behaviour in this context may elucidate why 'consistent' creative behaviour was associated with psi-hitting, and sporadic creativity with psi-missing in this fantasy context. For example, in terms of the magnitude-direction model, it may be that creative spontaneous behaviour is associated with the magnitude of the psi effect (deviation from chance) and that a moderating variable associated with comfort (e.g. extraversion) may interact with this to: a) affect the direction of this deviation (psi-hitting or psi-missing); and b) affect the consistent demonstration of creative behaviour at school. This interpretation is of course entirely speculative, yet demonstrates the complexity of the issue, concurring with Towle (1969) who argued that creativity is a necessary but not a sufficient criterion for psi experiences, suggesting interaction effects with other variables.

We may use the idea of 'degree' of creativity to re-interpret the contradictions inherent in Honorton's and Schmeidler's results. For example, if Honorton's sample was composed of a small number of 'high creatives' and a larger number of 'sporadic creatives', it might be expected that there would be overall psi-missing, but that within this, 'high creativity' would be correlated with psi-hitting. In Schmeidler's study, if participants were predominantly 'high creatives' we would expect to obtain overall psi-hitting as well as the positive relationship between high creativity and psi-hitting. However, in this crude model, the best way to measure the construct of 'psi-conducive high creativity' is not clear!

7.7.1.1 Summary

The early forced-choice studies reviewed above indicate that if there is a relationship between creativity and psi-hitting, it emerges in a complex interactive system. Despite giving us no clear answers, these studies produce some interesting insights, suggesting that: the overall psi-outcome of the study; the kind of creativity measured; the degree of creativity possessed; and the type of psi task involved, should all be considered as variables that may impact directly upon the observed relationship between creativity and psi. As should the wider intra- and inter-personal context, where other personality variables and the social environment may additionally affect the magnitude or direction of the outcome. This noted, despite the small number of studies ($n = 9$), there is an overall cumulative significant effect, albeit with a small effect size, where creativity and psi-outcome are positively related ($r' = .175$, $z = 5.727$, $n = 883$, $p < .0001$).

7.7.2 Free-response studies: Creativity and psi

Refer to Tables 7.3 and 7.5 for summaries of free-response psi research, in which it can be seen that a number of creativity measurements have been used: self-perceived creativity, involvement in creative activities, divergent-thinking, figural preference, creative personality and membership of 'artistic populations'. Initially, two things are striking in these tables: a) all of the free-response studies with participants drawn exclusively from artistic populations are in the psi-hitting direction, and are predominantly statistically significant; and b) that there are again conflicting patterns with psi-outcome and psychometric tests of creativity, some results being significantly correlated with psi-hitting and some with psi-missing and some results being at chance level. This suggests that the psychometric tests of creativity used may not be measuring the factor that appears to make artistic populations perform well in free-response studies.

However, when we look at the results of the psychometric measures in two groups: a) studies using artistic populations (ten studies); and b) studies using non-artistic populations (seven studies); an interesting pattern can be observed. For artistic populations there is only one (out of eight) marginally significant outcome with a psychometric measure taken (all have low effect sizes:-.12 to +.12). However, for studies working with psychology students or members of the general population, five studies (out of nine) show significant outcomes with psychometric measures of creativity: three with psi-hitting and two with psi-missing (with effect sizes from -.60 to +.37). Although it must be reiterated that artistic involvement does not indicate creativity per se, these seventeen free-response studies together indicate that 'creativity' or some correlate of creative persons does impact upon the manifestation of psi in experimental studies. What we can learn from these studies about how this might be, will be explored in the remainder of this section.

7.7.2.1 Free-response studies with artistic populations

The first free-response study exploring psi amongst 'artistic populations' was conducted by Moss and Gengerelli (1968), using emotionally charged targets in a telepathy design. They found, post hoc, that psi-hitting was higher when the sender-receiver pairing included at least one artist. The 'sender' was bombarded visually and aurally by emotionally charged episodes, while at the same time the 'receiver' recorded their stream of consciousness. There were three pairs of two pictures with associated sounds, which were grouped so as to be sufficiently different from each other in emotional content (tiger and tree; space and drunk; Madonna with child and Van Gogh). One from each of these pairs was randomly presented to the sender. Hence, for each trial the sender focused on three targets in a random order. The receiver saw all of the pairs, in an independent random order, and selected one from each pair that matched

their impressions (each target had a 50% hit-rate). A post hoc analysis, divided the 72 pairs into the following groups: 'both artists', 'one an artist' and 'neither an artist'. There was significant psi-hitting for the 'both artists' group (p = .003, 2-tailed, n = 12 pairs) and 'one an artist' group (p = .0009, 2-tailed, N = 14 pairs). There was nonsignificant psi for the group with no artists (p = .973, N = 46 pairs). (No test statistics or hit-rates were cited, however, the present author conducted a Chi square test on the data, and pairs with at least one artist (N = 26) had significantly greater psi-hitting (2 or 3 hits out of the three pairs) than pairs with no artist/s, where $\chi^2 = 20.757, p = .000004$, 2-tailed.

In a confirmatory study, Moss (1969) compared a group of professional artists (painters, composers, actors and writers, 30 pairs) and non-artists (teachers, secretaries, engineers and housewives, 43 pairs) on the same ESP task (with different images). As predicted, the artists group scored significantly higher than the non-artist group $\chi^2 = 3.95, p = .05$. The artist group (n = 30) achieved significant psi-hitting (p = .003, 1-tailed), while the non-artist team (n = 43) did not achieve significance (p = .38, 1-tailed). Examining the interaction between being an 'artist vs. non-artist' and 'having had an SPE and never having had an SPE', revealed that only the 'artist-SPE' group (n = 17) independently achieved significant psi-hitting (p = .006). There was no significant main effect for SPEs. Gelade and Harvie (1975) attempted a further replication of the 'artist-effect' with 40 sender-receiver pairs. All 40 receivers were artists, and 15 senders were artists. The overall psi effect was at chance (HR = 49.5%, MCE = 50%), however, artist/artist pairings scored higher (HR = 60%) than artist/non-artist pairings (HR = 44.4%). Gelade and Harvey, report that the artist-pairs did not achieve significant psi-hitting (CR = 1.6, p = .10). However, Palmer (1978) conducted a post hoc chi-squared analysis to show that the artist pairs did score significantly better than pairs with one or no artists (no statistics cited, see Table 7.3 for the results computed by the present author). These results contrast with the lack of significant difference in performance in a forced-choice ESP study between an artistic population (music students) and psychology students (Jackson et al., 1977), suggesting that there is something about being 'an artist' that may be associated with psi-hitting in free-response studies.

Moon (1973) took a different approach, comparing the performance of visual art students and students from the sciences and humanities on a word-association ESP task. Participants listened to 40 stimulus words on a tape, which had 15-seconds intervals between each word, in which time they were asked to speak aloud the first word that 'popped into their mind'. Meanwhile, a sender (usually Moon himself) held a list of the stimulus words and a 'target word', out of view of the participant. Two target words had been chosen for each stimulus word – stimulus words were chosen as those, for which, according to word-association norms,

Table 7.3

The statistical outcomes of creativity and ESP studies using free-response protocols with artistic populations

	Creativity Measurements				
	Self-reported creativity	Creative Activities	Divergent thinking	Creative Motivation	Artistic population psi-outcome
Moss & Gengerelli (1968)					Pairs including artist (n = 26): psi-hitting: p = .000005, 2-t. No artists (n = 46): p = .973, 2-t (χ^2 = 20.757, p = .000004, 2-t, r = .537, z = 4.556, n = 72)
Moss (1969)					Artist pairs (n = 30) scored higher than non-artist pairs (n = 43): χ^2 = 3.95, p = .05, r = .232, z = 1.987, n = 73 (artists psi-effect, p = .003, 1-t, n = 30)
Gelade & Harvey (1975)					Both artist pairs (n = 15) scored higher than other pairs (n = 25): (χ^2 = 4.2, p = .028, 2-t) r = .324, z = 2.049, n = 40 (artists, n = 15, p = .10)
Moon (1973)					Visual artists psi scores differ from MCE: t = 2.10, p < .05, 2-t. Non-visual-artists: t = .22, ns. Diff between groups ns, t = 1.46, 1-t, n = 80. (r = .162, z = 1.449)
Dalton (1997)		KMMPI: *rho* = -.117, ns (z = -1.324)	PJ: *rho* = .00, ns, TTCT: *rho* = -.07, ns, n = 128 (z = -.792)	SAM: *rho* = -.087, ns (z = -.984)	47% HR, ES(h) = .46, p = .00000007, n = 128
Schlitz & Honorton (1992)			r = -.12, p = .691, n = 20 (z = -.537)		50% HR (z = 2.20, p = .014, ES(h) = .52), n = 20
Morris, Dalton, Delanoy & Watt (1995)	*rho* = .090, ns, n = 97 (z = .886)	*rho* = -.040, ns, n = 97 (z = -.394)			33% HR, z = 1.67, r = .170, p < .05, n = 97
Morris, Cunningham, McAlpine & Taylor (1993)	*r = .110, ns, n = 32 (z = .622)*	High vs. low SP creativity in visual arts and music: higher psi scores, t = 2.20, p < .025, 1-t (r = .367, z = 2.104)			41% HR, p<.05, r=.325, 1-t, n = 32
McDonough, Don & Warren (1994)					30% HR, p = .38, 1-t, n = 20
Morris, Summers & Yin (2003)					38% HR, p = .05, 1-t, ES(h) = .26, n = 30
Cumulative r' (Fisher's z')	r' = .095 z = 1.036 p = .300 (2-t)	r' = -.026 z = .074 p = .941 (2-t)	r' = -.041 z = -.616 p = .538 (2-t)	r' = -.087 z = -.984 p = .326 (2-t)	

r' = -.021, z = -.408, n = 790, p = .300, 2-t, (for psychometric measures)
r' = .328, z = 4.931, n = 265, 2-t, p <.0001, 2-t (for artist populations versus controls)

Note. Underlined results indicate a negative direction, non-underlined a positive direction. Bold lines around a result indicate it is statistically significant.

the most common two responses (primary and secondary) covered the highest percentages of total responses. The probabilities of responding with a primary or secondary word were thus calculated for each word. Each participant was randomly allocated one out of four possible such lists of 40-stimulus-words and each had randomised order of words and target word (either the primary or secondary association). Moon calculated the chance probability of speaking the target word aloud and compared this to the observed words spoken aloud. The artists' spoke the 'target' association aloud significantly more often than that expected by chance ($t = 2.10, p < .05, n = 40$, 2-tailed), while those of non-artists did not differ from MCE ($t = .22$, ns, $n = 40$). However, there was no significant difference between the scores of artists and non-artists ($t = 1.46$, ns). This outcome does not support the superior ESP performance of artists found in the work discusses above (e.g. Moss, 1969), although artists alone did obtain a significant ESP effect, in favour of the 'artist psi-ability' hypothesis.

The remainder of the free-response studies to be discussed in this sub-section employed the ganzfeld technique. Bem and Honorton (1994), in a meta-analysis of ganzfeld studies suggested that artistic involvement (particularly musical) is a psi-conducive variable, along with belief in psi, extraversion, the use of a dynamic target set and the promotion of a warm social ambiance. A total of six ganzfeld studies have targeted artistic populations, achieving a combined hit-rate of 40% ($r = .344, p = 1x10^{-9}, n = 336$) (Dalton, 1997; McDonough, Don & Warren, 1994; Morris, Cunningham, McAlpine & Taylor, 1993; Morris, Dalton, Delanoy & Watt, 1995; Morris, Summers & Yin, 2003; Schlitz & Honorton, 1992). These artistic populations have scored higher than the general populations in ganzfeld studies, meta-analyses giving hit-rates of 32% in the PRL ganzfelds (Bem & Honorton, 1994) and 30% in ganzfelds post PRL (Bem, Palmer & Broughton, 2001).

Two ganzfeld studies with artistic populations also used established psychometric measures of creativity (Dalton, 1997; Schlitz & Honorton, 1992). Schlitz and Honorton obtained a highly significant hit-rate of 50% ($p = 0.014, n = 20$) with students at the Julliard School of performing arts. Similarly, Dalton achieved a high overall hit-rate of 47% ($p = 7x10^{-8}, n = 128$) with artistic groups drawn from full-time professionals and students in Edinburgh. Dalton (1997) found no overall significant correlations between divergent-thinking scores and psi-outcome, using both Possible Jobs (PJ, Guilford, 1959) (*rho* = .000) and the Torrance Tests of Creative Thinking (TTCT, Torrance, 1979) (*rho* = -.068). Neither did she find overall significant correlations with 'Something About Myself' (SAM, Khatena & Torrance, 1976), a measure of creative thinking strategies and personality (*rho* = -.087) or the Khatena-Morse Multitalent Perception Inventory (KMMPI, Khatena & Morse, 1990), a measure of creative interests and activities (*rho* = -.117). Likewise, Schlitz and Honorton

(1992) found no significant correlation between scores on the TTCT and psi-outcome. Although, when two exceptionally high scorers on the TTCT were removed there was a positive correlation between psi-hitting and divergent-thinking (r = .41, p = .045). One post-hoc explanation Schlitz and Honorton give for this is that exceptionally high divergent-thinking abilities may be associated with psi-missing as "any psi signal may be drowned out in a ... powerful uprush of creative ideas" (p. 94). Dalton suggests that the TTCT might not measure the dimension of creativity that may be related to anomalous cognition, raising the question of what dimension of creativity, if any, may be related to psi. Alternatively, Dalton considers other variables that might be associated with high hit-rates to be open perceptual/cognitive-styles or the possession of less conventional belief systems. However, she found no overall significant correlations openness-to-experience (*rho* = -.190) and psi-outcome (as measured by the NEO), or extraversion (*rho* = .021). Schlitz and Honorton list unique characteristics of the Julliard population in contrast to the general PRL population: being younger; having a lower belief in psi; reporting fewer psi experiences; being more competitive; and enjoying performing in public. Both divergent-thinking and psi-performance correlated positively with extraversion (MBTI) at a significant level, suggesting that creativity and extraversion may be confounded in this study. They speculate that their sample's enhanced performance may be due to a number of factors apart from creativity: self-confidence; self-discipline; enjoying new challenges; expectations of success; and being competitive within themselves, stretching their levels of achievement. As experimenters with 'psi-conducive' track records ran both these studies, the possibility of an experimenter effect must be considered as one explanation for the high hit-rates observed in these two studies.

A number of automated ganzfeld studies at the Koestler Unit at Edinburgh University, corroborate the above effect, working with artistic populations recruited from local art and music colleges and artistic communities (Morris, Cunningham, McAlpine & Taylor, 1993; Morris, Dalton, Delanoy & Watt, 1995; Morris, Summers & Yin, 2003). Morris, Cunningham, McAlpine and Taylor report a ganzfeld study run by Cunningham with 32 musicians and visual artists, which obtained a hit-rate of 41% ($p < .05$, 1-tailed). Extraversion (as measured by the NEO-PI-R, Costa & McCrae, 1985) was correlated with psi-hitting (r = .43, $p < .01$, 1-tailed), this being attributed to the subscales of: activity, excitement seeking and positive emotions. Self-rated creativity did not correlate significantly with psi-success (r = .109); however, sixteen participants who rated themselves as 'highly creative' in both music and visual art (n = 16), in contrast to 'average to low creative' (n = 4), scored significantly better in terms of psi-success ($p < .03$, 1-tailed). With such a small number of low creatives however, this finding is highly tentative. As participants were selected for artistic interests and a belief in psi, these factors may be confounded in this population.

Morris, Dalton, Delanoy and Watt obtained significant psi-hitting (33% hit-rate, $z = 1.67$, $p < .05$, 1-tailed, $n = 97$). The artists achieved an overall hit-rate of 39% (significant at $p = .02$), while the musicians achieved a hit-rate of 26%, which was nonsignificant. A significant negative correlation between the extraversion subscale of positive emotions and psi-outcome ($r = -.317$, $p < .01$) was found, reversing that of the Cunningham study. No significant correlations emerged between either self-reported creative activities (*rho* = .086) or self-perceived creativity (*rho* = -.044) and psi-hitting in the ganzfeld. However, only three participants rated themselves in the lower half of the ten-point response scale, and 97 in the high half, strengthening the argument for a ceiling effect. Morris, Summers and Yin obtained significant psi-hitting ($p = .005$, 1-tailed) with a 38% hit-rate, using an artistic population (musicians and visual artists). A significant correlation was found between psi-success and extraversion (*rho* = .32, $p = .02$, 1-tailed), which was found to exist for the artists only (*rho* = .47, $p < .05$). No artists in the study were introverts, hence, might extraversion rather than artistic behaviour may be responsible for the psi effect? It is not clear, whether this extraversion effect was due to social adjustment factors or to low baseline levels of cortical arousal (Eysenck, 1967).

Finally, McDonough, Don and Warren (1994) explored EEG correlates of psi-success in the ganzfeld with a group of professional artists including actors, writers, dancers, musicians and visual artists. A hit-rate of 30% was achieved for receiver rankings of the target, which is above chance, but not significantly so (exact binomial, $p = .38$, 1-tailed, $n = 20$). This is within the 95% confidence interval (29% to 71%) estimated for artistic populations (Schlitz & Honorton, 1992). However, the experimenter's subsequent rankings based on the receiver's mentation, made prior to discovery of the target, were significant, with a 45% hit-rate (exact binomial, $p = .042$, 1-tailed). This indicates either that the experimenter was guided by their own psi, or that they were more objectively able, perhaps due to experience in the ganzfeld, to detect target relevant mentation. This also indicates, as Sondow (1986) argues, that different abilities are associated with psi-success at different stages of the ganzfeld: a) psi-imagery entering awareness; and, b) this psi imagery is discerned and successfully related to the target. The artistic population in this study may be more skilled at the prior rather than the latter.

7.7.2.1.1 Different artistic groups and psi in the ganzfeld

As Bem and Honorton (1994) suggested that musical involvement in particular was associated with psi-hitting in particular (largely based on the results of Schlitz & Honorton, 1992), a consideration of the psi-success of different artistic groups is in order. Table 7.4 reveals a breakdown of hit-rates of different groups of artists for those studies that reported this

information. This indicates that members of different artistic disciplines have performed at a similar level across studies, with visual artists slightly outperforming other groups.

A deeper analysis of Dalton's (1997) data reveals that different artistic subgroups showed different relationships with creativity measures and psi-success. For visual artists and writers no significant correlations were observed between psi-success and verbal divergent-thinking (*rho* = -.188 and -.166 respectively). However, for musicians there was a significant positive correlation (*rho* = .358, $p < .02$, 2-tailed) and for actors there was a significant negative correlation (*rho* = -336, $p < .05$, 2-tailed). Bearing in mind that these groups all scored psi-hitting overall, these internal effects suggest that divergent-thinking does impact upon psi-hitting, but that it was not the factor that contributed to overall psi-success of these populations. The patterns of correlations with *z*-scores within each artistic group will be considered in hope of elucidation, bearing in mind that no corrections for multiple-analysis have been made.

Table 7.4

Hit-rates of different artistic disciplines in the ganzfeld

Research study	Music	Dance	Drama	Visual Art	Writers
Schlitz & Honorton (1992)	75% ($n = 8$)	0% ($n = 2$)	40% ($n = 10$)		
Dalton (1997)	56% ($n = 32$)		41% ($n = 32$)	50% ($n = 32$)	41% ($n = 32$)
Morris et al. (1995)	26% ($n = 39$)			39% ($n = 57$)	
Morris et al. (2003)	32% ($n = 22$)			44% (n=18)	
Overall	41% ($n = 101$)		41% ($n = 42$)	43% ($n = 107$)	41% ($n = 32$)

Note: MCE = 25%

Amongst visual artists significant negative correlations emerged between psi-hitting and SAM (*rho* = -,401, $p < .05$, 2-tailed) and KMMPI (*rho* = -500, $p < .01$, 2-tailed) (particularly with artistry, leadership and musical subscales), and with the amount of mentation produced in the ganzfeld (r = -.342, $p < .02$, 2-tailed). Dalton suggests that an abundance of verbalisation may inhibit receivers from entering an ASC. Extraversion correlated negatively with psi-hitting (*rho* = -.341, $p < .05$, 2-tailed), and there was small effect size, where elaboration (the embellishment or development of an idea in intricate detail) on the figural form of the TTCT correlated with psi-missing (*rho* = .240, ns). This suggests that for the artists feeling comfortable in the task, and becoming involved in speaking aloud and developing ideas in the ganzfeld was associated with missing the target.

Amongst the writers, SAM was correlated positively with psi-hitting (*rho* = .301, $p < .05$, 2-tailed), where the subscale of 'self-strength' (being confident, resourceful and versatile) was independently significant (*rho* = .419, $p < .02$, 2-tailed), as was 'individuality' (being a 'self-starter' and eccentric) (*rho* = .423, $p < .02$, 2-tailed). Conscientiousness on the NEO was positively correlated with psi-hitting (*rho* = .419, $p < .02$, 2-tailed). A different picture emerges for this group, where self-belief, independence and confidence, and perhaps carefully working towards goals are associated with psi-hitting.

Amongst the musicians, in addition to verbal divergent-thinking correlating positively with psi-hitting overall, two sub-scales were independently significant: flexibility (*rho* = .367, $p < .05$, 2-tailed) and originality (*rho* = .359, $p < .05$, 2-tailed). Intellectuality on SAM was correlated with psi-missing (*rho* = -.487, $p < .01$, 2-tailed), as was openness-to-experience (*rho* = .487, $p < .01$, 2-tailed) and structured mental activity in the ganzfeld (*rho* = .504, $p < .01$, 2-tailed). Extraversion correlated nonsignificantly with psi-hitting (*rho* = -.297). This suggests that for this group, the ability to shift between types of ideas and to have unusual ideas was psi-conducive, while intellectuality and structured cognition was psi-inhibitory. It is of interest that while musicians had the highest psi scores, they also scored lowest on the TTCT (in the 45th percentile of normative data, while other groups were between the 52nd and 58th percentiles). This fits with the idea that there is a positive relationship between psi-hitting and divergent-thinking unless there is 'too much' divergent-thinking.

Amongst the actors, the only variable to correlate significantly with psi-outcome was verbal divergent-thinking, in a negative direction, (on which they scored in the 58th percentile). Flexibility independently correlated with psi-missing (*rho* = .432, $p < .02$, 2-tailed). Hence, for the actors, the ability to shift between different ideas did not facilitate psi-hitting, as it did for the musicians, but inhibited it.

7.7.2.1.2 Summary of artistic populations in free-response psi paradigms

At this point, a brief consideration will be made of the experimenter effect (EE) in ganzfeld research as a potential explanatory variable for the high hit-rates in these ganzfelds. The highest hit-rates have been obtained by Schlitz and Honorton and by Dalton, all of whom are well known for being psi-conducive experimenters. Indeed, there was an EE in the Morris et al (1995) ganzfeld study reported above, where Dalton was solely responsible for the overall significant outcome. The joint research into the experimenter effect by Wiseman and Schlitz (1998) have suggested that Schlitz appears to be a psi-conducive experimenter, while Wiseman elicits psi-performance at chance levels. However, there have been ten free-response studies with artistic populations, with the involvement of 19 different experimenters,

and six different research labs. This suggests that some quality of the population may be contributing to the psi-outcome. In addition, four free-response studies (Gelade & Harvey, 1975; Moon, 1973; Moss & Generalli, 1968; Moss, 1969) involved non-artistic 'control' groups, whom artists outperformed ($r' = .328$, $z = 4.931$, $n = 265$, $p < .00001$). However, it is not clear in these studies if the experimenters were blind or not to participant's artistic status, hence an EE could still have occurred.

Hence, it appears that there is something about artistic populations that is 'psi-conducive'. It is not clear if this is due to any dimension of creativity or not. A number of variables could be responsible for the effect: self-confidence and positive motivation, extraversion, or open belief systems. Although due to the contradictory correlations with extraversion and belief-in-the-paranormal in these six studies, in these studies, it does not appear that these solely account for the psi effect, suggesting that there may be interaction effects or that a different factor is responsible (e.g. experimenter effects). Self-confidence, a purported trait of the Julliard sample, was found to correlate with psi-success on a conscious ESP task by Nicol and Humphrey (1953). It may be that artistic individuals are highly motivated in general (Schlitz & Honorton, 1992) or that they tend to have a high belief-in-the-paranormal (Moon, 1975) and therefore have positive expectations of success in psi tasks. Or it may be that they tend to be extraverted (Morris et al., 2003), and are more comfortable with free-response designs. It may be that artists are comfortable with the idea of a loose associative 'performance' and an inner searching that is required in many free-response studies.

In addition, the degree of creativity must be considered, both in terms of: a) ceiling effects that occlude relationships; and, b) too little (rigid) or too much (chaotic) divergent-thinking being associated with psi-missing. Consideration of possible interactions between intra-personal variables is important, and this requires further consideration in future research. Finally, the social and experimental environment may affect psi-outcome, both in terms of experimenter effects, and the task demands of particular paradigms.

7.7.2.2 Free-response studies with 'non-artistic' populations

The remainder of the free-response studies that will be discussed have not worked exclusively with 'artistic populations', but with a mixture of undergraduate students and opportunity sampling from the general population. These include two precognition experiments (Bierman, 1995; Rebman, Radin & Stevens, 1996), one clairvoyance study (Braud & Loewenstern, 1982); two ganzfelds (Roe, Ali & McKenzie; 2001; Sondow, 1986), one dream ESP study (Wilkinson, 2003) and one ESP study seeking to encourage 'hallucinatory' experiences in the receiver (Simmonds, Fox & Holt, 2002). It is noticeable that these studies do not achieve a

uniform trend towards psi-hitting. They do, however, reveal more significant outcomes with creativity measures, in both psi-hitting (three studies) and psi-missing directions (two studies). These five studies set out to intentionally explore the links between creativity and psi, and hence used psychometric measures of creativity. Two additional studies reported correlations between psi-performance in the ganzfeld with creativity questions from participant information questionnaires (self-reported creativity and involvement in creative activities) (Roe, Holt & Simmonds, 2003; Roe, Sherwood & Holt, 2004).

Braud and Loewenstern (1982) found that out of 20 teenage girls, those who were successful on a free-response clairvoyance task, where a randomly selected static picture was concealed in a brown envelope as the target, obtained significantly higher creativity scores than 'missers' on the Alternate Uses Test (Guilford, 1952), $U = 21$, $p < .05$, 2-tailed (a measure of verbal divergent-thinking, focusing on 'spontaneous' and 'adaptive flexibility'). A 35% direct hit-rate, the target being identified from amongst 3 decoys, was obtained ($z = 1.03$, ns), however, success on the study was determined by binary hits, which was in a psi-missing direction (HR = 45%, MCE = 50%, $z = -.45$, ns). Braud and Loewenstern interpreted the relationship between divergent-thinking and psi-hitting in terms of the spontaneous flexibility required to perform well on this creativity measure.

Roe, Ali and McKenzie (2001) found a statistically significant relationship between figural creativity on the Torrance tests of Creative Thinking (TTCT, 1974) for receivers and psi-success in the ganzfeld ($r = .374$, $p = .036$, 1-tailed). Extraverted receivers performed better than introverts, but nonsignificantly ($t = 2.80$, $p = .09$, 1-tailed). For the sender there was a positive trend where verbal divergent-thinking correlated with ganzfeld performance at $r = .366$, $p = .08$, 1-tailed. This suggests that different types of creative thinking may be associated with different roles in anomalous communication, receivers requiring imagistic flexibility, which may be related to metaphorical, dream-like or hypnagogic states of consciousness, while senders flexibly shift between concepts and ideas as part of a more 'focused' SC, using a 'creative' sending strategy, thinking of new ideas with which to 'communicate'. For the receiver, figural fluency ($r = .43$, $p = .03$, 2-tailed), flexibility ($r = .41$, $p = .05$, 2-tailed) and originality ($r = .41$, $p = .07$, 2-tailed) were associated with psi-hitting, to a suggestive degree, but not elaboration ($r = ..182$, $p = .352$, 2-tailed), the development of ideas.

Sondow (1986) found no significant relationships between self-reported creativity ($r = -.05$), scores on the Barron-Welsh Revised Art Scale, BW (1963), a measure of preference for figural complexity ($r = .17$), Barron's Scale (1958) of independence of judgement ($r = .06$), or a tolerance for ambiguity scale (Budner, 1962) ($r = .09$) and psi-hitting in the ganzfeld. A

Table 7.5

The statistical outcomes of creativity and ESP studies using a free-response protocols with 'non-artistic' receivers

	Creativity Measurement						
	Self-reported creativity	Creative Activities	Divergent thinking	Emotional Creativity	Figural Preference	Creative Personality	Psi-outcome
Braud & Loewenstern (1982)			Binary hitters > flexibility vs. missers: $U = 21$, $z = -.204$, $p < .05$, 2-t ($r = .493$)				Binary hits: 45%; $z = -.45$, ns. 35% HR, $z = 1.03$, ns $n = 20$
Sondow (1986/1987)	$r = -.05$, ns ($z = -.387$)				FP: $r = .170$, ns ($z = .317$) IJ: $r = .060$, ns ($z = .465$) TA: $r = .090$, ns ($z = .697$)		30% HR, $n = 60$, ns
Bierman (1995)		Involvement (psi-hitting) vs. non involvement: $F = 2.16$, $p = .045$, $n = 104$ ($z = 1.469$)					170 trials, mean z-score = .055 (t-test against MCE, $t = .51$, ns)
Rebman, Radin & Stevens (1996)	$r = .036$, $p = .054$ ($z = 1.47$)						$Z = -.175$, $p = .861$, 2-t, 1961 trials, $n = 1675$
Roe, Ali & McKenzie (2001)		$r = .374$, $p = .036$, 1-t, $n = 24$ ($z = 1.832$)					21% HR, $z = -.24$, $p = .41$, 1-t, $n = 24$
Simmonds, Fox & Holt (2002)					$r = -.6$, $p < .01$, 2-t, $n = 20$ ($z = 2.68$)		10% HR, $z = 2.4$, $p = .020$, 2-t, $n = 20$
Wilkinson (2003)			$r = -.57$, $p = .05$, 2-t ($z = -3.122$)				43% HR, $p = .06$, 1-t, $n = 30$
Roe, Holt & Simmonds (2003)	$rho = -.101$, $p = .536$ ($z = -.639$)						35% HR, SOR=87, $z = 1.77$, $p = .038$, 1-t ($n = 40$)
Roe, Sherwood & Holt (2004)	$rho = -.392$, $p = .014$ ($z = -2.498$)						25% HR, SOR=103, ns ($n = 40$)
Cumulative r' (Fisher's z')	$r' = .020$ $z = 1.433$ $p = .158$ (2-t)	$r' = .145$ $z = 1.469$ $p = .142$ (2-t)	$r' = .460$ $z = 2.817$ $p = .005$ (2-t)	$r' = -.648$ $z = -3.122$ $p = .002$ (2-t)	$r' = .107$ $z = 1.431$ $p = .152$ (2-t)	$r' = -.693$ $z = -2.68$ $p = .007$ (2-t)	
All psychometric measures combined: $r' = .036$, $z = 1.627$, $n = 2163$, $p = .116$ (2-tailed)							

Note. Underlined results indicate a negative direction, non-underlined a positive direction. Bold lines around a result indicate it is statistically significant. IJ = Independence of Judgement; TA = Tolerance for Ambiguity; FP = Figural Preference.

nonsignificant hit-rate of 30% was obtained. Being able to 'effortlessly experience' images, having detailed images, low control over the next image, and allowing imagery to 'just happen' were all correlated with psi-missing. Females scored in a psi-missing direction, (3 hits in 30 trials, $z = -1.9$, $p < .06$, 2-tailed) and males presumably in a psi-hitting direction (no statistics cited). Sondow (personal communication, 2004; 1987) suggests that 'effort' may be masking relationships between creativity and psi for females. When 'effort' was partialled out, there was a positive relationship between cumulative creative scores and psi $r = .28$, $p < .08$, for females. The correlation between preference for complexity (BW) and psi-outcome was independently significant (no statistics given) and the other measures showed positive trends: self-reported creativity ($r = .18$), independence of judgement ($r = .26$) and tolerance for ambiguity ($r = .16$).

Simmonds, Fox and Holt (2002) used a sending-receiving paradigm where the receiver watched random configurations of pixels on a computer screen, to encourage pseudo-hallucinations, 'looking for meaning in randomness'. Given that creative individuals are more willing to identify and develop themes, images and metaphors in ambiguous stimuli (Smith & Faeldt, 1999), creativity was expected to correlate with psi-outcome. There was overall significant psi-missing ($z = 2.4$, $p < .016$, 2-tailed). Both confidence of guessing the target correctly, and similarity between imagery and the target correlated significantly with creative personality (Gough, 1979), where $r = -.60$, $p < .01$, 2-tailed. This procedure may have produced too many mental associations, exacerbated in creative personalities. Such embellishment of one's perceptions and continual changes in mental content may lead in diverse directions, away from the initial percept, symbol, image, metaphor, sensation or feeling, and lead to and through ideas tangential to possible psi signals.

Wilkinson (2003), in an unpublished undergraduate dissertation project at University of Northampton, compared ESP dream performance with extraversion and emotional creativity. Overall psi-hitting was at 43%, above chance expectation (25%), but not significantly so ($p = .06$, 1-tailed). Extraversion (Eysenck, 1985) showed a positive nonsignificant trend with psi-hitting ($r = .34$, $p = .23$). Emotional creativity correlated with psi-missing ($r = .57$, $p = .054$) and with belief-in-the-paranormal ($r = .57$, $p = .051$). Emotional creativity was seen earlier to correlate highly with a proclivity to experience ASCs and with boundary permeability. This study again suggests that sensitivity or openness to internal experience, associated with creativity, may in certain contexts be associated with psi-missing, and that this appears to be independent of the extraversion effect.

The final two studies to be discussed were free-response precognition study on the world-wide-web. Bierman (1995) found a significant difference in psi scores between those who had

artistic interests (dance, music, painting) and those who did not, where $F = 2.16$, $p = .045$. The overall direction was in towards psi-hitting, but was non-significant. The mean *z*-scores were the highest for dance (active) ($z = .77$) and music (passive) ($z = .26$). The overall psi-outcome was nonsignificant ($n = 104$, $t = .051$). Rebman, Radin and Stevens (1996) report a positive trend between self-reported creativity and psi-hitting ($r = .036$, $p = .054$), however, the effect size is tiny, and smaller than the non-significant correlations reported with the artistic populations.

In summary, this author would suggest that these results indicate that there is a need to consider the interaction between different dimensions of creativity and their interaction with different psi tasks. For example, flexibility of thinking may in some tasks be over-stimulated and lead to too much 'cognitive noise', concurring with the idea that 'creative' individuals may experience too much of an 'uprush' of imagery in the ganzfeld (Schlitz & Honorton, 1992), making it difficult to identify the target amongst a plethora of impressions, thereby increasing the 'noise to signal ratio'.

7.8 Creativity and psi: Similar intrapersonal correlates?

In this section, the role of intrapersonal variables that may be related to both psi and creativity are considered. Might these be confounding factors in the creativity-psi literature? It is possible that the inflated psi-scores of artists in free-response ESP studies might be due to attributes of these populations that are associated with a psi-conducive profile, other than 'being an artist' or creativity. It will be argued here that key potential confounds are: belief in the paranormal, extraversion, self-confidence and a proclivity to unusual experiences or intrapersonal openness.

In the meta-analyses of the PRL database Bem and Honorton (1994) considered belief in psi, prior psi experience, meditation practice, extraversion and creativity to be important intrapersonal 'psi-conducive' variables in the ganzfeld. Milton and Wiseman (1999) argued that there is evidence in the PRL database for superior performance among those who reported prior psi testing and extraversion only, and evidence for the practice of mental disciplines in subsequent ganzfeld studies. Another meta-analysis found extraversion to be associated with psi-hitting in the ganzfeld (in free-response studies only) ($r = .20$, $z = 4.82$, $p = 1.5 \times 10^{-6}$) (Honorton, Ferrari & Bem, 1998). Belief in psi was found to be a significant mediating variable for psi-success according to a meta-analysis by Lawrence (1993).

Although not associated with creativity per se (Feist, 1999) extraversion may be a potential confound in some studies (e.g. Morris, Morris, Cunningham, McAlpine & Taylor, 1993). As already noted in Section 7.7.2.1, Morris et al.'s population of artists all scored

above the norm on extraversion. Similarly, anecdotally, Schlitz and Honorton (1992) noted that their population of performing artists appeared particularly self-confident, a variable that has been little explored in relation to psi-performance, but which has been found to be associated with psi-success (Nicol & Humphrey, 1953).

One of the most robust correlates of psi-success in experimental ESP research is belief-in-the-paranormal. The 'sheep/goat' effect (Schmeidler & McConnell, 1958) is where 'sheep' or believers in psi tend to score in a psi-hitting direction, while 'goats', who have a low belief in psi, do not. This indicates that variables such as expectation of success in a study, fear of psi (Tart, 1976) or congruence between beliefs and performance (Lovitts, 1981) affect psi-outcome. Lawrence (1993) conducted a meta-analysis of the 73 published studies examining this effect, conducted by 37 principal investigators, with over 4,500 participants in 685,000 trials. The combined Stouffer $z = 8.17$, $p = 1.33 \times 10^{-16}$. Effect size did not co-vary with study quality, or with the type of belief-in-the-paranormal scale used (of seven).

Empirically, creativity has been consistently related to belief-in-the-paranormal (creative personality and motivation: Davis, Peterson & Farley, 1973; Joesting & Joesting, 1969; Thalbourne, 2005; Thalbourne & Delin, 1994; Torrance, 1971; remote verbal associations: Gianotti, Mohr, Pizzagalli, Lehmann & Brugger, 2001; and artistic involvement: Moon, 1975). Overall, this research suggests that there is a low to moderate correlation between creative personality (inquisitive attitudes and motivations), artistic involvement and paranormal belief. This may be explained by a general link between creative attitudes and open belief systems. Gianotti, Mohr, Pizzagalli, Lehmann and Brugger (2001), however, suggest that associative processing underpins the relationship. They describe a continuum of associative processing, from creative thinking, through paranormal ideation in healthy individuals to psychopathological delusion, disordered thought processes or 'apophenia' – the "specific experience of abnormal meaningfulness" (p. 596).

Openness-to-experience, transliminality and boundary-thinness appear to be consistently associated with belief-in-the-paranormal and reporting SPEs (Krippner, Wickramasasekera & Tartz, 1997; McCrae & Costa, 1997; Palmer & Braud, 2002; Richards, 1995; Zingrone, Alvarado & Dalton, 1998-1999), but paradoxically, they do not consistently predict psi-success (Bierman, 1993; Broughton & Alexander, 1995, 1997; Dalton, 1997; Morris, Cunningham, McAlpine & Taylor, 1993; Morris, Summers & Yin, 2003; Parker, 2000; Roe, Holt & Simmonds, 2003; Sanders, Thalbourne & Delin, 2000; Schmeidler, 1988; Storm & Thalbourne, 1998-99; Thalbourne, 1996; van Kampen, Bierman & Wezelman, 1994;

Zingrone, Alvarado & Dalton, 1998-99)[5]. Hartmann, Harrison and Zborowski (2001) suggest two explanations for the relationship between SPEs and thin boundaries: either people with thin boundaries have "better or looser imaginations" (p. 356) and are more suggestive and elaborate upon sensitivities to stimuli; Or, they suggest thin boundaried individuals may be better at detecting psi information. Given the conflicting results cited above it seems unlikely that boundary-permeability or a proclivity to have unusual experiences is responsible for the 'artist-effect', although insufficient research has been conducted to confidently answer this question.

7.9 Summary and criticisms of experimental studies exploring the link between creativity and psi

Clearly the issue of the relationship between creativity and psi is a complex one, which requires meticulous experimentation to control for numerous potentially confounding variables. As Anderson (1962) writes:

> Whether the understanding of one unknown, such as ESP, will or will not be achieved by working on it with another unknown, such as creativity, will be settled by experimentation, not discussion. Regardless of the road we choose to travel, we all share the road blocks of the seemingly infinite number of variables complicating and frustrating our path. Their removal is of course, our challenge. (p. 291)

Which variables are complicating and frustrating our path at this stage? Which can be 'eliminated' or controlled for in future research? Main criticisms that may elucidate this issue fall into five categories: 1) inadequate multi-dimensional creativity measurement mean that the findings of these studies are difficult to relate to each other, they are measuring different constructs under the unspecific title of 'creativity'; 2) lack of a control sample or wide ranging samples, creating ceiling effects; 3) confounding of creativity with other personality-motivation variables: namely extraversion, self-confidence and belief-in-the-paranormal; 4) the confounding of creativity with situational variables, such as the experimenter effect; 5) there may be an interaction been creativity and the type of ESP test employed, or between

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[5] Various reasons could be postulated for this. There may be no significant relationship between psi and boundary-permeability, but such individuals may be more likely to label experiences as paranormal in their daily lives. It may be that people who volunteer to take part in psi experiments are by their nature more open-to-inner-experience, creating a ceiling effect. It may be that openness-to-inner-experience interacts with task demands in a complex way that has not yet been uncovered, for example, the mild 'sensory isolation' of the ganzfeld procedure may produce a SC in individuals that are already 'labile' that is too fluid – there may be an optimal level of 'openness'. Alternatively, openness without 'focus' or goal-directedness, may not be psi-facilitative, rather it may increase 'cognitive noise'. Finally, particular dimensions of 'openness' only e.g. a lower threshold to awareness of 'subliminal' stimuli may be related to psi-success. Studies on perceptual defense suggest that a lower threshold for emotional/visual stimuli to enter awareness is related to psi-success (Haraldsson & Houtkooper, 1995; Watt, 1994), which has been associated with creativity (as discussed in Section 2.4.1.2) – thus, this particular subset of 'openness' might be of particular interest in further understanding any relationship between creativity and psi.

stages of a particular task e.g. in the ganzfeld, where psi-success depends both on the mentation experience and the subsequent judging stage. Stanford (1993) refers to three points at which creativity variables affect psi-outcome, or with which they may interact: a) extrasensory responsiveness; b) ability to judge; and 3) motivation for judging.

From these studies however, much can be learnt. Re-analysing and reinterpreting the results suggests that: 1) something about artistic involvement is associated with a proclivity to experience ASCs, with belief-in-the-paranormal and with psi-success; 2) this effect appears to go across various types of artistic involvement (music, dance, writing, drama, visual); 3) this success cannot be attributed merely to divergent-thinking or to the personality factor of openness on the NEO; 4) despite this, internal effects suggest that psychometric measures of creativity (emotional, personality, divergent-thinking, self-perceived) are also associated with 'boundary-thinness' and with magnitude of the psi-outcome.

This latter relationship appears to exist in complex interaction with other intrapersonal and situational variables. For example, divergent-thinking may facilitate psi at a certain level, but inhibit psi through too much rigidity (low divergent-thinking) or too much cognitive noise (high divergent-thinking). Some psi tasks may influence this curve, e.g. white noise in the ganzfeld producing increased cortical arousal, or the searching of meaning in randomness task encouraging too much divergent-thinking (Simmonds, Fox & Holt, 2002). It is clear from Anderson (1966) that degree of creativity is an important variable.

In addition, the interaction of creativity variables with moderating personality factors has not been considered in the past research, might it be for example that certain types of associational fluidity require 'focusing' (as suggested by Sondow, 1986; Moriarty & Murphy, 1967), and that variables such as 'positive intent/motivation' or 'ego strength' should be measured? Forty years of research exploring the relationship between creativity and psi since these early 'descriptive' models have not managed to explore their validity in any systematic way.

A final speculation is that dimensions of creativity impact upon psi in different ways. Might an underlying dimension, in addition to the above, be associated with both creativity and psi, e.g. epistemological flexibility, the ability to adaptively shift between types of cognition and associated states of consciousness; or a lower subliminal threshold for internal visual imagery? No research has yet been done exploring the full spectrum of possible creativity-psi interactions as outlined earlier in this chapter. All have focused on psi as a conscious behavioural response, through mentation and choice of targets. If psi unconsciously informs our decisions and reactions in daily life (as most models propose) might it be more pertinent to examine either: the relationship between creativity and psi on a subliminal psi

task (e.g. precognitive habituation[6]); or attempts to use psi to unconsciously influence the outcome of a divergent creativity task? In such a design, baseline levels of subliminal awareness would be hypothesised to correlate with psi-success and creativity.

In the following chapter an empirical study is reported that addresses the relationship between artistic involvement, creativity and anomalous cognition in free-response design, bearing the caveats outlined above in mind.

[6] Since writing this chapter the author conducted a pilot study based on this suggestion with a group of professional visual artists (sculptors and painters) (Holt, 2006). A significant psi effect was shown for affective (t (13) = -1.794, p = .048, 1-tailed) but not neutral images (in the predicted direction, but not significant when corrected for multiple analyses). Non-significant trends in the predicted direction were observed between this effect and creativity, where emotional creativity (*rho* = -.497, p = .060, 1-tailed), artistic creative personality (*rho* = -.435, p = .095, 1-tailed) and heightened internal awareness (*rho* = -.465, p = .075, 1-tailed) correlated with the direction of the precognitive habituation effect for affective images, and the correlation for involvement in music and performance arts reached statistical significance (*rho* = -.559, p = .037, 1-tailed, uncorrected for multiple analyses). This outcome suggests that further exploration with this protocol might be profitable, exploring the hypothesis that affective and artistic dimensions of creativity might be associated with increased subliminal psi-awareness of affective stimuli.

CHAPTER EIGHT

Study Three: Exploring the relationship between creativity and psi with a free-response experience-sampling paradigm

8.1 Introduction

This chapter presents an empirical investigation of the potential links between creativity and psi. In Chapter Seven a review was made of 27 experimental studies, conducted between 1962 and 2003, that explored the relationship between creativity and psi. These suggested that there might be something about artistic populations that is psi-conducive. Of ten free-response studies working with artistic populations, four had control groups, and found that compared to 'non-artists', artists obtained a significantly higher hit-rate (r' = .328, z = 4.931, p <.00001). The remaining six studies used the ganzfeld paradigm, each obtaining above chance psi-scoring, with hit-rates between 30% and 50% (MCE = 25%), and an overall hit-rate of 40% (r = .344, p = $1x10^{-9}$, n = 336). These artistic populations obtained higher hit-rates than the general populations of ganzfeld studies – for which a recent meta-analysis estimates a hit-rate of 30% (Bem, Palmer & Broughton, 2001). It has commonly been suggested that the psi success of artistic populations is due to 'creativity', however, the correlations between psi-performance and psychometric measures of creativity are mixed and contradictory. Mere involvement in the arts is not equivalent to creativity. Thus, as yet, it is not known why artists have performed well in these studies. This may, for instance, be due to experimenter effects, belief in the paranormal, self-confidence, extraversion, the ability to shift easily into or between states of consciousness or to creativity (as reviewed in Chapter Seven).

The study reported in this chapter aimed to directly explore this question of 'what it is about artists that appears to be related to psi-success in free-response ESP studies', focusing on creativity. In so doing, the outcomes of Study Two were drawn upon, using the seven dimensions of creativity that emerged from a PCA as potential predictors of 'psi-performance' on a free-response ESP task. In Study Two, only one dimension of creativity – emotional creativity – demonstrated a statistically significant relationship with SPEs (r = .30, p = .00001). In addition, reports of the use of certain cognitive-styles in the creative process were significantly correlated with SPEs: 'heightened internal awareness' (r = .43, p = .000001); 'intuition, hunches and inspiration' (r = .42, p = .000001) and 'dreaming, day dreaming and hypnagogia' (r = .41, p =

.000001). Professional artists in the sample had significantly higher emotional creativity scores than 'non-artists' ('other professions', $z = -3.15$, $p = .002$, and scientists, $z = -2.94$, $p = .003$), but involvement in artistic activities alone was not related to the reported incidence of SPEs to a significant degree. The tentative conclusion of this study was that it is not cognitive flexibility and originality, creative personality or involvement in particular creative domains that relate to the reporting of SPEs, but an openness to and exploration of 'psychological space', and a proclivity to ASCs. This concurs with the idea that people who have 'internal sensitivity' are more likely to have psi experiences (Honorton, 1972). Hence, the current study tested the hypothesis that a heightened sensitivity to emotions and 'internal awareness', common but not exclusive to artists, explains the propounded link between artistic creativity and psi.

Criticisms of previous creativity-psi research were considered in Section 7.7. These were addressed as follows: 1) multi-dimensional creativity measurement was used; 2) both artists and 'non-artists' participated in order to avoid ceiling effects with some creativity measures; and 3) the following personality and attitude variables were measured in order to control for their potentially confounding effects: belief in psi, self-confidence, extraversion, and the extent to which participants report having unusual experiences in daily life (indicating a propensity to shift between states of consciousness). To recapitulate the rationales for the latter: a) belief in the paranormal has been associated both with successful psi-performance and artistic creativity (Lawrence, 1993; Moon, 1975); b) extraversion has been associated with psi-success in the ganzfeld (Honorton, Ferrari & Bem, 1998) and in at least one of the ganzfeld ESP studies, all artists were described as scoring above the mean on extraversion (Morris, Cunningham, McAlpine & Taylor, 1993); c) self-confidence, a purported trait of the Julliard sample (Schlitz & Honorton, 1992), has been found to correlate with psi-success (Nicol & Humphrey, 1953); and d) artistic creativity has been associated with a proclivity to shift into altered states (as seen in Chapter Six), which has also been associated with psi-performance (Braud, 2002). 4) The current study also considered the potential role of demand characteristics associated with the ganzfeld, which might be preferential to artists, through, for instance, the 'performance' of mentating for the actor or the focus on visual imagery for the painter. This consideration was one reason for developing a new methodology for free-response ESP research, which is described below.

8.1.1 Sampling 'naturally occurring' experience

The protocol of the current study may be conceptualised as an amalgam of experience sampling methodology (ESM) (Hektner, Schmidt & Csikszentmihalyi, 2006) and descriptive experience sampling (DES) (Hurlburt & Heavey, 2006), yet with a quasi-experimental component. In the following sections, ESM and DES will be described, prior to an exposition of the adaptation of these sampling methodologies for the purposes of the free-response ESP study that follow.

Both DES and ESM have sought to capture 'snapshots of everyday consciousness' and both expound similar benefits of such an endeavour. Both methods seek to capture regularities in and dynamic fluctuations of the phenomenological content of everyday life. Proponents of each argue that by sampling experience, that is immediately recounted, accounts will be less tinged by retrospective fallacies and biases, such as theory-led recall, misinformation effects or 'imagination inflation', which are argued to be problematical in questionnaires, diary reports and phenomenological interviews (Bolger, Davis & Rafaeli, 2003). Both approaches propound the value of collecting situated, contextual and ecologically valid, experiential reports – where experiences are embedded in natural contexts, in response to triggers *in vivo*, in interaction with meaningful life events rather than constructed laboratory scenarios or hypothetical questions. Both extol an 'idiothetic' approach (Conner Barrett, Tugade, & Tennen, 2007), nesting the idiographic within the nomothetic – attempting to understand the meaning of contingent, subjective phenomena within laws that explain objective phenomena. The current study sought to take advantage of one of the key attributes of experience sampling – 'embededness' – exploring psi, or psi-like, impressions and associated states as they arise in the context of people's everyday lives, albeit it under special circumstances – participating in an ESP task.

ESM and DES are distinct in three key ways: the type of data focused upon, the flexibility of research designs enabled, and philosophical assumptions about the data collected. ESM collects quantitative data and through the use of multi-level statistics seeks to model the interaction between situation and experience. DES draws upon the traditions of phenomenology and introspection, aiming to sample 'direct' conscious experience with minimal conceptual overlay.

ESM is "a research procedure for studying what people do, feel, and think during their daily lives" (Larson & Csikszentmihalyi, 1983, p. 41). It is a quasi-naturalistic method that involves participants providing questionnaire-reports about the nature and quality of their experience as they go about their everyday activities. Reporting is either triggered by randomly timed signals over a set period of time (signal-contingent sampling) or by a particular environmental or psychological stimulus (event-contingent sampling). The methodology has three broad

characteristics: participants record information in a 'natural setting', in 'real time' (i.e. as close as possible to a signal or event) and do so on repeated trials (Conner, 2005). As such, ESM is concerned with recognizing the importance of the contexts in which psychological processes unfold. Through repeated measurements, the goal is to expose "regularities in the stream of consciousness" (Csikszentmihalyi & Larson, 1987, p. 527). ESM employs statistical procedures to explore experiential (or temporal) regularities on three levels: 1) fluctuations within a single individual's experience (the 'stimulus' level); 2) average experiences of different groups, e.g. personality types (the 'person-level'); and 3) the interaction between the person and stimulus-level, e.g. how different personality types show different patterns of experiential variability.

In DES (Hurlburt & Heavey, 2006) participants are asked to respond at randomly triggered epochs to the question "What are the details of your inner experience *at this very moment*?", where 'inner experience' refers to anything that is going on in awareness. Participants, or co-researchers, wear a beeper in an earpiece and write down their 'inner experience' in a notepad or record it on a separate voice-recorder. At the end of each DES day, participants discuss their experiences in an interview, which examines the 'inner experience' of each beep, seeking clarification and elucidation, in addition to honing observational clarity. DES draws upon phenomenology, seeking to develop a disciplined exploration of 'the structure of nowness'.

The current study drew upon DES in that: 1) participants were asked to describe 'psi-impressions' qualitatively; and 2) had the opportunity to talk further about their experiences at the end of the 24-hour period.[1] However, it drew upon ESM in that participants were: 1) asked to record this impression at their own impetus (whenever they labelled or conceptualised a thought as being potentially psi-relevant); and 2) asked to complete an experience-sampling questionnaire immediately following this. Thus, the design was event-contingent (the event being the participant's awareness of a potentially psi-relevant experience). It was planned to study data at the person-level to examine if different dimensions of creativity were associated with psi-performance, and to examine at the stimulus-level if particular dimensions of consciousness were associated with psi-performance (as well be described below). In addition to combining qualitative and quantitative sampling approaches, the current study introduced a quasi-experimental component, as rather than simply observing the correlates and/or structure of

[1] The protocol diverges most radically from DES in that participants reported experiences at their own instigation – thus introducing meta-cognition about which experiences to report – DES avoids such self-selection. DES has not been used to study specific types of experience within individuals, but rather, structural differences in inner experience between groups. In future research, the random sampling of inner experience in an ESP might be profitable. In the current study, it was deemed appropriate to give participants autonomy and control over when to mentate.

reported experiences, each event related to a specific task, and reports were evaluated by independent judges according to their degree of correspondence to an ESP target.[2]

The experience-sampling questionnaire concerning the context of the event was based on an instrument that has been specifically designed to measure fluctuations in naturally occurring states of consciousness – the Phenomenology of Consciousness Inventory (Pekala, 1991). Further items were added from a scale developed by Sargent (1980) to assess reported states of consciousness in a series of ganzfeld ESP studies. Alvarado (1998) in a historical review of reports of spontaneous cases of psychic experiences notes their association with 'borderland' dream states, trance, hallucinations and religious ecstasy. Although, in a review of ten surveys of subjective experiences of ESP (1979-1998) he notes that 48.7% of the cases reported occurred in "waking states" (presumably non-altered). However, it is not known how these SPEs, in various states, relate to 'veridical psi'. In reviews of experimental research pertaining to states of consciousness, psi-scoring has been found to be higher with: muscular and mental relaxation (12/25 studies independently significant), low to moderate levels of autonomic arousal (7/10 studies independently significant) and cognitive quietude (9/16 meditation studies) (reviewed by Braud, 2002). The psi-conducive state is thus thought to be one of reduced distractions (inner and outer), internally deployed attention, de-structuring or loose associative processing freed from top-down constraints, and positive expectancy and confidence of success (Braud, 2002; Braud, Wood & Braud, 1975; Honorton, 1977; Honorton & Harper, 1974; Parker, 1975). Previous studies using post-session questionnaires in the ganzfeld have found psi success to be significantly and positively associated with: time distortion, a loss of body awareness, relaxation, spontaneity of imagery, abundance and clarity of mental imagery, and bizarre mental activity (Palmer, Bogart, Jones & Tart, 1977; Palmer, Khamashta, & Israelson, 1979; Sargent, 1980). In the current study the analysis of state-experiential variables was essentially exploratory since no previous research has assessed psi-performance in relation to reports of naturally occurring states outside of the laboratory. However, it was hoped to elucidate whether artists might more easily enter states of relaxation and dissociation, which might facilitate the psi processes (as argued e.g. by Anderson, 1962; and Murphy, 1966).

While experience sampling has not previously been applied to the study of psi, it has precedents in psi research that has allowed participants to take part in their own space and time, both in early research (e.g. Carrington, 1944; Miles & Ramsden, reported by Barrett, 1911) and

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[2] Such a procedure is akin to a recent suggestion made by Conner et al., (2007) that future developments of ESM may involve asking people to perform specific tasks when signalled, such as completing a cognitive task that might be programmed to run on a palmtop computer.

more recent protocols developed by Delanoy, Watt and Morris (1993) and Ertel (2004), both of whom have suggested that 'take-home' protocols may be psi-conducive (using clairvoyance/precognition tasks). Delanoy et al. (1993) found significant psi-hitting with a take-home procedures (p = .01, 1-t, exact binomial, n = 9, trials = 366) and non-significant psi-outcomes with the same participants under laboratory conditions; Ertel found significant psi-hitting under both take-home and laboratory controlled conditions, with the take-home condition having significantly higher hit-rates (t = -3.02, df = 15, p = .004, 1-tailed). This was attributed to: participants being better able to relax in their chosen environment (Ertel, 2004); and/or that the freedom and choice of when to take part may promote feelings of competence and motivation (Delanoy et al., 1993). Further, it was hoped that ESM may be particularly interesting to use in a study pertaining to creativity, where participants would have time and the freedom to use the methodology in a creative manner, which may also be psi-conducive due to the spontaneity that this might allow (according to Stanford's PMIR model, 1974).

The advantages of the adapted experience-sampling protocol were perceived to be various. By taking the psi experiment out of the lab, it was hoped to minimize task demands associated with previous laboratory free-response ESP designs that might favour artists (as described above) or people who are able to shift into a relaxed, psi-conducive state on demand. By collecting data over a 24-hour period the methodology enabled impressions to be recorded that arose in naturally occurring states of consciousness (including dreams and variants of the waking state). This would enable impressions to be recorded in or after 'preferred' states (e.g. hypnagogia or meditation), or as they arose spontaneously (e.g. whilst washing up or at work), and would enable the assessment of these according to similarity with the ESP target. By giving autonomy to participants and enabling spontaneity and creativity of response it was hoped that the protocol would be psi-conducive (following Delanoy et al, 1993 and Ertel, 2004). In the longer term this study was seen to be of value as an initial foray into new territory, testing a methodology that might provide fruitful for the study of anomalous experiences and psi *in vivo*.

8.1.2 Study aims and hypotheses

The following hypotheses were made, for which intended statistical analyses will be discussed subsequently:

1) There will be overall psi-hitting, in that the 'ESP impressions' will enable independent judges to select the target video clip to a degree better than mean chance expectation.
2) Artists will demonstrate greater psi-hitting than 'non-artists'.

3) Emotional creativity scores will correlate significantly with overall psi-hitting.
4) Non-linear cognitive styles on the CCI (Creative Cognition Inventory) will correlate significantly with overall psi-hitting.

Exploratory analyses were:

1) To examine whether creativity components predict psi-performance, and when partialling out potential confounding variables (belief in psi, extraversion, self-confidence, and unusual experiences).
2) To examine if particular dimensions of consciousness (on the Phenomenology of Consciousness Inventory) correlate significantly with psi-performance.
3) To examine whether divergent-thinking has a curvilinear relationship with psi-performance, where both very low and high divergent thinking is associated with psi-missing (Schlitz & Honorton, 1992).
4) To examine the magnitude and direction model of creativity (Palmer, 1997; Schmeidler, 1974)

8.2 Method

8.2.1 Design

The present study intended to explore the utility of using event-contingent experience-sampling methodology within a quasi-experimental ESP protocol, where 'receivers' record impressions about an ESP target at their own impetus. This further included a 'sender' (the experimenter, NH) watching a randomly selected video-clip, and a judging stage using two blind independent judges, where the target clip and three decoy clips are rated for their similarity to a receiver's mentation. The dependent variable for the evaluation of psi-performance was based on the sum-of-target-ranks awarded; the dependent variable for personality and exploratory analyses was the *z*-score of target ratings (averaged across judges). Planned analyses were made at the group level – looking at overall psi-performance and psychometric correlates of this. Exploratory analyses looked at psi-performance and reported states of consciousness at the stimulus-level. The presentation order of experience-sampling questions was randomized to help prevent boredom and stereotyped responses with repeated use.

The statistical analyses to be used were specified in advanced. A sum of target ranks analysis was used as the primary outcome measure, to test hypothesis 1), because it is sensitive to directional effects across the target ranks, and it is expected that that the potential 'psi-conducive'

conditions of the ESM study, where participants can control how and when they 'mentate', will lead to a directional outcome towards psi-hitting. Two independent judges were used to provide similarity ratings for each clip, to assess inter-judge reliability. It was thus proposed to assess the degree of concordance between their ratings and if these are sufficiently similar ($r > .6$) (Stanford & Frank, 1990) to combine their ratings. These collective ratings for each clip were used to rank the target for each trial. Raw ratings were not be used as they are subject to bias due to individual differences in rating style (errors of central tendency or 'generosity' and errors of variability), hence each judge's ratings was first converted into a standardised score (z-score) (Stanford & Mayer, 1974). Hence, the standardisation occurs across each set of ratings and the variability of the scores of each judge will be the same (SD = 1), based around a mean of zero. The mean of the independent judge's z-scores was then calculated. This is the accepted method of combining rating scores (e.g. see Roberts et al., 2005), as it maximally reduces bias or noise.

A one-tailed t-tests was used to compare z-scores between artists and 'non-artists'. This was repeated, partialling out potentially confounding variables (extraversion, belief in the paranormal, self-confidence, and the proclivity to have unusual experiences).

Z-scores (averaged z-scores of target ratings for each trial overall) were used as the psi-index, to assess factors that correlate with individual differences in psi-performance. Z-scores are more sensitive than ranks, allowing for greater variance across participants. Analyses were two-tailed, due to the unpredictable inter-correlations between creativity and psi-performance reported in the previous literature. Partial correlations were conducted to see if any relationships between creativity and psi were maintained when accounting for potentially confounding variables.

Exploratory analyses examined the relationship between state of consciousness and psi-performance the data will be considered at the stimulus, within-subjects level, using the mean z-score of the independent judges for separate mentations within each trial as the psi-index and associated experience sampling questionnaire data. Further exploratory analyses examined the data for magnitude effects, following Palmer's (1997) model; and for curvilinear effects, e.g. with divergent-thinking, following Schlitz and Honorton (1992).

The p-values for specific planed analyses (hypotheses 1-4) should be corrected for multiple analyses (where, using the Bonferroni method, the criterion value for significance would be $p = .05/7 = .007$). Exploratory analyses should not be thus corrected, being suggestive for future research merely. Due to the low statistical power the author decided to consider whether effect sizes were replicated, rather than judging outcomes solely in terms of statistical significance at the $p < .007$ level.

With only 30 trials in the current study the statistical power is low. Considerable consideration was given to this issue and to the possibility of increasing the power of the study by enabling each impression recorded by a participant to constitute an independent separate trial. However, a method by which to provide a different target clip at the correct time could not be envisaged with current software, without making the task overly structured (e.g. having a different target 'sent' to participants at set times), which would limit spontaneity and, it was envisaged, might have been confusing to the participant, 'bombarding' them with lots of different imagery. Potential ways of overcoming such problems in future work will be further considered in the Conclusion to this thesis. Statistical power was thus sacrificed over the perceived value of attempting to develop a more ecologically valid and potentially 'psi-conducive' methodology. The number of trials was limited to 30 due to the intensive nature of data collection, each trial taking 24-hours, with a day either side for participant briefing and de-briefing. Such a small sample size is however commensurate with previous artist-psi research, which has nevertheless obtained significant effects (e.g. Dalton, 1997 [$n = 32$]; Schlitz & Honorton, 1992 [$n = 20$]).

8.2.2 Participants

A total of 30 participants took part in this study: 15 'artists' (9 females; 6 males; mean age = 37.13; ranging from 25 to 64) and 15 'non-artists' (9 females; 6 males; mean age = 40.20; ranging from 26 to 62). There was no significant difference between the groups according to age ($t = -.757$, $p = .455$, 2-t). It was intended to match groups according to age, gender, and degree of familiarity with the experimenter/sender. The latter proved more difficult than anticipated; the mean familiarity ratings (on a scale from 1-9) were: 2.42 for artists and 3.38 for 'non-artists'; however, the difference between these was non-significant ($z = -.897$, $p = .377$, 2-t).

For the purposes of selection, an artist was defined as a person who either professionally or as a full-time degree student was involved in the visual arts (e.g. painting, photography or sculpture), performance arts (e.g. dance, drama, film-making, animation), music (performing or composing) or artistic writing (e.g. poetry, plays, novels or short stories). 'Non-artists' were defined as persons not involved in any artistic pursuit professionally or on a full-time basis.

The 'artist' sample had all received at least one year of professional training in 'the arts' and consisted of: 1 illustrator; 2 fine artists; 1 photographic artist; 1 graphic designer/fine artist; 1 arts director/fine artist; 1 3D computer graphics/animation artist; 1 costume/jewellery designer; 1 textile designer; 1 ceramics student (year 2); 1 portrait artist; 1 fine artist/musician; 1 musician; 1 musician/arts teacher; and 1 composer/musician. Although, not part of the inclusion criteria, to

the author's knowledge, at least 7 of these artists met some criteria for 'cultural creativity', having exhibited artwork in public and national art galleries and having had compositions performed and published. The 'non-artists' consisted of: 1 barrister's clerk; 1 business consultant; 1 dentist; 1 gardener; 5 psychology research-students/researchers; 1 physicist; 1 youth worker; 1 conservationist; 1 software developer; and 2 administrators. Indeed, at least 4 of the non-artists also met criteria for 'cultural creativity', having published scientific research papers.

Participants were selected through opportunity sampling and the snowball technique through: a local groups of artists with which the author was acquainted (n = 2); colleagues at the University of Northampton (n = 7); friends involved in the arts (n = 20); and an advert asking artists to take part in an ESP study in the *Paranormal Review* (n = 1). Only the latter participant was unknown to either NH or a friend of NH. NH had never met 14 of the participants previously, was acquainted with 11 to varying degrees and knew 5 reasonably well.

Two independent judges assessed the participants' data for psi-performance. Both were acquaintances of NH, but did not know each other or of the other's identity. Judge One (J1) was male, aged 36 and a creative writer, selected for his sensitivity to metaphor; Judge Two was male, aged 34 and a parapsychology researcher, selected for his familiarity with the judging procedure.

8.2.3 Materials and equipment

Experience Sampling Program (ESP), version 4 (Barret & Feldman-Barret, 2005). This is free software for Palm PDAs that has been designed specifically for ESM research. It displays questions, records responses (as hidden files) and measures reaction times (to respond to each question). ESP includes two software packages: 'ESP', a palm application that interacts with participants; and 'ESP desktop', a PC application for designing experiments and configuring the ESP settings, which runs on Windows. ESP has two modes of operation: an 'automatic mode', which prompts responses at random or fixed times over a set period of time; or a 'manual mode', which lets participants respond when they choose to.

Tungsten T personal digital assistant (PDA) by Palm Inc (2002). The dimensions of this are 7.4 x 9.6x 1.3 cm, with a high-resolution colour display screen measuring 5.3 x 5.3 cm. It runs on Palm OS version 5 and has a Texas instruments OMAP1510 processor, with 16 MB of internal memory. The PDA has a microphone and its installed software includes 'Voicememo', which enables up to 55 minutes worth of audio mentation to be recorded (without a memory expansion card). The software also includes 'Notepad', which enables recordings to be made with a stylus (a metal 'pen' which is stored inside the PDA) on the screen, thus capturing words or images. The

PDA has rechargeable batteries, which remain charged for up to two days, depending on degree of usage, and a portable charger in which to store it when not being used.

Target pool. A revised version of the University of Northampton target pool, consisting of 112 minute-long digital video clips that were drawn from commercial films to reflect a range of emotions and themes (as used previously in ESP research by e.g. Sherwood, Roe, & Holt, 2005; Roe, Sherwood, & Holt, 2004). The pool was revised to delete two violent clips that NH felt uncomfortable with sending. Clips are arranged in 27 sets of 4 so that members of a set were as distinct as possible.

An automated remote viewing computer system developed by Dr Paul Stevens and written in Microsoft Visual Basic v5 that presented video clips for Media Player v7. Video clips are stored digitally as MPEG files, labelled 1a, 1b, etc. Randomisation was achieved using the Visual Basic pseudo-random algorithm, seeded using the timer at the start of the program. Once the 'Start' button has been pressed, the computer first selects a target set then selects one of the four clips within that set. This program has been used in a number of ganzfeld, dream-ESP and PK studies to select targets (e.g. Roe, Holt & Simmonds, 2003; Roe, Sherwood & Holt, 2005).

Psychometric measures

Experience sampling questionnaire. The Experience Sampling Program was configured to display and store responses to 31 questions that related primarily to the state of consciousness in which a potential ESP impression was recorded. These were based on: the phenomenology of consciousness inventory, PCI (Pekala, 1991), with 21 items assessing 12 dimensions (positive affect, negative affect, altered experience, imagery, attention, self-awareness, internal dialogue, ASC, rationality, volitional control, memory and arousal); 2 items concerned environmental context (described with free response text) and degree of solitude; 8 items were taken from post-trial ganzfeld questionnaires (Sargent, 1980; Simmonds & Holt, in press) and concerned auditory and taste/smell imagery, effortlessness, wakefulness, the source of, familiarity of imagery, preoccupation with current concerns and degree of confidence that one's imagery was related to the target. Most responses involved moving a point on a slider from 0 to 100% to indicate degree of agreement or disagreement with a statement.

The Emotional Creativity Inventory, Averill (1999). (Described in Section 3.1.3). More recent research suggests that the ECI taps into paying attention to affect and the ability to form cognitive content about emotional experience. Gohm and Clore (2000; 2002) in factor analyses of 18 scales that assess aspects of emotional experience identified four latent traits concerning the way

individuals differ in emotional experience: intensity, attention, expression and clarity. Emotional creativity fell into the 'attention' category – the degree of attention that is given to affect (rather than intensity of affect in reaction to daily events, the expression of affect, or the clarity with which emotions are identified).[3] The attention subscale: loaded on emotional creativity (.76), monitoring one's moods (.68) and absorption (.57). It did not consistently correlate with any of the 'big five traits'; it correlated significantly with openness on the NEO (r = .33, p < .01, n = 151), but not with Goldberg's intelligence version (r = .09, ns, N = 119), which provides some construct validity as the prior includes openness to emotions.

Fuchs, Kumar and Porter (2006, unpublished) report that scores on the ECI correlated significantly with self-perceived creativity (r = .26, p < .001), fantasy proneness, which is a tendency to fantasize and to have a vivid imagination (r = .42, p < .001) and both cognitive (r = -.37, p < .001) and affective (r = -.22, p < .001) alexithymia. Affective alexithymia was characterized as a low awareness of emotional arousal and a low degree of emotions accompanying cognitions, and cognitive alexithymia as a normal or high awareness of arousal with a low degree of cognition associated with this emotional arousal. The larger correlation with cognitive arousal suggests that the ECI taps more strongly into the ability to form cognitive content about experiences of emotional arousal – although these effect sizes are low.

The Amended Creative Activities and Interests Checklist (Griffin & McDermott, 1998; Hocevar, 1979). (Described in Sections 3.1.3 and 6.1.2.)

Gough's Creative Personality Scale, CPS (1979). (Described in Section 3.1.3.).

Self-perceived creativity and the importance of creativity. (Described in Section 3.1.3).

Shapes, a figural divergent-thinking task. (Described in Section 3.1.3).

The Creative Cognition Inventory, CCI-R. (Described in Chapter Three). This has six sub-scales: Internal Awareness (α = .852); Linear Cognition (α = .724); Playful Cognition (α = .801); Intuition (α = .748); Oneiric Cognition (α = .730); and Beyond the Self (α = .723).

The Australian Sheep-Goat Scale (Thalbourne & Delin, 1993). This scale was developed to assess degree of belief in paranormal phenomena. It consists of 18 items, with a five-point response scale ranging from 'strongly disagree' to 'strongly agree', with 'neutral/unsure' at the midpoint. Eleven items cover experiences of and belief in ESP (e.g. believing that ESP is possible and having had a precognitive dream), five items enquire about experiences of and belief

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[3] Indeed, emotional creativity did not correlate significantly with a measure of mood lability (rho = .168, p = .136, n = 80) (combined data of: Holt & Roe, in press; Roe & Holt, in press) or with neuroticism (r = .08, ns, n = 149) (Averill, 1999).

in PK (psychokinesis), and two items about belief in an afterlife and the possibility of contact with spirits. The scale obtained adequate concurrent validity, a test-retest reliability of $r = .66$ (across an 11 month-long period) and an internal consistency coefficient of $\alpha = .94$ (Thalbourne & Delin, 1993).

The *'self-confidence'* sub-scale of the Adjective Checklist (Gough & Heilbrun, 1983), consisting of 34 items, 20 of which are positive indicators of self-confidence and 14 of which are antithetical. High scorers are described as "initiators, confident of their ability to achieve goals. They are not above cutting a few corners to create a good impression, and observers do see them as assertive, enterprising, and self-confident". The scale has adequate internal consistency (α = .79, males; α = .71 females), test-retest reliability (α = .68, males; α = .78 females), construct and convergent validity (Gough & Heilbrun, 1983).

The *'extraversion'* subscale of the short scale of the Revised Eysenck Personality Questionnaire (EPQ-R, Eysenck, Eysenck & Barrett, 1985): 12-items, with a yes/no response scale, assessing aspects of sociability, activity, liveliness and excitability. The scale is reported to have adequate internal consistencies (α = .88, males; α = .84 females) and validity. Extraversion is a 'higher order trait', with varying subcomponents, included in many multidimensional personality inventories; however overall, extraverts are "gregarious, friendly, dominant and socially facile" (Watson & Clark, 1997, p. 771).

The *'unusual experiences'* subscale of the Short Oxford-Liverpool Inventory of Feelings and Experiences (O-LIFE, Mason, Linney & Claridge, 2005). This is one dimension of the schizotypal personality trait, concerning a proclivity to have unusual cognitive and perceptual experiences and beliefs (hallucinatory experiences, perceptual aberration and magical thinking). The short-scale consists of 12-items with a yes/no response scale, and includes: seeing shapes or forms in the dark, one's thoughts being almost audible, thinking that one has special powers or that accidents are caused by mysterious forces, experiences of a sense of presence, one's face looking different from normal in a mirror and rushes of vivid ideation. The scale has adequate internal reliability (α = .80) and concurrent validity (r = .90 with the long-form of the O-LIFE: Mason et al., 1995).

8.2.4 Procedure

Initial pilot trials helped the author decide to limit the trial period to one, rather than two days, as participants felt that this was too long. Piloting also helped to ascertain whether participants

would be comfortable with the procedure outlined below and with the use of the PDA, the comprehensibility of the participant instructions, and the length of the experience sampling questionnaires. Responses from pilot participants indicated that the latter were acceptable.

Potential participants were sent a booklet that described the study aims and procedure (see *Appendix 8.1*), plus the personality questionnaire to look at and complete if they were still interested in participating (see *Appendix 8.2*). An initial meeting was then arranged with a participant, when the practicalities of the study were described to them by the experimenter (NH), who attempted to create a good rapport. Subsequently, the participant was shown how to use the PDA and guided through the protocol with a practice session. They were reminded of their right to withdraw from the experiment at any point and of the booklet which described how to use the PDA and delineated all details of the study, in case they forgot anything and gave the contact details for NH should they experience any difficulties and need to cancel the trial. The participant and NH arranged a future 24-hour slot, which would constitute the trial day, and a time for a follow-up meeting, when the target clip would be revealed. On eight trials, this post-trial meeting was conducted over the telephone/post, as meeting face-to-face was inconvenient for the participant (e.g. due to living some distance away). On these trials they posted the PDA to NH, who downloaded the data and then emailed them their target clip and debriefed them about it over the telephone[4]. There was no communication between the participant and NH between these two 'meetings'.

On the ESP-ESM trial day participants carried a PDA with them for 24-hours. When they felt like taking part (i.e. recording a daydream, thought, dream or experience) the participant switched on the PDA and recorded this impression or experience either through Voicememo or Notepad. This meant that they had choices about how to record their impression: either through speaking into the microphone; writing them down; or by drawing pictures. They then initiated the 'ESP' questionnaire which recorded their responses to questions about their state of consciousness, time and situation. Each participant was asked to record at least one impression, which they could initiate at any time over the pre-arranged 24-hour trial period. The participant could not subsequently access any of their experience-sampling forms and mentations were automatically 'time-stamped'.

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[4] Analysis showed that while these subjects experienced a slightly different procedure this did not appear to affect the outcome. Psi-scoring was non-significantly lower on these 8 trials (t = -.856, p = .399, 2-tailed). However, this difference disappeared (to t = .001) when distance between the sender and receiver was accounted for. There was a small negative correlation between distance and psi-performance r = -.277, p = .139, 2-tailed.

On the trial day a target video clip was randomly selected by the remote viewing programme on a laptop computer. NH watched this and attempted to send information about it to the participant at spontaneous times throughout the day, recording times, lengths of sending sessions and details of the information focused upon, to assist/monitor her own sending.

The participants were informed, in the briefing session, of the above, and that they would see the target clip in the debriefing session. They were told that no attempt was being made to distinguish between whether any psi was due to telepathy, clairvoyance or precognition, allowing them to frame the task as they preferred.

At the final stage of each trial, the participant typically met with the experimenter for a debriefing session. The participant gave her the PDA and then they discussed the experience of taking part in the study, looked at the impressions they had recorded, and made comparisons with the target clip, which they were then shown. Participants had the opportunity to ask any questions about the research and to receive feedback about the overall outcomes.

The mentations that were generated by each participant were used by two independent judges in order to detect the identity of the target from three decoy clips. Each judge gave a confidence rating (0 to 100%) for each clip, representing certainty that it was the target. This was done both for each separate impression and holistically for all the impressions, considered as a collective, across the 24-hour period (the latter was planned to be the primary measure). It was decided to use independent judges, rather than allow participants to be the judges, in order to avoid possible unconscious cues concerning the identity of the target during the judging stage (as the experimenter is also the sender in this design). The judges were both blind as to the study hypotheses (beyond that the study was interested in the relationship between creativity and ESP and used an ESM design), the identity of the target, the trial date and any information regarding the identity of the participant. They were not involved in the trials in any way other than judging mentations.

One participant did email NH to cancel the trial, as their day had become too busy, and rearranged it for a day later in the week. NH had already started 'sending' although neither this nor the identity of the target clip was revealed to the participant. The trial was aborted and a different clip was randomly selected for the participant on the newly arranged trial day.

11 participants were located in the same town as NH, but she did not leave home on these days to avoid any accidental meeting with them. The remaining participants lived at distances from Northampton: Oxford(5), Bristol(3), Coventry(3), London(2), Leeds(1), Brighton(1), York(1),

Taunton(1), Moreton-in-Marsh(1) and Wellington, Somerset(1). NH had no contact details for 8 of the participants until after the trial (having been introduced to them by mutual contacts who arranged the initial meeting), email addresses only for 10 participants and phone numbers/addresses for the remaining participants. There was no way, in the opinion of the author, by which participants could obtain information about the clip through 'normal' means. The 'sending' took part in isolation, files recording details of each trial and NH's laptop required passwords to access, and details of the study were not disclosed to any person. However, as already discussed, this study was designed in an attempt to gain a better understanding of 'psi and everyday consciousness', and was process rather than proof oriented.

BPS ethical guidelines were adhered to throughout this study, considering in particular confidentiality, sensitivity to participants' beliefs, careful debriefing and making participants aware of their right to withdraw at any stage of the study. Please refer to *Appendix 8.3*, which contains the report submitted to the University of Northampton research ethics board concerning this study.

8.3 Results and discussion

8.3.1 Treatment of data

There were missing data for the figural divergent-thinking task, where three participants did not complete this (two artists and 1 non-artist). Further, one of these participants (non-artist) neglected to complete the questionnaire, missing out the following psychometric measures: creative personality, self-confidence, unusual experiences and belief in the paranormal. These participant's psi-scores were therefore not included in correlations with these variables.

The data entry was triple checked for any errors, as were *z*-score calculations. Creativity scores for participants were based on the dimensions of creativity outlined in Chapter Six. The score for each creativity scale was put into the dimension upon which it had the highest loading on the pattern matrix[5]. To compute combined scores from measures with different scales, raw scores were converted into standardized *z*-scores and then summed.

The distribution of variables was assessed, looking at means and medians, skewness coefficients and boxplots. Most variables were not significantly skewed, however the following were: scientific creative personality, the use of intuition in the creative process, involvement in

[5] Hence emotional creativity consisted of total scores on the ECI, artistic creative personality of self-perceived creativity, the importance of creative practice and involvement in visual art, figural divergent-thinking of fluency, flexibility, originality and boundary crossing scores, scientific creative personality of Gough's CPS and involvement with science.

performance arts and music, the number of images drawn during the psi-task and the word count of the psi-mentation. Following square root transformations neither scientific creative personality nor 'performance and music' were significantly skewed. Following a square root transformation and removal of outliers (2 low: 4,7), 'intuition' also approximated the normal curve. The image and word variables were too severely skewed to respond to transformations, and so it was decided to only use non-parametric tests with these variables. Several other variables had outliers: emotional creativity (1 high: 144); linear cognition (1 low: 3); science (1 low, 2 high: -2, 2, 5); and figural divergent-thinking (2 low: 9, 11). This was only seen as a problem for scientific creative personality as the other variables are assumed to be normally distributed in the population, hence it was decided to remove the extreme outlier (5) in partial correlations. It was thus decided to use non-parametric tests, and to use transformed data, with extreme outliers removed for partial correlations (and any post hoc parametric analyses).

8.3.2 Group descriptive statistics for artists and 'non-artists'

In order to be able to consider any potential differences in psi-outcome or correlates between artists and 'non-artists', and in order to illustrate the characteristics of the sample as a whole, Table 8.1 shows the mean scores and standard deviations on key variables.

From this it can be seen that artists only differ significantly from 'non-artists' on artistic creative personality, the number of drawings made as part of the ESP-mentation and the use of playful cognition and intuition/inspiration in the creative process. This gives support to the 'artistic' nature of this group; although they have non-significantly higher scores on figural divergent-thinking. That the artists compare similarly to the non-artistic group on measures such as belief in the paranormal and extraversion helps to experimentally isolate the factor of 'artistic involvement'. The 'non-artists' score non-significantly higher on scientific creative personality, self-confidence, linear cognition and writing. However, both samples score very similarly on 'internal awareness' and emotional creativity, suggesting, on average that both groups are 'psychologically minded'. Artists however, seem to be slightly more prone (non-significantly so) to unusual experiences (with mean scores of 8.00 versus 6.07).

It is possible that the non-artistic sample does not represent 'typical non-artists', being interested in parapsychology enough to take part in an in-depth study, exploring their own consciousness. Hence, it is perhaps not surprising that there was no difference between the

Table 8.1

Means and standard deviations of scores on psychometric measures for artists, 'non-artists' and the entire sample

	Artists Mean (SD)	'Non-artists' Mean (SD)	Test statistic (*p*-value, 2-t)
Extraversion	5.80 (2.52)	6.10 (3.03)	t = -.295 (.770)
Belief in the paranormal	62.20 (12.89)	59.64 (14.64)	t = .500 (.621)
Unusual experiences	8.00 (3.12)	6.07 (3.65)	t = 1.533 (.137)
Self-confidence	8.13 (5.46)	10.43 (4.27)	t = -1.254 (.221)
Emotional creativity	107.97 (13.91)	104.80 (14.69)	t = .606 (.549)
Figural divergent-thinking	37.00 (11.59)	32.64 (10.20)	t = 1.039 (.309)
Artistic creative personality	1.13 (2.90)	-1.12 (1.28)	t = 5.103 (<.0001)
Scientific creative personality	-.50 (.95)	.50 (1.69)	*z = -1.914 (.056)*
Performance arts and music	3.47 (4.14)	2.27 (2.46)	t = .965 (.343)
Domestic crafts	5.40 (3.38)	4.07 (2.76)	t = 1.184 (.247)
Writing	1.87 (1.96)	2.80 (2.81)	t = -1.056 (.300)
Internal awareness	18.67 (6.07)	18.23 (5.51)	t = .205 (.839)
Oneiric cognition	8.60 (2.41)	6.93 (2.37)	*t = 1.906 (.067)*
Beyond the self	8.67 (2.41)	6.60 (3.48)	*t = 1.891 (.069)*
Playful cognition	29.93 (4.42)	25.17 (4.24)	t = 3.015 (.005)
Intuition	11.20 (1.08)	9.63 (2.13)	z = -2.725 (.006)
Linear cognition	10.40 (3.33)	12.17 (2.01)	t = -1.757 (.090)
Number of images recorded during ESP-trial	3.27 (3.61)	.53 (1.36)	z = -2.930 (.004)
Word count of mentation	262.80 (317.22)	287.93 (230.78)	z = -.85 (.395)
Estimated distance (miles) between sender and receiver	69.82 (71.06)	47.39 (49.97)	t = 1.000 (.326)

Note. Test-statistics refer to group differences between artists and non-artists, with *p*-values in parentheses.

groups on either 'internal awareness' or emotional creativity. Indeed, the mean emotional creativity scores of the artists in this study (mean = 107.97, SD = 13.91), were similar to those of the artists in Study Two (mean = 108.89, SD = 16.15), but the 'non-artists' had slightly higher mean emotional creativity scores in this study (mean = 104.80, SD = 14.69) than 'other professions' in Study Two (mean = 99.15, SD = 15.66), but within 1SD. Further, both artists and 'non-artists' scored higher on 'unusual experiences' than the mean scores reported by Mason et al. (2005), which are 3.17 (SD = 2.92) for males and 3.39 (SD = 2.92) for females, suggesting that the sample as a whole is slightly 'anomaly-prone', scoring 1-2 SDs higher than the norm. In the current sample, both the artists and 'non-artists' are slightly introverted, with mean scores (5.80 and 6.10 respectively) lower than 'normative' mean scores (6.36 (SD = 3.80) for males and 7.60 (SD = 3.27) for females, Eysenck et al., 1985), but again, within 1SD. Both artists and non-artists also score above the mid-point (54) on belief-in-the-paranormal (with mean scores of 62 and 60), thus appearing to be 'pro-paranormal'.

In summary, artists only score significantly higher than 'non-artists' on measures that directly pertain to involvement in the arts (artistic creative personality, and the use of playful cognition

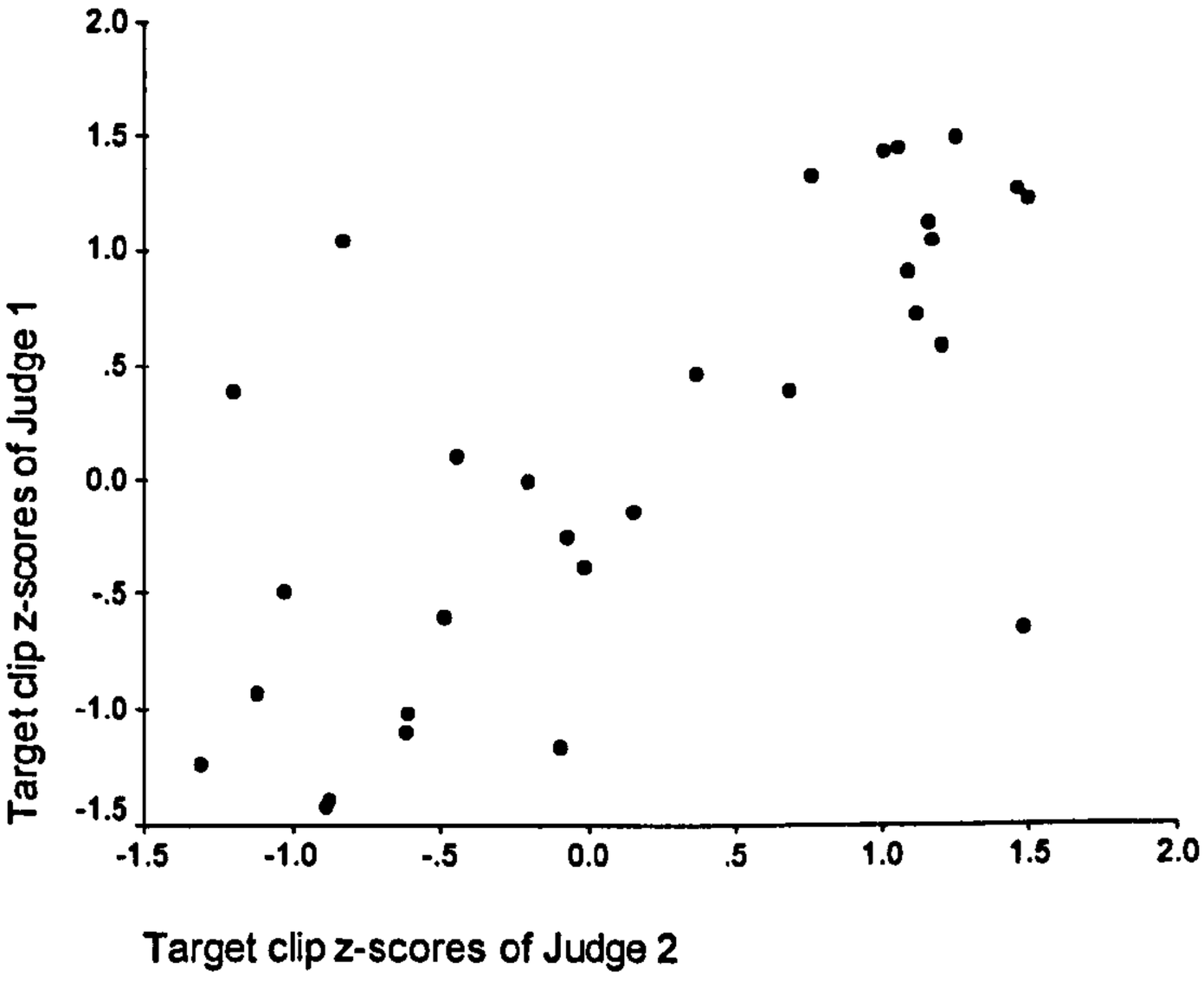
and intuition/inspiration in the creative process). The two groups appear to be roughly matched according to other creativity, personality and belief measures. However, the sample as a whole appears to have a proclivity for unusual experiences.

8.3.3 Inter-rater reliability of the independent judges

The *z*-scores (for the target clip) of the two independent judges (J1 and J2) correlated with each other at $r = .716$, hence this was considered to indicate sufficient inter-rater agreement (see section 8.2). Figure 8.1 plots the *z*-scores for J1, J2 and combined *z*-scores for the targets across trials, and shows the similarity in scoring of the judges. They awarded the same rank (e.g. 2, 2) on 18 trials, rankings next to each other (e.g. 2,3) on 8 trials, and rankings two intervals apart (e.g. 2,4) on 4 trials. Despite these differences, the two judges tended to concur with each other, and it may be argued, based on the shared variance between *z*-scores, that their decisions were mostly (51.3%) based on objective, rather than subjective (48.7%) data/associations (that is, using reliable information in the mentations rather than using 'hunches', apophenia, noticing different facets of lengthy mentations, or rating 'randomly'). Thus, combining the ratings of J1 and J2 should provide a more reliable measure of psi-performance, converging towards 'objectivity'.

Figure 8.1

Scatter plot of the target z-scores for Judge 1 and Judge 2



8.3.4 Psi-performance of artists and 'non-artists'

Based on average-standardized ratings (of J1 and J2) for each clip, target rankings are as delineated in Table 8.2. The hit-rate amongst artists was 40% (r = .346), being commensurate with previous free-response ESP research with artistic populations, as reviewed in Chapter Seven (where six ganzfeld studies conducted with artists obtained a combined hit-rate of 40%, r = .344). However, the hit-rate was higher than predicted for non-artists (47%, r = .500), perhaps suggesting that the ESM protocol was 'psi-conducive' for this sample, concurring with Delanoy et al. (1993) and Ertel (2004). The overall hit-rate was 43.3% (r = .423[6]). However, the sum-of-ranks analysis for overall psi did not reach statistical significance (SOR = 68, z = 1.03, p = .152, 1-t). The higher than expected sum of ranks may be accounted for, in part, by a magnitude effect in the artist sample, with 33.3% rank 4s, which would concur with the magnitude and direction model propounded by Palmer (1997) and Schmeidler (1974), where creative populations might be more sensitive to contextual factors that are hypothesised to affect direction, while tending to respond strongly (with magnitude) in either direction. In any event, hypothesis one, that there would be significantly low SORs, indicating target ranks are organised in a 'psi-hitting' distribution, was rejected.

Table 8.2

Target rank frequencies for artists, 'non-artists' and both samples combined.

	Target ranks				Mean *z*-score (SD)	SOR	*z*	*p*-value (1-t)	*r*
	1	2	3	4					
Artists	6 (40.0%)	3 (20.0%)	1 (6.67%)	5 (33.3%)	.168 (.895)	35	.680	.248	.176
'Non-artists'	7 (46.7%)	1 (6.67%)	4 (26.7%)	3 (20.0%)	.155 (.912)	33	.961	.168	.248
Total sample	13 (43.3%)	4 (13.3%)	5 (16.7%)	8 (26.7%)	.161 (.888)	68	1.030	.152	.188

As hypothesized, the mean *z*-scores were higher for artists than 'non-artists' (.168 versus .155), but this difference was not statistically significant (t = .037, df = 28, p = .485, 1-tailed); even when controlling for potentially confounding variables (extraversion, unusual experiences, paranormal belief, self-confidence, familiarity and distance between the sender and receiver):

[6] Exact binomial: p = .013, 1-t.

$F_{(1,14)} = .513$, $p = .482$. Thus, hypothesis two, that artists would demonstrate better psi-performance than 'non-artists' was rejected.

This outcome does not concur with previous free-response work comparing artists with 'non-artists' (reviewed in Section 7.7.2.1) where artists across four studies had significantly higher psi-indexes than controls (Gelade & Harvey, 1975; Moon 1973; Moss 1969; Moss & Gengerelli 1968), where $z = 4.931$, $p < .00001$, $r' = .328$. Various reasons could be postulated for this. Perhaps artists respond more to emotionally charged targets, as used in Moss's research. In the current study, targets varied in emotionality (neutral, slightly negative, to positive). However, clip emotionality (rated by the author/sender) did not impact on psi-performance (*rho* = .098, p = .607, 2-tailed). In Moss's follow-up study, artists who had previously reported a SPE were responsible for the 'psi-hitting'. However, in this study, belief-in-the-paranormal, which includes SPEs, was negatively correlated with psi-performance (as discussed in Section 8.3.6), for both groups. Hence, this explanation does not appear to explain the lack of an 'artist-psi' effect.

Alternatively, the control group in this sample might be better matched than in previous studies, only significantly differing from 'non-artists' on 'artistic creative personality' of the creativity/personality/belief scales, and associated cognitive-styles – 'playful, absorbed cognition' and 'intuition/inspiration'. Having inadvertently selected participants in each group with similar levels of emotional creativity and heightened internal awareness might have mitigated against any 'artists' advantage'. This explanation would be consistent with the outcome of Study Two, where artists did not report significantly more SPEs than 'non-artists', but that level of EC, rather than domain involvement, did significantly predict the reporting of SPEs. That EC, rather than 'being an artist', might predict psi-performance will be considered in Section 8.3.5.

Finally, it could be that the methodology did not give an advantage to artists, which previous free-response designs may have done, e.g. by being comfortable with 'performing' (most relevant to Schlitz and Honorton's sample from the Juilliard school of performing arts), or focusing on and describing visual imagery (in the case of visual artists). In the current study participants could create their own environment in which to respond and could record any type of mentation or experience, in any state of consciousness, as they wished, in privacy, and spontaneously.

In summary, the current study obtained a hit-rate commensurate with previous research supporting the 'psi-hypothesis' (43%, $r = .423$), with a non-significant trend towards psi-hitting (according to a SOR analysis; $z = 1.03$, $p = .152$, 1-tailed). Further, there was no significant difference between the psi-performance of artists and non-artists (based on mean z-scores; (t =

.037, p = .485, 1-tailed), suggesting that involvement in the arts alone may not explain the success of artistic samples in previous psi-research.

8.3.5 Psychometric measures of creativity and psi-performance

Table 8.3 presents the correlation matrix of creativity components and psi-performance. No creativity components correlated significantly with overall psi-performance. Partialling out the potentially confounding effects of UE, E, PB and S-C did not impact upon these small effect sizes.

Table 8.3

Correlations between creativity dimensions and z-scores (2-t)

Psi-performance	Emotional creativity	Artistic creative personality	Scientific creative personality	Figural divergent-thinking	Music and performance arts	Domestic crafts	Writing
Spearman's *rho*	.127 (.404)	-.117 (.538)	.255 (.182)	-.142 (.480)	-.298 (.110)	-.044 (.819)	.133 (.483)
Partialling out E, UE, PB & SC	.133 (.526)	-.119 (.570)	-.064 (.762)	.014 (.948)	-.257 (.216)	-.044 (.819)	.303 (.141)

Hypothesis three, that emotional creativity would correlate positively and significantly with overall psi-performance, was rejected. The overall correlation between emotional creativity and psi-performance was non-significant (*rho* = .127, p = .505). Thus emotional awareness/creativity, while related to the reporting of SPEs (Holt et al., 2004), does not appear to be related to objective psi-performance. The enhanced performance of 'non-artists' (compared to previous research) in this study cannot be explained by emotional creativity and affective awareness[7].

8.3.6 Dimensions of the CCI-R and psi-performance

Contrary to expectation (based on the positive correlations between the non-linear sub-scales and SPEs (discussed in Section 7.5) negative correlations were formed between non-linear cognition and psi-performance (as observed in Table 8.4). The largest correlations were for 'beyond the self' (*rho* = -.429, p = .018, 2-tailed) and 'internal awareness' (*rho* = -.311 p = .074, 2-tailed), which were negatively associated with psi-performance. 'Beyond the self' consisted of items

[7] In a post hoc analysis, emotional creativity did correlate positively with psi-performance for artists (*rho* = .411, p = .128, 2-tailed), but not for non-artists (*rho* = -.056, p =.844, 2-tailed). Although non-significant, this effect is of a similar effect size to that found between psi-performance and emotional creativity in a population of visual artists (Holt, 2006), and as such, may deserve future consideration.

which were previously in the 'heightened internal awareness' sub-scale: using, in the creative process, ideas that seem to come from some source other than the self; a sense of channelling in the creative process; and a sense of connecting with something 'other'. Might it be that such experiences and mental content adds cognitive noise and might such participants be drawing on aspects of their own vivid imagination, rather than 'psi-information'?

Table 8.4
Correlations between CCI dimensions and z-scores (2-t)

Psi-performance	Internal awareness	Playful cognition	Intuition	Oneiric cognition	Beyond the self	Linear cognition
Spearman's *rho*	-.311 (.074)	-.230 (.222)	-.006 (.977)	-.142 (.480)	**-.429** (.018)	.065 (.735)
Partialling out E, UE, PB & SC	-.301 (.143)	-.246 (.236)	-.074 (.724)	.187 (.370)	**-.448** (.025)	-.062 (.770)

Note: Correlations in bold are significant at the $p < .05$ level.

Such experiences, e.g. where parts of the creative process seem to be dictated by some other source than the self have been related to intrusions from the right hemisphere (Martindale, 1977-78) and are similar to experiences of a sense of presence or a homologue right hemisphere sense of self (Persinger & Healey, 2002). Perhaps being prone to such experiences is related to difficulties in distinguishing between experiences which are 'self' or 'other' generated, which might make identifying psi information across an unstructured period of time (24-hours) difficult. Alternatively, it might be that such subjects might have a strong belief in psi and may have been trying too hard to be psychic in this study.

8.3.7 Post hoc observations of predictors of psi-performance amongst artists

A post-hoc analysis showed that some creativity variables were associated with psi-missing for artists and psi-hitting for controls ('artistic-CP' and 'writing') and vice versa (emotional creativity). In particular, 'artistic creative personality' was associated with psi-missing for the artist-sample (*rho* = -.534, $p = .04$, 2-tailed). The more that artists reported engaging in visual art, perceiving themselves to be creative, and rating their creative involvement as very important to their life, the worse they appear to have performed on the psi-task. Perhaps high artistic-CP was associated with having too many associations, where imaginative mentation might either mask or embellish upon and diverge from any psi-information. This was suggested by Schlitz and

Honorton (1992) in respect of high divergent-thinking and by Dalton (1997), who, with a sample of visual artists, found significant negative correlations between both psi-hitting and: creative personality; and the amount of mentation produced in the ganzfeld. These effects were not reduced by partialling out UE, PB, S-C and E.

In addition, extraversion was significantly and positively correlated with psi-performance amongst the artists (*rho* = .619, p = .014, 2-tailed). Extraversion has been significantly associated with psi-success in a number of ganzfeld studies working with artistic populations (Morris, Cunningham, McAlpine & Taylor, 1993 (with subscales of: activity, excitement seeking and positive emotions); Morris, Summers & Yin, 2003; Schlitz & Honorton, 1992; but not Morris, Dalton, Delanoy & Watt, 1995). This suggests that 'something about being an artist' might interact with 'something about extraversion' to lead to successful psi-performance –introverted artists may have too much ideation, cogitating upon experiences, hindering the spontaneous entrance of novel ideas into WM/awareness (Eysenck, 1967).

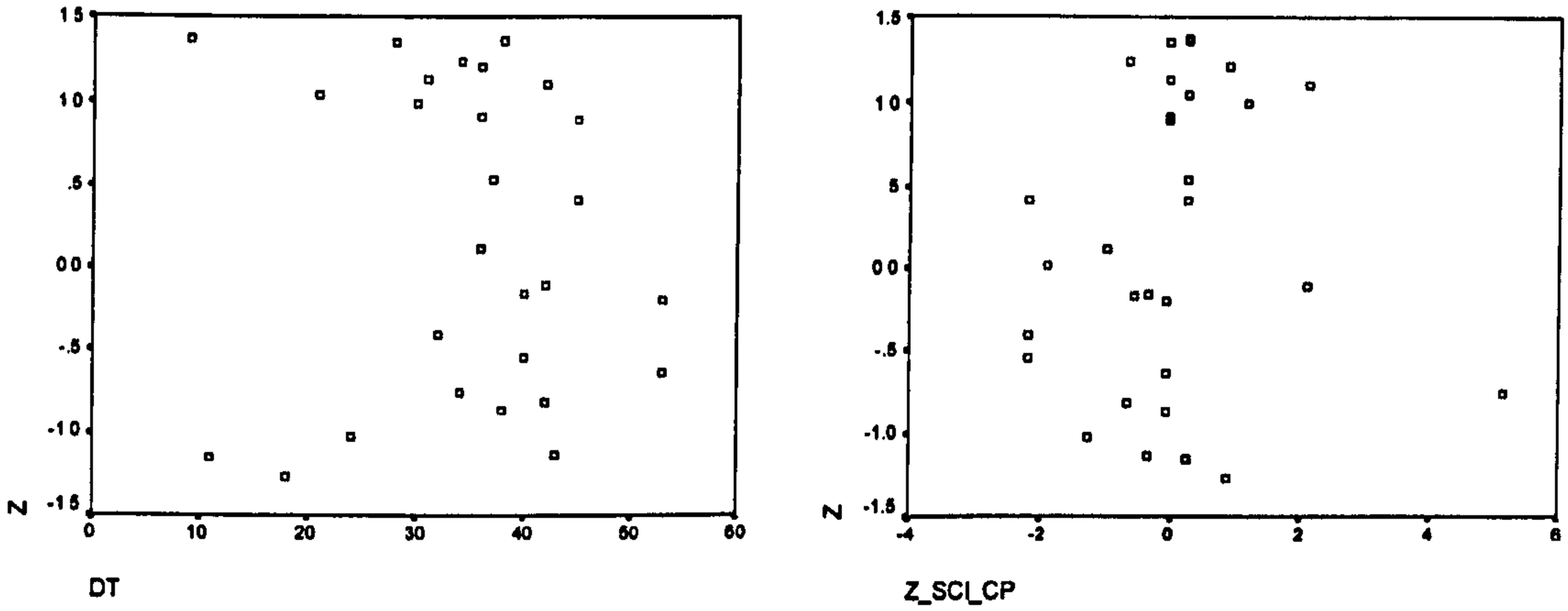
No personality-creativity variables significantly predicted psi-performance for non-artists (apart from 'beyond the self'). Perhaps this group was heterogeneous, using a variety of strategies on the ESP task. If it is the case that personality interacts with task demands to effect psi-performance, then we might not expect to find consistent correlations amongst such a group.

8.3.8 Curvilinear relationships between creativity and psi-performance

Analysis of scatter plots, curve estimations and line graphs of creativity variables (divided into high, medium and low scores) did not reveal significant curvilinear relationships with psi-performance (Refer to *Appendix 8.4* for this data). There was a slight trend for figural-DT in the predicted direction, where highest psi-scores were obtained with moderate levels of figural-DT and lower psi-performance with both high and low figural-DT, but this was not significant ($F_{(2,24)}$ = .902, p = .419). However, the scatter plots for figural-DT and scientific-CP (shown in Figure 8.2) did show curvilinear distributions along the opposite axis, where low scorers on figural-DT and high scorers on scientific-CP tended to either strongly hit or miss – suggesting a magnitude effect, to which attention will now be turned.

Figure 8.2

Scatter plots showing the relationship between psi-performance (*z*-scores) and both figural divergent-thinking and scientific creative personality



8.3.9 The 'magnitude and direction' model

This section will examine whether creativity variables have affected the magnitude of the psi-index following Palmer (1997) (as discussed in Section 7.7.1). First the target rankings, displayed in Table 8.2, will be analysed to see whether there is evidence for any overall magnitude effect in the data. Comparing the number of 'extreme ranks' (1's and 4s) to those of 'middle ranks' (3s and 4s) showed a suggestive magnitude effect for artists (with 11 extreme ranks and 4 middle ranks) (exact binomial, $p = .041$, 2-tailed). Magnitude of psi-scoring did not reach statistical significance for non-artists (with 9 extreme ranks and 6 middle ranks) (exact binomial, $p = .092$, 2-tailed)[8]. This concurs broadly with Schmeidler's and Palmer's hypothesis that 'creative populations' might be prone to unconsciously detecting a 'psi-signal', but that this may be expressed or blocked depending upon the presence of 'psi-conducive' contextual factors. However, artists did not show a significantly greater magnitude effect than non-artists, there being no significant difference between the absolute *z*-scores of artists (mean = .757) and non-artists (mean = .798) ($t = -.256$, $p = .800$, 2-tailed). These magnitude effects appeared to be stronger than 'directional effects' – illustrated by non-significant outcomes when running the same analysis on binary hits and misses ($p = .153$ and .196 respectively), and by the SORs

[8] For the entire sample the magnitude effect was significant at $p = .002$, 2-tailed.

analyses reported previously. These simple analyses suggest that in this study there was a stronger magnitude than directional effect.

It was not found, according to Schmeidler's (1974) hypothesis that if overall psi-performance is in a psi-hitting direction there will be positive correlations between creativity and psi-performance, and vice versa. Nevertheless, some suggestive creativity-magnitude-effects were found. Table 8.5 displays correlation coefficients (and associated probabilities) for the degree of relationship between absolute z-scores (the magnitude of psi-performance, in terms of deviation from zero) and the creativity dimensions. Significant effects can be observed with two dimensions of creativity.

Scientific-CP is associated with magnitude of scoring in a positive direction, where higher scorers on Gough's CPS and an interest and involvement in science is associated with extreme psi-scores (*rho* = .370, p = .044, 2-tailed). However, this was brought to non-significance by partialling out the effects of EU, SC, E and PB (r = .159, p = .640, 2-tailed) – mostly due to the effects of unusual experiences and extraversion, with which 'scientific-CP' was positively correlated with in this sample.

Table 8.5

Correlations between creativity dimensions and absolute z-scores (Spearman's rho, 2-t)

Psi-performance	Emotional creativity	Artistic creative personality	Scientific creative personality	Figural divergent-thinking	Music and performance arts	Domestic crafts	Writing
Z-scores	.035 (.856)	-.117 (.538)	**.370** (.044)	**-.535** (.004)	.208 (.270)	.064 (.738)	.098 (.603)

Note: **Correlations in bold are significant at the $p < .05$ level.**

The second magnitude effect was for 'figural-DT' (*rho* = -.535, p = .004, 2-tailed). This effect was not partialled out by UE, SC, E and PB (r = .522, p = .011, 2-tailed). It appears that scoring at a low level on the figural-DT task is associated with either very high or low psi-scores. This is in the opposite direction to that proposed by Palmer (1991), where high flexibility scores might make participants more sensitive to contextual variables (e.g. experimenter effects) that might lead to psi-hitting or missing. The effect may be interpreted in accordance with Schlitz's and Honorton's (1992) suggestion, that less divergent and associative thinking, leading to more 'cognitive quietude' and less deviations from potential psi-impressions, might facilitate psi-

performance – however low figural-DT would in this case have to interact with another variable for this to lead either to psi-missing or psi-hitting.

8.3.10 Stimulus level analyses

Experience-sampling questionnaire data were only available for 22 participants (11 artists and 11 controls). Only eleven participants completed a questionnaire after every single impression recorded, as described in the procedure and participant instructions. Another 11 participants completed questionnaires to cover clusters of impressions, most commonly reporting that they did not have time to complete the questionnaire at times when they wanted to record something that they thought was relevant very quickly. One participant's responses were excluded because all were at 'mid-point' on the scale, where the response cursor rests naturally, and hence it was assumed that they had not completed the questionnaire properly. A further seven participants forgot to complete the experience-sampling questionnaire at all.

While the ESM allowed participants the freedom to record impressions according to their own proclivities, it also encouraged non-compliance. Presumably the main motivation of the participants was to record their impressions, rather than to complete the less exciting questionnaires. However, the study may have seemed complex to some participants, particularly if using a PDA for the first time. The questionnaire had to be initiated by the participant, which may have been easy to forget under such circumstances. In future ESM-psi research it would thus be advisable to write a programme that activates a shorter experience-sampling questionnaire automatically, after an impression has been recorded. Further, consideration could be given to ways to encourage compliance, as suggested by Conner Barrett, Tugade and Tennen (2007), such as financial rewards for completing sampling questionnaires and stressing participant's important role as co-researchers in a scientific study. However, a careful balance needs to be struck, enabling intrinsic motivation, enjoyment and playfulness to also play a part in the participants' experience.

It would be possible to correlate, at the person-level, the average scores on 12 dimensions of consciousness (across the 24-hours, for each of the 22 participants) with psi-performance. However, retrospective state summaries may be inaccurate. Thus, a rudimentary within person analysis was conducted, based on the limited and possibly non-representative 11 'compliant' participants (5 artists and 6 controls). Scores on the 12 dimensions of consciousness for the 'best' and 'worst' impressions for each participant (those with the highest and lowest *z*-scores) were compared. The most accurate psi-impressions contained *less* visual imagery ($z = -2.19$, $p = .028$,

2-tailed) and less positive affect (z = 2.14, p = .032, 2-tailed) compared to the 'worst' psi-impressions across the 24-hours. This may be aligned with psi-conducive models of cognitive and affective quietude (Braud, 2002).

In future studies, with complete data, it is hoped to use hierarchical linear modelling to examine whether particular states are associated with psi-hitting or missing, and whether this differs according to group membership (e.g. artists versus 'non-artists' or introverts versus extraverts). For example, Conner et al. (2007) detail how factor analysis of stimulus-level variables can be used to create individual 'signatures' (e.g. a 'psychic signature'), i.e. structural regularities pertaining to an event (e.g. psi-hitting), which can then be compared at the group level, e.g. to see if 'psychic signatures' differ according to personality, gender or other person-level categories.

There were 204 individual mentations in the study, ranging from 2 to 24 recorded impressions for each trial. At a future date it may be possible to analyse the thematic content of these mentations qualitatively. In order to illustrate the types of impressions that were recorded during the study, those with extreme high and low z-scores are detailed below. From this very small selection it can be noted that reports vary along several dimensions, such as 'strangeness' versus mundanity and degree of descriptive detail, and are described whilst undergoing various activities, including programming, driving and walking.

Impressions with the five lowest z-scores (ranging between -1.24 and -1.11) were contributed by 4 participants and the lowest for each participant is presented here:

- z = -1.24, "*Notepad, 1.08 a.m.:* A wild beast was coming in my mind while I was programming – strange!" (p#11, control, rank 4 overall);
- z = -1.19, "*Notepad, 16.46 p.m.:* Strange feeling in head – like someone staring upwards from the floor at me" (p#8, artist, rank 1 overall);
- z = -1.19, "*Notepad, 13.49 p.m:* A man in a long dark coat visits me – he speaks to me, however, I cannot hear him. He is in a dark tunnel quite a distance away, standing facing me" (p#29, artist, rank 4 overall);
- z = -1.16, "*Notepad, 8.08 a.m.:* Holidays. Sick and sinks" (p#13, artist, rank 1 overall).

Impressions with the five highest z-scores (ranging between 1.60 and 1.50) were contributed by 4 participants and the highest for each participant is presented here:

- z = 1.60, "*Notepad, 19.13 p.m.:* Field of swaying golden and amber grain. Seen from a low viewpoint as if amongst stalks" see *Figure 8.2,* (p#22, artist rank 2 overall);

- z = 1.50, "*VoiceMemo, 13.36 p.m.*: ... I'm stuck in traffic, I'm driving home. Erm, an image of a ginger tom cat keeps popping into my head" (p#24, artist, rank 1 overall);
- z = 1.50, "*Notepad, 14.28 p.m.:* Bookshelf", see *Figure 8.3*, (p#13, artist, rank 1 overall);

z = 1.50, "*VoiceMemo, 10.15 a.m.:* ... While I was walking to work I was daydreaming about astronauts and Tom Hanks in Apollo 13, which is not something I normally think about ..." (p#1, control, rank 1 overall).

Figures 8.3 and 8.4

Examples of drawings recorded by participants to illustrate impressions that arose during the ESM-ESP task

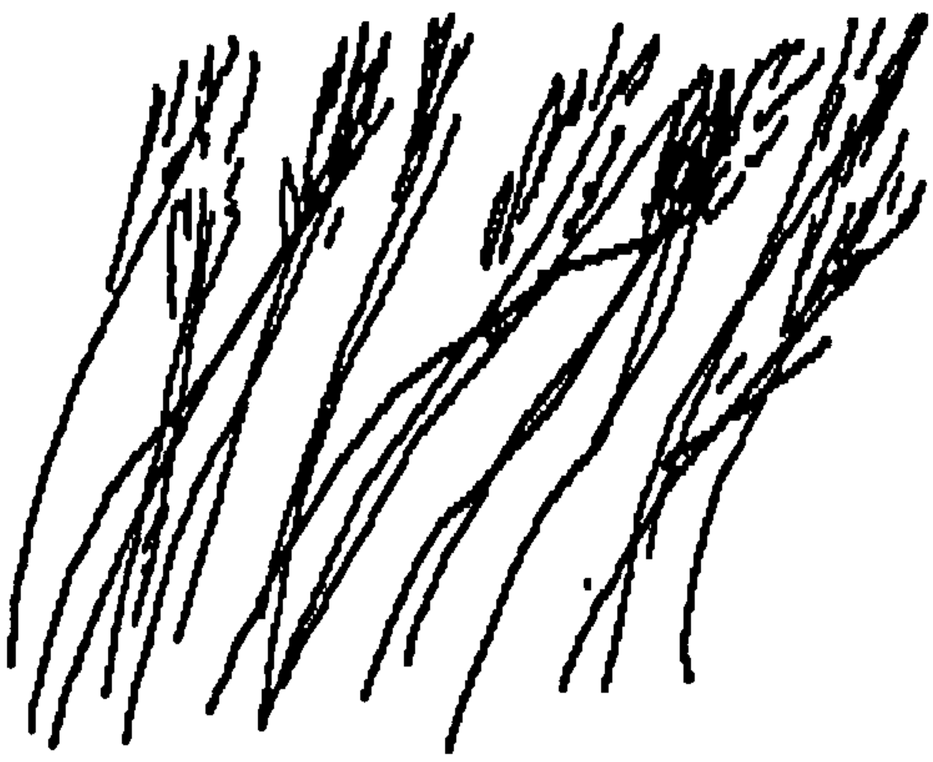


Figure 8.3

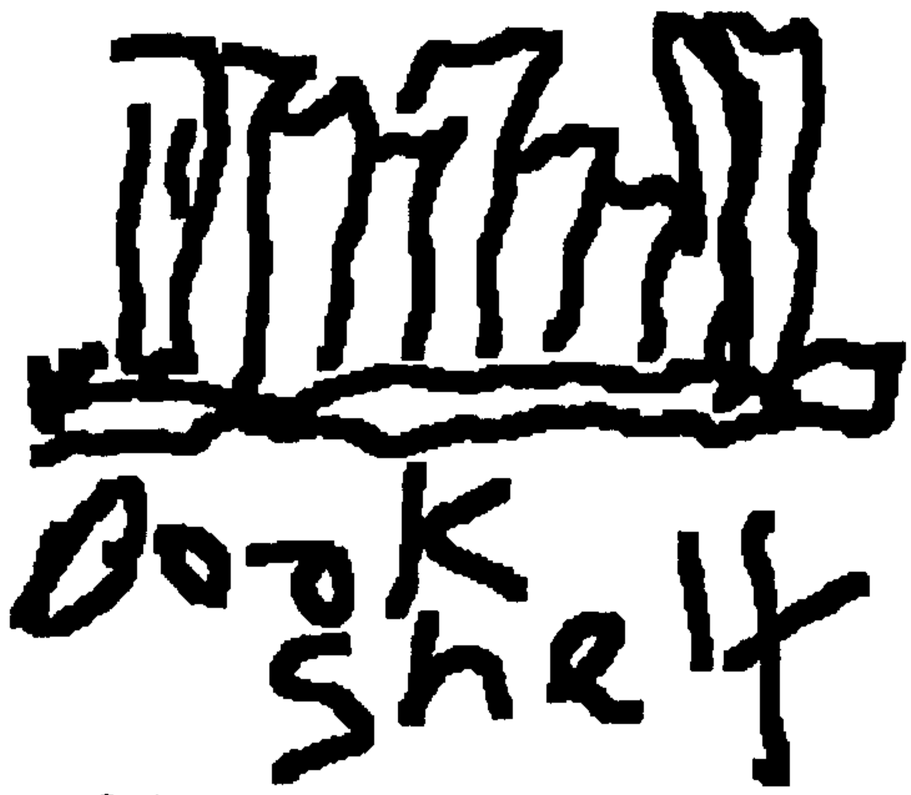


Figure 8.4

8.4 Summary and conclusions

Artists performed at a level commensurate with free-response ganzfeld research with artistic populations, with an effect size of r = .347 (Dalton, 1997; McDonough, Don & Warren, 1994; Morris, Cunningham, McAlpine & Taylor, 1993; Morris, Dalton, Delanoy & Watt, 1995; Morris, Summers & Yin, 2003; Schlitz & Honorton, 1992). To this extent the 'artist-psi' effect can not be refuted. Crucially, however, artists did not outperform 'non-artists' (who obtained an effect size of r = .500). Nevertheless, a sum-of-ranks analysis did not find these outcomes to deviate significantly from chance expectation (SOR = 68, z = 1.03, p = .152, 1-t).[9] It was by no means the aim of this study to 'prove' ESP in any capacity, but rather to assess the predictors of 'psi-performance'. In light of this and considering the context of this study as a part of a larger whole

[9] While it is not claimed that this study obtained a significant psi-effect, as the data did not meet the planned criteria, it is noted that when analysed using the same statistical test as in previous studies (which all assessed the psi-outcome in terms of the exact binomial of the hit-rate), a 'significant' p-value is obtained.

that has assessed the validity of the psi-hypothesis, a number of correlates of psi-performance were observed and a number of interpretations drawn.

The main outcome of this study emerges from the observation that 'non-artists' performed at a similar level to artists. That artists only differed from non-artists according to 'artistic-creative personality', other creativity and personality variables being controlled for, suggests that artistic involvement alone does not explain the enhanced psi-effect found in previous ESP studies that have worked with artistic populations.

If this is the case (which is difficult to extrapolate from one small study) why might this be? It might be that the task demands of previous studies or experimenter effects have been responsible for the previous effects where artists scored higher than controls (Gelade & Harvey, 1975; Moon, 1973; Moss, 1969; Moss & Gengerelli, 1968), for example, where actors are more comfortable performing to an audience in the dramatic and bizarre ritual that is the ganzfeld ESP experiment. It might be that in previous work the comparison groups were not adequately controlled, which would suggest that some other person-level variable/s is/are associated with psi-performance, which artists might more commonly, but not exclusively, possess. It might be that particular types of artists might do well in psi tasks (for example, extraverted artists, as a post-hoc finding of the current study suggested, following Morris et al. (1993, 2003)). Further, it may be that the procedure of this study facilitated psi-performance amongst non-artists, by allowing them to take part as they preferred, increasing autonomy, control, and perhaps a sense of relaxation, as argued by Ertel (2004) and Delanoy et al. (1993) of take-home ESP procedures.

None of the seven creativity measures significantly predicted overall psi-performance. The hypothesis that emotional creativity might be the factor, as was found for SPEs in Chapter Seven, that was associated with psi-performance, rather than, and independent of, domain involvement, was rejected. In previous creativity-psi research the combined effect size of all correlations between measures of creativity and psi (across both forced-choice and free-response studies) is very small: $r' = .049$, $n = 3851$, $z = 1.695$, $p = .045$. The current study did not find any simple significant effects that might dispute this weak, almost zero effect. However, a number of suggestions arose, which could be examined in future research.

One style of creative-cognition, 'beyond the self', characterised by a sense of receiving information from 'something other', was associated with psi-missing (*rho* = -.429, $p = .018$, 2-tailed). It was questioned whether such participants might have expected any 'psi' information to have felt 'other', rather than being 'mundane' – perhaps these participants had more problems with 'source monitoring', deciding whether a thought was 'psi-mediated' or not. This raises

interesting questions about how and why participants selected a thought or experience to record – how were the 'possibly psychic' moments chosen out of the stream of consciousness?

While 'beyond the self' predicted the overall direction of psi-performance, figural divergent-thinking predicted the 'magnitude' of psi-performance. This to some extent supports Palmer's (1997) magnitude and direction model. Low figural divergent-thinking was associated with a magnitude effect for both artists and non-artists (*rho* = -.535, p = .004, 2-tailed), suggesting that less flexible, creative cognition led to either extreme psi-hitting or missing in this study, leading the author to speculate whether low-DT plus the presence of an additional variable leads to psi-success.

Predictions concerning the characteristics of the psi-conducive participant were not met in this study. However, it is worth noting that the population as a whole scored above the norm on unusual experiences, emotional creativity and belief in the paranormal and hence might have been a more homogenous group than intended, leading to restricted variances in the samples. Further, given the moderate effect size for the psi-outcome in this study, it might be argued that this population demonstrated a degree of psi-conduciveness.

The model drawn upon in sections of this chapter, where creative cognition can both enable (perhaps through cognitive disinhibition, see Section 2.4.1.1) novel, perhaps psi-mediated information to enter consciousness, but too much of which, due to too many ideas (or too little 'filtering' of relevant information) assumes that 'psi' is unconscious information in a system. If artists (with high artistic-CP) are prone on a conscious psi-task to drown out psi, allowing too much uncontrolled imagery to be embellished or expressed, perhaps they would perform better on an unconscious psi-task. In such a task, psi mediated information might inform a response, without the need to introspect, mentate and deliberately encourage a 'too fertile' up-rush of ideas.

In conclusion, the current study, in the author's opinion, profitably explored the use of a new methodology in ESP research. Both artists and non-artists performed well in this task; however creativity and intrapersonal awareness did not appear to be responsible for this effect. This study has suggested that the few previous findings that artists are more psychic than non-artists be questioned, and rather: that previous methodologies may have favoured artists; and that interactions between task demands, state variables and person-variables be further explored. It is suggested that ESM-ESP work be continued, whereby autonomy is given to participants, and that larger studies with multi-level designs be conducted, enabling consideration of the interaction between personality and states of consciousness, for example. Consideration, in such case, should be given to procedures by which to increase participants' compliance, for example through

practice to increase familiarity with the equipment, the simplification of the protocol, rewards for fully completed trials, or increased sense of responsibility as valued co-researchers. Such studies would be better enabled with designs that allow each psi-impression to constitute a separate and independent ESP trial, increasing statistical power substantially; for example, a complete ESP-task could be programmed to run palm-top computer that could be instigated at a participant's inclination, when, and as often as they like.

CHAPTER NINE

Conclusions

In this chapter I will provide a summary and synthesis of the findings and implications of this thesis, in addition to considering future extensions of this work. What did I discover on this journey to learn more about the relationship between experiences of consciousness and 'varieties of creativity'?; and what does this suggest about the nature of creativity?

9.1 Creativity and trait measures of boundary-permeability

The first empirical study in this thesis examined whether creativity might be related to boundary-permeability as a trait, or, in the words of Andreason (2006, p. 101) whether creative people "live in a more fluid and nebulous world". Boundary-permeability has been conceived as an extension of the openness-to-experience factor of personality, with emphasis on intrapersonal openness (McCrae, 1994). Its neurological underpinnings have been described in terms of increased connectivity between neural networks (Thalbourne, Crawley & Houran, 2003), and parallels have been made with cognitive disinhibition or weak sensory barriers, leading to increased awareness of, and hypersensitivity to, stimuli (internal and external) (Claridge, 2001). The rationale for Study One was that, extrapolating from models of cognitive, affective and perceptual 'looseness' in the creative process (e.g. Flowers & Garbin, 1989; Russ, 2001), creativity might be related to boundary-permeability, whereby more remote or unusual ideas might permeate consciousness, that might be fertilely combined into a useful product.

Study One compared multiple, and non-cognitive, measures of creativity to transliminality and boundary-thinness, and assessed the relationship between creativity and the sub-scales of Hartmann's (1991) Boundary Questionnaire (BQ). This analysis suggested that, contrary to previous research, that assessed cognitive creativity (Thalbourne, Bartemucci, Delin, Fox & Nofi, 1997; Thalbourne, 2000a; Levin, Galin & Zywiak, 1991), affective, domain involvement and personality measures of creativity do appear to be related to the 'open, sensitive, fluid, anomaly-prone' traits of boundary-permeability. As such, Study One demonstrates the importance of multi-dimensional creativity measurement. Transliminality and boundary-thinness were both significantly associated with: emotional creativity (Averill, 1999) (r = .477 and .389, $p < .001$) and creative personality (Gough, 1979) (r = .432 and .343, $p < .01$), and boundary-thinness with artistic involvement (Griffin & McDermott, 1998) (r = .318, $p < .01$)[1]. It was thus suggested that

[1] When corrected for multiple analyses.

creative personality and affective and artistic creativity are related to 'cognitive-styles' where more information, perhaps subtle emotional, ideational and imagistic stimuli, gains access to conscious awareness.

Analysis of the 'primary-process' subscales of the BQ and creativity suggested that different types of boundary-thinness relate differentially to types of creativity. The 'thoughts, feelings and moods' subscale purports to assess 'fluidity of cognition, the ability to withhold rational analysis and affect-laden and absorbed cognition'. It correlated significantly with both domain general (creative personality and self-perceived creativity) and domain specific creativity measures (emotional creativity and involvement in the arts), providing support for Russ's (2001) contention that both affective and cognitive aspects of primary-process thinking are related to creativity[2] and that 'cognitive-affective boundary-permeability' *might* be associated with creativity in general. However, the 'unusual experiences' sub-scale of the BQ (e.g. synaesthesia, auditory hallucinations, out-of-body experiences and telepathy) correlated at a significant level only with emotional creativity and artistic involvement. The relationship between 'unusual experiences' and involvement in artistic domains has gained subsequent support from recent research, using the unusual experiences (UE) sub-scale of the O-LIFE (Mason et al., 1995)[3]. Burch Pavelis, Hemsley, and Corr (2006) and Nettle (2006) replicated a relationship between artistic involvement and UE with both visual artists and poets. However, neither used any other indicators of creativity, precluding analyses that might help to understand these relationships further. Nettle did compare UE amongst a sample of mathematicians, who scored significantly lower on UE. This finding has parallels with the outcomes of Study Two of this thesis, concerning scientific creative-personality. In Study Two, boundary-permeability correlated significantly and positively with involvement in the arts (visual, performance, music and writing), emotional creativity, at low levels with divergent-thinking and remoteness-of-verbal-associations, but *not* with involvement with science.[4] Albert and Runco (1987) relate temperamental differences between the 'scientist' and the 'non-scientist' to Hartmann's boundaries. They postulate a mechanism of 'stimulus barriers', where different thresholds of stimulus barrier lead to variations in both external and internal stimulus intensity. They suggest that the 'scientist' versus the 'artist' tends to have a stronger stimulus barrier and as such is less

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[2] Although, Farias, Claridge and Lalljee (2005, p. 981) relate this sub-scale primarily to affective, rather than cognitive expansion, to emotional self-expression and 'expanded states of being', due to items depicting 'emotional sensitivity' or 'hypersensitivity'.

[3] Although, this scale focuses on a narrower range of 'unusual experiences': perceptual aberration and magical thinking. However, as seen in Chapter Two, it correlated at a high level with transliminality.

[4] Nettle suggests that orderly cognition, associated with an autistic rather than a 'psychotic' spectrum, may be linked to mathematical creativity This type of thinking has been associated with alexithymia, the inverse of which is associated with psychological mindedness and emotional creativity.

frequently and intensely concerned with internal, affective and intrapersonal/interpersonal content. In the arts, they argue, problems are idiosyncratic and 'internally set' and in the sciences are institutional and 'externally set'. Such models could be tested in future work. While it seems that artistic creativity may be associated with UE, the mechanism for this is not clear. I am currently collecting data in a visual latent inhibition study, which in part will examine whether cognitive disinhibition (discussed in Section 2.4.1.1) is related to both types of creativity and UE.

9.2 Creativity, ASCs and 'controllable oddness'

The purpose of Study Two was to explore how multiple dimensions of creativity might relate to distinct types of experience. A Principal Components Analysis was conducted with a range of creativity measures in order to identify potential underlying dimensions of creativity that might correlate differentially with ASCs. From this emerged seven components: 'emotional creativity'; 'artistic creative personality'; 'scientific creative personality'; 'writing and remoteness-of-verbal-associations'; 'figural-divergent-thinking'; 'involvement with music and performance arts'; and 'domestic crafts'. All components, apart from 'scientific creative personality' and 'domestic crafts', formed positive correlations with ASC proclivity at the $p < .05$ level. However, only those for emotional creativity ($r = .50$, $p < .001$) and artistic creative personality ($r = .38$, $p < .001$) remained significant when correcting for multiple analyses, supporting the outcome of Study One where affective and artistic creativity and unusual experiences.

It was suggested that this provided some support for models of affective (e.g. Taft & Gilchrist, 1979) rather than cognitive 'looseness' (e.g. Martindale, 1989) that have sought to explain links between creativity and ASCs. O'Reilly et al. (2001) rejected the cognitive model in favour of a motivational model, suggesting that having UEs leads to a desire to express them through the 'subjective arts'. While not rejecting O'Reilly et al.'s suggestion, Study Two highlighted the role of affective awareness in this process – both emotional creativity ($\beta = .382$, $p < .001$) and artistic-creative-personality were direct predictors of ASC-proclivity ($\beta = .201$, $p < .001$). These relationships are intriguing, but raise further questions, such as: How might emotional creativity be related to altered states of consciousness?; and what factor can explain the unique variance (when partialling out affective and cognitive factors) between artistic-creative-personality and ASC-proclivity, might this be motivational, or due to imagistic capabilities, for example?

A key feature of Study Two was that it enabled a more detailed analysis of creativity-ASC relationships, considering the role of specific states of consciousness, e.g. mystical experiences,

hallucinations and unusual dreams. Analyses were made of the relationship between sub-classes of ASC with each creativity component. This led to the tentative interpretation that there may be different associative 'routes' between ASC-proclivity and creativity, through: 1) openness to internal experience and affect; and 2) playful, imaginative creative involvement, perhaps along a 'sleep-wake' continuum of oneiric cognition (Glicksohn, 1989). This suggestion emerged from a number of observations. That emotional creativity was associated with unusual experiences in general[5], implicated the role of affect in ASC-proclivity, which appeared to be mediated by boundary thinness and the use of 'heightened internal awareness' in the creative process on the CCI. In addition, artistic-creative-personality was associated only with 'positive' ASCs that appeared to fit into two conceptual strands: vivid imagistic experiences, perhaps along a sleep-wake continuum (hallucinations, hypnagogia, vivid dreams and vivid waking imagination); and absorbed/expanded states, perhaps related to flow states (dissociation, positive mystical experiences and changed feelings of space and time)[6]. Artistic creative-personality was most strongly associated with the use of 'loose, playful, absorbed cognition' in the creative process on the CCI and with vivid imagination. This suggests that imagistic-fantasy states/cognition may be a key variable in the relationship between artistic creativity and ASCs, rather than, or in addition to the motivation to express experiences (O'Reilly et al., 2001). A final observation from this set of analyses was that figural divergent-thinking correlated significantly only with the 'dreams' ASC sub-scale (hypnagogia, high dream recall and unusual dreams) and the use of inspiration in the creative process on the CCI, suggesting a link between cognitive looseness and oneiric-states.

In summary, different aspects of creativity appeared to be associated with different ranges of UEs: emotional creativity with ASCs in general, artistic creative-personality with 'positive ASCs' (e.g. not with negative mystical experiences); and figural-DT with vivid dream states along a sleep-wake continuum. Further, certain types of creativity, e.g. scientific-creative-personality, did not appear to be associated with ASC-proclivity. This suggests that there may be 'varieties of creative experience', where different ways of being creative are related to different experiences of consciousness. This raises the question: are different ways of being creative related to different degrees of shift in state or ASC-proclivity along a continuum, or, as Dietrich (2004) might suggest, may there be functionally and experientially different continuums to 'shift along'? Future research might examine these hypothesised continuums, e.g. through performance measures of affective awareness and sensitivity (following Smith and van der Meer, 1994) and of

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[5] With each of the sub-scales of the ASASC, even when correcting for multiple analyses.
[6] Again, all these effects were significant when correcting for multiple analyses.

proclivity to see meaning in randomness or pseudo-hallucinations (following Farias, Claridge and Lalljee, 2005).

The final analysis of Study Two concerned the 'controllable oddness' hypothesis (Barron, 1993), which was partially confirmed in this study, being upheld for emotional creativity but not for cognitive, trait or behavioural measures of creativity. However, it is of note that ego-strength – a resistance to mental breakdown was significantly negatively correlated with ASC-proclivity, but not with creativity. Yet, despite this, creativity was still related to ASC-proclivity (even when the effects of ego-strength were partialled out). This suggests that creativity was associated with unusual experiences, to varying degrees, but not with a *lack* of well-being (physical, cognitive or affective) and thus implies that the relationship between creativity and ASCs is not associated with mental ill-health. However, the current study did not examine whether such relationships are associated with 'thriving' (Fredrickson, 2002), self-actualisation (Maslow, 1978) or 'spiritual growth' (Rowan, 1988).

9.3 Creativity, SPEs and ESP

This thesis further explored whether the multidimensional creativity approach employed in Study Two might help to understand the purported relationship between artistic creativity and anomalous cognition (e.g. Dalton, 1997). In Study Two the reporting of subjective parapsychological experiences (SPEs) only correlated significantly with emotional creativity. It was suggested (in Chapter Seven) that heightened internal awareness and ASC-proclivity might mediate the links between the reporting of SPEs and emotional creativity. Thus, it was argued that creative individuals are prone to report SPEs according to the extent to which they are open to and explore 'psychological space'. This concurs with the idea that people who have 'internal sensitivity' are more likely to have psi experiences (Honorton, 1972). Was Anderson (1962) right when she speculated that sensitivity to the transliminal, the non-verbal and the affective might connect creativity and psi? In Study Three this model was tested against an index of 'objective ESP-performance'.

Chapter Eight detailed a novel protocol in parapsychological research, which, based on the principles of experience-sampling methodology enabled participants to take part in a free-response ESP study in the context of their 'everyday life', rather than coming into a laboratory. Participants recorded impressions that they thought might be relevant to an ESP target over a 24-hour period. This procedure enabled dream images, ideas arising in meditation, daydreams, or in any naturally occurring state of consciousness, to be recorded. It was thus thought to give

autonomy concerning 'how to be psychic' to participants, rather than seeking to induce an altered state in the laboratory experimentally, which was done in most previous artist-ESP research, using the ganzfeld.

The impressions recorded by participants were compared to four video clips (3 decoys and one target ESP clip, which were selected out of 27 possible sets of four clips for each trial by a pseudo-random algorithm) by two 'blind' independent judges (who had good inter-rater consistency). Overall, the judges selected the target clip 43% (r = .423) of the time (where MCE = 25%), 40% (r = .344) for artists and 47% (r = .500) for non-artists, a hit-rate commensurate with previous work with artists (the cumulative hit-rate for which is 40%, r = .346). Non-significant above chance scoring was obtained for both artists and non-artists (z = 1.03, p = .152, 1-tailed). For the purposes of this study it is merely worth noting that the effect sizes are such that their tentative treatment as indicators as an approximation of veridical psi-performance is a valid hypothesis, but by no means presumed.

The key finding of this study was taken to be that artists did not perform better than non-artists[7]. This was contrary to early ESP free-response work with artists and controls (e.g. Moss, 1969). It was thus suggested that the methodology might have been psi-conducive, enabling participants to use personal strategies, and that the task demands of the ganzfeld procedure might have been preferential to artistic populations. Alternatively, this might have been because the groups in the current study were better matched – only differing significantly on artistic creative-personality (and associated CCI scales – 'playful cognition' and 'inspiration'). This suggests that artistic involvement alone might not have led to the ESP-success of artists in previous studies.

Contrary to hypotheses, neither emotional creativity, nor internal awareness significantly predicted psi-performance in this study. Hence, while emotional creativity and artistic involvement were associated with ASC proclivity and the reporting of anomalous experiences in Study Two, they were not significant predictors of overall ESP-success Study Three. However, the sample as a whole scored above the norm on unusual experiences and emotional creativity – demonstrating that a group with these characteristics can perform well in an ESP task. An alternative perspective is that emotional creativity relates to the erroneous ascription of ESP in daily life – apophenia – as Gianotti et al. (2001) argue. Or, emotional creativity may interact with other variables to elicit an accurate, conscious psi response. Future research could explore such potential interaction effects.

A number of significant findings (at $p < .05$ level, uncorrected) emerged that could be explored in further research. For example, artists, but not non-artists, performed better if they

[7] Other findings being post-hoc or not significant when correcting for multiple analyses.

were extraverted. Previous studies, working with artists alone have found that extraverted artists did better, perhaps due to impulsivity (e.g. Morris et al., 1993; 2003). However, the current study suggests extraversion and 'being an artist' *interact* to lead to psi-success. The use of information/experiences that seemed to come from 'beyond the self' in the creative process was associated with overall psi-missing. This concept has parallels with Persinger's (e.g. Persinger & Healey, 2002) 'sensed presence' work, and its relationship of this construct with psi might be worth further investigation. It might be that 'psi-information' is often mundane and not necessarily dramatic or channelled and hence this might be a red-herring. Such findings are starting points for further studies rather than conclusions. Thus, rather than answering questions this study appears to raise more questions. Replication and the testing of interaction models are required. One outcome of Study Three replicates that of earlier research – creativity measures as direct single measures of psi don't appear to work particularly well.

Future research could explore the potential links between artistic creativity, emotional creativity and awareness of subliminal affective material – perhaps introducing an ESP component, drawing upon the work of Bem (2003).[8] Studies on perceptual defense, suggest that a lower threshold for emotional/visual stimuli to enter awareness, is related to psi-success, which has been associated with creativity (as discussed in Section 2.4.1.2) – thus, this particular subset of 'openness' might be of particular interest in further understanding any relationship between creativity and psi.

9.4 Future directions: Qualitative analyses

An analysis of the qualitative reports provided by he participants of Study Two could be made at a future date. These might provide insights concerning construals of the creative process. For example, a thematic analysis could be made of responses to the question "what motivates you to be creative?" which included statements such as: "Greater sense of living, deepening the moment-to-moment experience"; "The need to express or explore feelings, both negative and positive. To make sense of the world"; "Deadlines, any sort of pressure to get things done. Discussions and brain storming sessions with colleagues"; and "Being sad has usually inspired

[8] Although highly tentative, the author would be interested in exploring affective awareness variables, in interaction with creativity factors, as predictors of psi-performance in the future, given that, for artists only, EC formed a suggestive positive trend with psi-performance. Further, in a pilot study, on an unconscious, latent psi-task, where preference for images was hypothesised to be affected by exposure to future affective stimuli (Holt, 2006), EC also positively predicted psi-performance amongst artists. These findings are weak, but of interest to myself, as it builds upon work that tests whether precognitive physiological 'affective' responses (e.g., prior to exposure to shocking stimuli) are detectable. This work requires a meta-analytical overview of its efficacy, nevertheless, EC, or a related construct, could be used as a measure of awareness, or tendency to symbolise in WM, such arousal based 'information'.

me to write poetry. I used to find that it was a necessity in those moments and words flowed out of my pen". Emerging thematic clusters could even be compared to scores on the psychometric measures used in Study Two.

Such an approach follows Martindale (1995, p. 255) in that "to have a creative idea, one obviously has to be conscious of it", with a focus on exploring subjective reports of experiences of consciousness that are considered by participants to be associated with their creativity. In Study Two, participants were also asked to describe any experiences of 'inspiration or insight' and 'loss of self-awareness' during the creative process.

For example, the highest scorer on scientific creative personality (a physicist, male, aged 41-50) in response to the question 'Have you ever experienced a moment of inspiration or insight as a part of the creative process?', said:

> Absolutely. Normally by reading about other ideas or hearing about other ideas one suddenly realises they can be applied or adapted to one's own problems.

And, the lowest scorer on scientific creative personality (an artist, female, aged 41-50) replied:

> I have had clear visual images/ideas appear in my mind linked with a creative process – the image is usually impossible to directly translate into physical reality but it prompts the desire to try – therefore these images that appear in the mind are the inspiration behind the creation of a painting or tapestry or print. Insight might come in an experience of profound peace or oneness with nature, which I then attempt to translate into an artwork.

Clearly there is a lot of qualitative data that could be systematically and meaningfully explored. Indeed, the report by the physicist above, reflects further findings of Study Two, based on the CCI – that while scientific-CP was not significantly associated with ASC-proclivity, it was significantly predicted by (but not when corrected for multiple analyses) the use of inspiration in the creative process, and negatively by 'heightened internal awareness'. This suggests that epistemological flexibility is related to scientific-CP but neither extreme shifts into unusual states, nor intrapersonal exploration.

9.5 Future directions: Affective and cognitive expansion

This thesis correlated emotional creativity with other measures of creativity for the first time, suggesting that it is most strongly associated with artistic-creative-personality and non-linear creative-cognitive-styles, but also, at low levels with cognitive measures of creativity (refer to Section 5.2.4). These relationships could be elaborated upon as further potential outcomes of this

thesis, exploring, for example, the relationship between affective and cognitive looseness.[9] Emotional creativity has been related to other measures of creative experience and has been shown to involve paying attention to affect (Gohm & Clore, 2000; 2002), the ability to form cognitive content about experiences of emotional arousal (Fuchs, Kumar & Porter, 2006) and manipulating this cognitive content creatively (Averill, 1999). It has been inversely related to alexithymia, where the left hemisphere 'interpreter' cannot symbolically represent right hemispheric emotional experiences (Taylor & Bagby, 2000). However, in this thesis, EC has been shown to be robustly related to UEs. The reason for this could be explored further, e.g. might this be due to affective awareness, affective expansion, or is this unique to being creative with emotions e.g. ascribing rich and meaningful interpretations to feelings or events? Further, in what way might EC mediate the relationship between ASCs and other dimensions of creativity, such as artistic-CP and figural-DT?

Future research might also be based on theoretical ideas relating creativity, affect and unusual experiences. Persinger and Makarec (1987) describe a phenomenological continuum of unusual experiences that is underpinned by electrical lability in the temporal lobes – temporal lobe lability (TLL). They speculate that artistic creatives, poets, visual artists, writers, would be one kind of 'special intermediary population' in terms of neuroelectrical lability in the temporal lobes, in between those who do not and do have temporal lobe epilepsy. Conceptual links have been made between intense affective experiences and temporal lobe lability (Thalbourne et al., 2003). Cartwright, Clark-Carter, Ellis & Matthews (2004) hypothesised that creativity and TLE may be linked through two processes: increased neurochemical activity that may lead to over-inclusive thinking; and the emotionalization of internal and external stimuli. However, they found no effect between incidence of TLE and scores on a figural-preference test. The outcome of this thesis suggests that other measures of creativity might be more profitably used in such a study, and provides some support for Cartwright et al.'s suggestion that artistic creativity may be related to unusual experiences via 'heightened emotional responsiveness'.

It is proposed that future creativity-ASC research could explore the 'cognitive' and 'affective' models further, and whether, looseness in each of these leads to different states of consciousness for example. Models that distinguish between affective and cognitive-processing systems could be used and compared in such an endeavour, for example, Dietrich's (2004) theoretical hypofrontality information-processing model. Dietrich's paper on the neuroanatomy of normative

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[9] Since writing this conclusion a paper was published by Ivcevic, Brackett and Mayer (April, 2007). This suggested that EC is distinct from emotional intelligence and related to artistic creativity (poetic production). However, further work to explore the correlates of EC could be fruitful – and indeed consideration of the more robust correlations EC forms in the current thesis with ASC proclivity and boundary-permeability than creativity.

information-processing and creativity, may be used as a theoretical basis to develop future studies seeking to further explore and replicate these differential creativity-ASC relationships. Dietrich's model is composed of four elements: deliberate (e.g. focused thinking about a problem) versus spontaneous (e.g. moments of inspiration) information processing modes; and cognitive versus emotional processing. Spontaneous modes of the latter may lead, in Dietrich's model, to: loose-associative thinking, along a sleep-wake continuum (cognitive); and 'religious states' with a strong sense of meaning (affective)[10]. Clearly, such ideas provide a new arena of theoretical consideration and empirical research about the links between types of creativity and types of cognition/states of consciousness, and different patterns of interaction between them.

9.6 Future directions: The Creative Cognition Inventory

The use of the CCI was advantageous in Study Two, and proved to be a useful resource, enabling an examination of the experiences reported as being functional in or important to the creative process. A scale of this nature did not previously exist, and the CCI could be developed in the future, including: further testing of the content, discriminant and convergent validity of the sub-scales and replication of the factor structure. Different sub-scales of the CCI could be mapped onto different types of information-processing models and the validity of this assessed empirically, e.g. 'beyond the self' could be compared to 'sensed presence', following initial work in this vein reported in Chapter Three.

9.7 Future directions: Experience-sampling ESP research

ESM may be a valuable resource for parapsychology. This thesis presents the first study using this methodology in an ESP-design, and as such highlighted some benefits and pitfalls that could be addressed in future research. In addition, its efficacy requires further testing. With the amendment of existing software, facility of reporting and completing experience-sampling questionnaires could be improved. Additionally, programmes could be written to allow people to take part in ESP tasks without a sender – self-contained precognitive or clairvoyance tasks that run on a PDA. Future work with ESM would enable studies of two types: quasi-experimental work and descriptive experience-sampling of conscious experience pertaining to either/and a

[10] Indeed, any model of creativity-ASCs may need to be more complex than this, Dietrich (2003) himself describes the 'commonality' of ASCs, in terms of brain activity as 'hypofrontality', with a variety of different patterns of concurrent activity in the temporal, parietal and occipital lobes, as leading to different types of ASC: e.g. meditative states, flow states, hallucinations.

creative or anomalous nature. The latter would enable, for example, intricate designs, where over longer periods of time, co-researchers could describe experiences of anomalous experiences or altered states as they arose and complete experience-sampling questionnaires about their state and context. This would enable analyses of person-level variables (e.g. UE or creativity) and experiential profiles to be assessed. I intend to proceed with such work in the future, to use multi-level analyses, with larger samples, to enable interactions between state and trait to be examined as well as state and trait variables alone as predictors of experience and performance.

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APPENDIX 2

The Quadrant Model of Creativity

A. 2 The creative process: The interior and individual

The 'creative process' has been defined as the "sequences of thoughts and actions that lead to a novel, adaptive production" (Lubart, 2000-2001, p. 295). Research into the 'sequences' of the creative process has relied upon: phenomenological and retrospective reports made by creators (e.g. Wallas, 1926); think-aloud protocols during problem-solving (e.g. Patrick, 1935); observations of performance on time-limited tasks (e.g. Guildford, 1967); factor analyses of components of creative thinking or behaviour (e.g. Kumar, 1991); experimental manipulation of variables presumed relevant to creative thinking (e.g. Krampen, 1997); and, the simulation of the creative process on computers (see e.g. Boden, 1996). The nature of any creative process will depend upon personality and domain-based factors.

A.2.2 The creative person: The exterior and individual

Research belonging in this quadrant has sought to identify attributes, characteristics and behaviours that distinguish between more and less creative individuals: genetic, physiological, psychological and behavioural. Research has relied upon biographical descriptions (e.g. Barron, 1963), psychometrics (e.g. Feist, 1998), and experimental methodologies (e.g. Mendelsohn, 1976). Further, personal orientations to problem-solving and creative thinking have been explored – 'creative styles', which might be considered an interaction between creative 'process' and 'person' (e.g. James & Asmus, 2001; Kirton, 1976; Myers & Myers, 1980). There is diversity within this person-level view of creativity. MacKinnon (1978, cited by Isaksen, 1987, p. 10) reminds us that: "there are many paths along which persons travel toward the full development and expression of their creative potential, and there is no single mold into which all who are creative will fit. The full and complete picturing of the creative persona will require many images".

A. 2.3 The creative participation / press: The interior and collective

This quadrant focuses upon understanding situational conditions and how they impact upon creative behaviour. Research in this quadrant has sought to: identify social and cultural climates that are conducive to and inhibitive of creativity (e.g. Amabile, 1996; Rogers, 1959); patterns of

creativity in relation to social, cultural, economic and political shifts (e.g. Martindale, 1996; Lubart, 1999); identify patterns of creative achievement over lifetimes - historimetrics (e.g. Simonton, 1999); and the impact of situational factors (e.g. birth order) on the development of creative achievement (e.g. Baer, Oldham, Hollingshead & Jacobsohn, 2005). As a recent example, Zha, Walczyk, Griffith-Ross and Tobacyk (2006) compared the creativity of graduate students in individualistic and collective cultures.

Weisberg (1989) asserts that a creative individual always begins with a cultural background with which they approach a creative problem, full of the influences of other creative individuals. The idea of the isolated creative 'outsider' (Wilson, 1978) is rejected in this perspective, placing the creator firmly in a wider context. Thus, for example, Csikszentmihalyi (1999) argues that creativity is culturally bound, proposing a systems view of creativity (of person; domain; and 'gatekeepers' or specialists), and Gardner (1996) stresses the importance of peer evaluation for eminent creativity, where work is judged by society as to its novelty and value. One area of study, thus, is the diffusion of innovations - how new ideas or products are responded to by others and their influence within the wider cultural sphere, a key issue being criteria for acceptance.

Further reflections in this quadrant are upon culturally implicit views (or stereotypes) of 'creativity' (e.g. Sternberg, 1985). Such views affect both creativity in daily life and responses on creativity measures, and reminds us that the idea of 'creativity' is a social construction that varies cross-culturally. For instance, Lubart (1999, p. 340) describes an Eastern view of creativity in terms of "personal fulfilment" and connection to "primordial realm" or "ultimate reality" rather than 'adaptive novelty', and meditation or yoga may be used to access 'creative states' (Krippner & Maliszewski, 1978). For instance, Maduro (1976, cited by Lubart, 1999, p. 340) describes how a group of Indian painters worked with a system of being creative based on the yoga sutras, through which an artist seeks to 'become' a deity in order to depict it.

A.2.4 The creative product or performance: The exterior and collective

The creative product or performance is essentially the end-point of the creative process. This may be expressed through different forms of symbolisation, such as image, music, word, numbers, patterns, non-verbal communication. The historical and cultural paradigms for manipulation of these symbols constitute the previous creative products that are encountered in 'creative participation'. Research in this quadrant has focused on the specific attributes (in terms of process, person and participation) of involvement in specific domains of creative behaviour (e.g.

Feist, 1998; Getzels & Csikszentmihalyi, 1976) and a key debate is whether creativity is domain-general (there is an underlying factor of general creativity) or domain-specific (e.g. Plucker & Beghetto, 2004; Root-Bernstein & Root-Bernstein, 2004).

Gardner (1993; 1999) delineates seven/eight types of intelligence, which are modular, function independently or in synthesis, and may be used creatively or not: spatial, linguistic, logical-mathematical, intrapersonal, interpersonal, musical, bodily-kinaesthetic intelligence, and naturalist (which Gardner added at a later date). Gardner (1999) also tentatively speculated about existential or spiritual intelligence (an idea developed further by Zohar & Marshall, 2000). These types of intelligence clearly relate to different 'creative activities', such as composing music, writing poetry, and solving scientific problems. However, note that all the domains need not be adding to a permanent cultural database, some forms of creativity may be intrapersonal or interpersonal. These relate these to self-actualising models of creativity Maslow (1971), to social problem-solving (Guildford, 1967) and to Averill's (1999) construct of emotional creativity. Emotional creativity consists of access to ones feeling life, the ability to discriminate between feelings and to express them symbolically in order to further understand and guide ones behaviour (intrapersonal intelligence), and reading the moods and emotions of others (interpersonal intelligence). Interpersonal and intrapersonal intelligences are clearly intimately related, Sohms (1997, p.44) suggests that: "through attention to one's subjective feelings, affects can function as a 'sixth sense' to provide information about others".

Gardner based his model of multiple intelligences, in part, on brain lesion data and developmental evidence of different types of functioning. This was driven by the perceived limitation of verbal, logical reasoning and mathematical-spatial domains of typical intelligence tests to measure the full range of human abilities. However, further research is required to validate his model, and it is included here in order to consider the range of domains in which any 'generic' predisposition to be creative may be expressed, and the possible range of skills that might interact with the 'creative personality'.

This issue brings us to a further contention in creativity research, whether creativity is domain-general or domain-specific. Gardner (1996) argues that creativity is 'domain' based, requiring mastership of the tools and techniques of any domain, and interaction in the corresponding 'field' of product-assessing peers, expertise and knowledge. However, Root-Bernstein and Root-Bernstein (2004) argue that many artists are scientific and many scientists are artistic and that the distinction between the two is false. Likewise, Plucker and Beghetto (2004) argue that creativity is domain-general, the differences in domain-specificity relating to interest

and commitment rather than creativity. Sternberg (2005) attempts to reconcile this dichotomy, noting that the most popular position today argues for an interaction between domain-specificity and generality (e.g. Amabile, 1996; Lubart & Guignard, 2004). Sternberg suggests that analytical ability is domain-general, but that creative abilities are domain-specific; that knowledge is domain-specific, but that thinking styles are domain-general.

In summary, creativity may occur in different domains, including that of 'everyday life'. Any time we are faced with a new dilemma or problem with no learned or practiced solution, we are presented the opportunity to be creative (Goff, 1998). However, in each domain there may be different ways of being creative. As an example, Singer and Berkowitz (1972) explored the nature of creative humour, comparing the 'wit' and the 'clown'. As predicted, these dimensions were unrelated, and the 'wit' was significantly associated with high scores on verbal divergent-thinking, and 'clowning' with adaptive regression.

'Tensions' between quadrants reflect debates in creativity research. For instance, tension between: a) the individual and collective quadrants, reflects debates about whether creativity should be defined at an individual or cultural/historical level; b) the interior and exterior quadrant, reflects debates about whether creativity needs to lead to an observable product, or whether creative products might be non-observable and psychological; c) the exterior individual and collective quadrants reflects debates about whether creativity is a general factor versus being domain-based; and d) the interior individual and interior collective quadrants reflects debates concerning whether creativity is a state/process or a trait/characteristic.

The individual versus the collective. Gardner (1996, p. 145) argues that: "No person, act or product is creative or non-creative in itself. Judgements of creativity are inherently communal, dependent on individuals expert within a domain". In contrast, Storr (1972, p. xi) simply defines being creative as: "The ability to bring something new into existence. ... Fortunately, it does not imply that the 'something new' need be new to everyone, or, indeed, new to anyone else save the person who creates it". Hence definitions abound where creativity is a rare, societal phenomenon versus a normal, everyday, individual phenomenon. Arguing that a prerequisite of creativity is that it must be perceived as having value in the context in which it arises, Boden (1994) distinguishes between 'psychological' and 'historical' kinds of creativity. It is this 'psychological' aspect of creativity, with emphasis on the process rather than the communal 'value' of the creative product, which is essential, central to all 'kinds' of human creativity. Likewise, Barron (1979, p. 331) argues that human creativity may be eminent or everyday: "In

personal relationships, creativity helps break out of stultifying patterns. ... In ordinary work, a new way of doing things, from cooking to carpentry is a manifestation of creativity. All of us are potentially creative in our lives". Extending this distinction between eminent and everyday creativity leads to consideration of whether creativity is a prerequisite of many or only a gifted few within a culture. For instance, Gardner (1993) describes the unique psychological profiles of eminent creators such as Picasso, Einstein and Stravinsky. In the "genius view of creativity" (Weisberg, 1989, p. 148) only certain extraordinary individuals, possessing particular cognitive and personality characteristics, are considered creative. Is, as Maslow (1971) suggests, the creative process for an individual thinking of a creative way to solve an everyday problem, such as a new soup recipe, the same as that involved in Kekulé's discovery of the benzene ring or Crick and Watson's discovery of the structure of DNA? Weisberg (1989, p. 153) suggests that if "all solutions to problems are 'creative', so long as they are novel and they meet the demands of the problem, then the capacity to think creatively must be a basic human capacity, and not the exotic trait or skill envisioned by the 'genius' view". Similarly, Ward, Smith and Finke (1999) emphasise that creative cognition in a part of 'normative human cognition', common to all. Eysenck (1993; 1995) seeks to reconcile genius/historical and 'everyday'/psychological views by arguing that 'creativity as a trait' or cognitive-style is normally distributed amongst the population, but that this interacts with environmental (e.g. supportive atmosphere), cognitive (e.g. domain relevant skills and intelligence) and personality (e.g. self-confidence and motivation) factors, in a multiplicative fashion, to lead to eminence, which is relatively rare and has a 'J-shaped' distribution. The quadrant model enables us to contextualise and integrate or demarcate (as preferred) the perspectives outlined above.

The interior versus the exterior. Creativity may arise in various domains, some of which lend themselves to enduring objects, some of which do not. The following extract illustrates this 'tension'. It is an excerpt of a discussion on the nature of creativity by a group of creativity researchers taken from Taylor (1989, p. 105):

> *Barron*: It has been assumed in most of our discussion that we can determine whether or not a person is creative by observing his or her behavior or discovering what his or her products are. This kind of definition is probably basic to the kinds of prejudices that psychologists have. One could just as well construe creativity as an internal process continually in action but not always observable – or perhaps in some cases fundamentally unobservable.
>
> *Fiedler*: Yes, but creativity surely must be identified eventually by its product – no?
>
> *Barron*: No.
>
> *Hyman*: You mean that a person can go through life being creative and nobody will be able to identify him or her?
>
> *Barron*: Yes, by this type of definition.

Creativity may be purely mental or may be externally manifested: "The human act of creation, basically, is a personal reshaping of given materials, whether physical or mental. What is new is form transformed; a new form, generated from an old" (Barron, 1979, p. 331). Taft and Gilchrist (1970, p. 136) define this 'productless' creativity "in terms of awareness of, and responsiveness to, experience".

APPENDIX 3

The Creative Cognition Inventory – assessing the internal consistency, factor structure and construct validity

A. 3.1 Partial replication of factor structure of the CCI

The CCI was used in three studies, two, each with a sample size of 40 (with no repetition of participants) which were experimental studies exploring the interaction between mind and matter (Holt & Roe, in press; Roe & Holt, in press) and one pilot study using the precognitive habituation paradigm with only 14 participants (Holt, 2006).

With a sample size of only 91 cases (with no missing data) this is too small for a PCA analysis (the minimum recommendation being 145 (Hair, Anderson, Tatham & Black, 1998), hence these results should be treated with caution and the factor structure be viewed as potentially less stable than that of Study Two. A PCA was conducted with varimax rotation as previously, constrained to six factors (as this was a confirmatory analysis), which are described below (with factor loadings in parentheses). This accounted for 61.104% of the variance and had a Kaiser-Meyer-Olkin measure of sampling adequacy of .733. (the rotated factor matrices for both of these can be seen in Table A.3.2).

Deeper self: A sense of being in tune with the universe (.819), a sense of communicating with something other (.789), a sense of communicating with a deeper sense of self (.735), a sense of purpose that seems to come from beyond the self (.604), working with a set goal in mind (-.540), ideas arising while dreaming (.590), meditation (.540).

Linear cognition: Methodical and systematic problem solving (.825), rational, logical thought (.806), making discoveries through trial and error (.503), daydreaming (-.435), the careful selection of ideas (.375).

Playful cognition and inspiration: Playing with ideas (.842), the use of analogy (.699), sudden moments of inspiration in waking life (.668), recombining existing elements in new ways (.603), loose, playful, unconstrained thinking (.598), *making discoveries through trial and error (.389).*

Instincts and intuition: Following your intuition (.823), trusting hunches or instincts (.780), luck, chance and fortunate accidents (.426).

Bodily feelings and affect: Positive emotions (.729), paying attention to bodily feelings (.700), the release of negative emotions (.641), *making discoveries through trial and error (.389).*

Oneiric states and imagery: Paying attention to auditory impressions (.723), a sense of channelling information (.653), ideas arising as falling asleep or waking up (.580), *Ideas arising while dreaming (.340)*, paying attention to visual imagery (.499).

It was considered that the factor structure was partially replicated, the main distinction being that items relating to emotions and bodily feelings loaded on a separate factor (being separated

out of 'heightened internal awareness'). Further, 'playful cognition' and 'analogy' combined to form a single factor. The factor structure of this data was not considered in further detail due to the low sample size, but due to the similar factor structure it was decided to combine all data in a single PCA, which is presented in Chapter Three.

Table A.3.1

Identifying the structure of the CCI: Principal component analyses, varimax rotated factor matrices for Study Two (*n* = 204)

	Heightened internal awareness	Intuition and inspiration	Linear cognition	Playful, absorbed cognition	The use of analogy	Oneiric cognition
Making discoveries through trial and error	-.011	**.493**	*.311*	*.436*	.121	-.244
Trusting hunches or instincts	.261	**.764**	.062	.054	.199	.109
Ideas arising while dreaming	*.304*	*.358*	.019	.023	.001	**.720**
Methodical and systematic problem solving	-.184	.034	**.825**	.056	.014	-.028
Sudden moments of inspiration in waking life	.177	**.631**	-.029	*.303*	-.024	.263
Rational, logical thought	-.285	.016	**.777**	.033	-.022	-.003
A sense of communication with a deeper sense of self	**.696**	*.358*	-.073	.097	.070	.196
The careful selection of ideas	.184	-.033	**.690**	.145	.162	-.121
Loose, playful unconstrained thinking	.033	.288	-.213	**.537**	.280	*.329*
Following your intuition	.222	**.692**	-.097	.067	.259	.244
Ideas arising as falling asleep or waking up	*.319*	.235	.072	.038	.124	**.706**
Meditation	**.629**	*.366*	.087	-.115	-.005	.147
Paying attention to visual imagery	**.625**	-.008	.034	.236	.298	.206
Experiences of losing track of time when involved in creative work	*.455*	.049	.082	**.523**	.136	-.048
Playing with ideas	.183	.168	.143	**.704**	.271	.032
Luck, chance, fortunate accidents	.219	*.405*	-.172	**.438**	.224	.114
The use of analogy	.028	.118	.211	.192	**.711**	.171
A sense of purpose that seems to come from beyond the self	**.650**	*.324*	-.121	-.004	.290	.193
Recombining existing elements in new ways	.085	.242	.111	.193	**.702**	-.107
Working with a set goal or outcome in mind	-.025	-.071	**.576**	-.257	.086	.150
A sense of channelling information	**.476**	.199	*.358*	-.286	*.332*	.041
Paying attention to auditory impressions	**.681**	-.028	.059	.182	.122	.150
Day dreaming	*.446*	-.040	-.172	*.460*	.093	**.464**
The release of negative emotions	**.642**	-.077	-.112	.190	.070	.261
Non-verbal modes of thinking	*.447*	.046	-.137	.283	**.474**	.220
Positive emotions, e.g. joy, excitement, euphoria	**.627**	.267	-.125	*.346*	-.132	.050
Paying attention to bodily feelings	**.744**	.052	-.115	.137	-.108	-.046
A sense of communicating with something other	**.784**	.268	-.137	-.046	.200	.161
A sense of being in tune with nature or the universe	**.735**	*.348*	-.099	.095	.008	.082

Table A.3.2

Identifying the structure of the CCI: Principal component analysis, rotated factor matrices (*n* = 80)

	Deeper self	Playful cognition, analogy and inspiration	Intuition, instincts and luck	Bodily feelings and affect	Linear cognition	Imagery and oneiric states
Making discoveries through trial and error	.239	*.389*	*.304*	*-.344*	**.503**	-.159
Trusting hunches or instincts	.245	.077	**.780**	-.004	.067	.084
Ideas arising while dreaming	**.590**	.151	.259	.027	-.078	*.340*
Methodical and systematic problem solving	-.053	.086	-.181	.117	**.825**	-.010
Sudden moments of inspiration in waking life	-.040	**.668**	.232	.262	.016	.105
Rational, logical thought	-.193	-.081	.021	.170	**.806**	.057
A sense of communication with a deeper sense of self	**.735**	.160	.297	.208	-.072	.197
The careful selection of ideas	*-.356*	-.029	-.298	.177	**.375**	*.321*
Loose, playful unconstrained thinking	-.013	**.598**	.168	.265	-.291	.229
Following your intuition	.124	.098	**.823**	.157	-.071	.206
Ideas arising as falling asleep or waking up	*.414*	.187	.033	-.032	-.223	**.580**
Meditation	**.540**	.114	*.337*	.179	.040	.044
Paying attention to visual imagery	*.313*	.357	.145	-.225	-.169	**.499**
Experiences of losing track of time when involved in creative work	.299	**.653**	-.224	-.095	-.011	.026
Playing with ideas	.109	**.842**	.105	-.156	-.055	.052
Luck, chance, fortunate accidents	.121	.215	**.446**	-.039	-.100	-.004
The use of analogy	.034	**.699**	*.326*	.234	.095	-.013
A sense of purpose that seems to come from beyond the self	**.604**	.236	*.351*	.214	-.044	.259
Recombining existing elements in new ways	.198	**.603**	.078	-.255	.178	.261
Working with a set goal or outcome in mind	**-.540**	-.086	.263	-.047	.264	.125
A sense of channelling information	.018	.015	.062	.011	.114	**.653**
Paying attention to auditory impressions	.204	.124	.124	.149	.012	**.723**
Day dreaming	*.382*	.276	-.187	.415	**-.453**	.200
The release of negative emotions	.251	.174	.117	**.641**	-.122	-.155
Non-verbal modes of thinking	*.380*	.266	-.173	.290	.016	.254
Positive emotions, e.g. Joy, excitement, euphoria	.319	-.127	.112	**.729**	.245	.093
Paying attention to bodily feelings	.251	-.034	-.011	**.700**	.237	.110
A sense of communicating with something other	**.789**	-.020	.079	.207	-.073	.211
A sense of being in tune with nature or the universe	**.819**	.048	.241	.236	-.026	.056

APPENDIX 4.1

Copies of the creativity and personality measures used in Study One

A.4.1.1 The Emotional Creativity Questionnaire: Averill (1999)

Instructions

This questionnaire contains 30 items concerning the way you think, feel, and react in a variety of situations, and your opinions on a variety of issues. For each statement circle your chosen response on the answer sheet according to the following scale:

1. If the statement is **much less** true of you than of the average person, or if you **strongly disagree** with the statement.
2. If the statement is **somewhat less** true of you than the average person, or if you disagree with the statement.
3. If the statement is **about the same** of you as of the average person, if you are **neutral**, or if you **cannot decide.**
4. If the statement is **somewhat more** true of you than of the average person, or if you **agree** with the statement.
5. If the statement is **much more** true of you than of the average person, or if you **strongly agree** with the statement.

Read each statement carefully. Be particularly careful when responding to negatively worded statements (e.g., "I do not like working alone"), for they can be especially confusing. If a statement seems confusing to you, it may be helpful to prefix it with the phrase, "Compared to the average person, ..." Then, indicate your degree of agreement or disagreement.

There are no "right" or "wrong" answers. Simply describe your self and state your opinions as accurately as possible. Your first intuitive response is usually the best. If you change your mind, please erase your first answer completely. Answer all the questions, and check frequently (after each group of five items) to be sure each answer is in the correctly numbered space.

	Compared to the average person, . . .	Much less	Some what less	About the same	Some what more	Much more
1.	My emotional reactions are different and unique	1	2	3	4	5
2.	When I have strong emotional reactions, I search for reasons or my feelings.	1	2	3	4	5
3.	I try to be honest about my emotional reactions, even when it causes me problems.	1	2	3	4	5
4.	I respond well in situations that call for new and unusual emotional responses.	1	2	3	4	5
5.	I believe that people should work on their emotional development as hard as they work on their intellectual development.	1	2	3	4	5
6.	I can imagine myself being lonely, angry, and joyful, all at the same time.	1	2	3	4	5
7.	I think about and try to understand my emotional reactions.	1	2	3	4	5
8.	I sometimes experience feelings and emotions that cannot be easily described in ordinary language.	1	2	3	4	5
9.	I am good at expressing my emotions.	1	2	3	4	5
10.	I have felt combinations of emotions that other people probably have never experienced.	1	2	3	4	5
11.	I am not particularly interested in the emotional aspects of my life.	1	2	3	4	5
12.	The way I experience and express my emotions helps me in my relationships with others.	1	2	3	4	5
13.	My emotions are almost always an authentic expression of my true thoughts and feelings.	1	2	3	4	5
14.	I like music, dance, and paintings that arose new and unusual emotional reactions.	1	2	3	4	5
15.	I think about past emotional experiences to help me cope with current emotional problems.	1	2	3	4	5
16.	I have emotional experiences that would be considered unusual or out of the ordinary.	1	2	3	4	5
17.	My emotions help me achieve my goals in life.	1	2	3	4	5
18.	When in emotional situations, I tend to respond in a unique manner.	1	2	3	4	5
19.	I like to imagine situations that call for unusual, uncommon, or unconventional emotional reactions.	1	2	3	4	5

	Compared to the average person, . . .	Much less	Some what less	About the same	Some what more	Much more
20.	After an intensely emotional experience, I try to step back and examine my reactions objectively.	1	2	3	4	5
21.	When responding emotionally, I can be quite inventive and innovative.	1	2	3	4	5
22.	My outward emotional reactions accurately reflect my inner feelings.	1	2	3	4	5
23.	I would have to be a poet or novelist to describe the kinds of emotions I sometimes feel, they are so unique.	1	2	3	4	5
24.	I can experience a variety of different emotions at the same time.	1	2	3	4	5
25.	My emotions are a major source of meaning in my life; without them, my life would lack significance.	1	2	3	4	5
26.	I prefer movies and books that depict complex and improbable emotional situations.	1	2	3	4	5
27.	I pay attention to other people's emotions so that I can better understand my own feelings.	1	2	3	4	5
28.	The range and diversity of my emotional reactions sometimes exceed my ability to describe how I feel.	1	2	3	4	5
29.	I try to disguise and hide my emotions.	1	2	3	4	5
30.	I am able to experience a large number of different emotions.	1	2	3	4	5

A.4.1.2 Creativity Checklist: Griffin & McDermott (1998)

Please tick those of the following in which you have an active personal interest:

The painting of pictures ☐

The drawing of pictures ☐

The making of sculpture ☐

The taking of artistic photographs ☐

The making of useful or decorative objects ☐

The renovation of old or antique objects ☐

Participating in drama production ☐

Performing in a play ☐

Performing in a band ☐

Performing in an orchestra ☐

Performing in dance ☐

Performing in comedy ☐

Going busking ☐
Participating in video production ☐

Recording music ☐
Writing music ☐
Writing poetry ☐
Writing plays ☐
Writing short stories ☐
Writing magazine articles ☐
Writing journal articles ☐

Interior decorating ☐
Exterior decorating ☐
Inventing new recipes ☐
Making clothes ☐
Growing or gardening ☐

Please tick those of the following you have done in the last 12 months:

Completed a painting ☐
Completed a drawing ☐
Completed a sculpture ☐
Completed some photographic art ☐
Made a useful or decorative object ☐
Renovated an old or antique object ☐

Been actively involved in the production of drama ☐
Performed in a play ☐
Performed in a band ☐
Performed in an orchestra ☐
Performed in dance ☐
Performed in comedy ☐
Gone busking ☐
Been actively involved in the production of a video ☐

Recorded music ☐
Written music ☐
Written poetry ☐
Written plays ☐
Written short stories ☐
Written magazine articles ☐
Written journal articles ☐
In the last 12 months how many of these have you had published? ☐

Interior decorating	☐
Exterior decorating	☐
Invented new recipes or recipe	☐
Made clothes	☐
Created a garden or part of a garden	☐

Please list any other creative things that you have done in the last 12 months:

A.4.1.3 The Adjective Checklist: Gough (1979); Domino (1970)

This answer sheet contains a list of adjectives. Please read them quickly and mark those that describe you as you really are. Do not worry about duplications or contradictions. Skip any adjectives that you may not know the definition of.

Absentminded	☐	Curious	☐
Active	☐	Cynical	☐
Adaptable	☐	Demanding	☐
Adventurous	☐	Disorderly	☐
Affected	☐	Dissatisfied	☐
Alert	☐	Distractible	☐
Aloof	☐	Egotistical	☐
Ambitious	☐	Energetic	☐
Argumentative	☐	Enthusiastic	☐
Artistic	☐	Honest	☐
Assertive	☐	Humorous	☐
Autocratic	☐	Hurried	☐
Capable	☐	Idealistic	☐
Careless	☐	Imaginative	☐
Cautious	☐	Impulsive	☐
Clear-thinking	☐	Independent	☐
Clever	☐	Individualistic	☐
Commonplace	☐	Industrious	☐
Complicated	☐	Informal	☐
Confident	☐	Ingenious	☐
Conservative	☐	Insightful	☐
Conventional	☐	Intelligent	☐

Interests narrow	☐	Restless	☐
Interests wide	☐	Sarcastic	☐
Intolerant	☐	Self-centred	☐
Inventive	☐	Self-confident	☐
Logical	☐	Sensitive	☐
Mannerly	☐	Serious	☐
Moody	☐	Sexy	☐
Original	☐	Sharp-witted	☐
Outspoken	☐	Sincere	☐
Quick	☐	Snobbish	☐
Rational	☐	Spontaneous	☐
Rebellious	☐	Submissive	☐
Reflective	☐	Suspicious	☐
Reserved	☐	Tactless	☐
Resourceful	☐	Unconventional	☐

Thank You!

A.4.1.4 Self-perceived creativity: (Holt, 2001)

How creative would you describe yourself to be?

Not at all creative						Highly creative
1	2	3	4	5	6	7

A.4.1.5 The Transliminality Scale: Thalbourne (1998)

Please respond to each of the statements below by circling the appropriate response, where 'T' indicates 'true' and 'F' indicates 'false'.

1.	Horoscopes are right too often for it to be a coincidence	**T**	**F**
2.	At times I perform certain little rituals to ward off negative influences	**T**	**F**
3.	I have experienced an altered state of consciousness in which I felt that I became cosmically enlightened	**T**	**F**
4.	At the present time, I am **very good** at make-believe and imagining	**T**	**F**
5.	I have felt that I had received special wisdom, to be communicated to the rest of humanity	**T**	**F**
6.	I have sometimes behaved in a much more impulsive or uninhibited way than is usual for me	**T**	**F**
7.	I am fascinated by new ideas, whether or not they have practical value	**T**	**F**
8.	I have sometimes sensed an evil presence around me, although I could not see it	**T**	**F**
9.	My thoughts have sometimes come so quickly that I couldn't write them all down fast enough	**T**	**F**
10.	If I could **not** pretend or make-believe anymore, **I wouldn't be me – I wouldn't be the same person**	**T**	**F**
11.	Sometimes I experience things as if they were doubly real	**T**	**F**
12.	It is sometimes possible for me to be completely immersed in nature or in art and to feel as if my whole state of consciousness has somehow been temporarily altered	**T**	**F**
13.	Often I have a day when indoor lights seem so bright that they bother my eyes	**T**	**F**
14.	I am convinced that I have had at least one experience of telepathy between myself and another person	**T**	**F**
15.	I am convinced that I am psychic	**T**	**F**
16.	I have experienced an altered state of awareness which I believe utterly transformed (in a positive manner) the way I looked at myself	**T**	**F**
17.	I am convinced that I have had a premonition about the future that came true and which (I believe) was not just a coincidence	**T**	**F**
18.	I think I really know what some people mean when they talk about mystical experiences	**T**	**F**
19.	I have gone through times when smells seemed stronger and more overwhelming than usual	**T**	**F**
20.	I can clearly feel again in my imagination such things as: the feeling of a gentle breeze, warm sand under bare feet, the softness of fur, cool grass, the warmth of the sun and the smell of freshly cut grass	**T**	**F**
21.	A person should try to understand their dreams and be guided by or take warnings from them	**T**	**F**
22.	While listening to my favourite music, in addition to feeling calm, relaxed, happy etc, I often have a feeling of oneness with the music, or of being in	**T**	**F**

	another place or time, or vividly remembering the past		
23.	At times, I somehow feel the presence of someone who is not physically there	**T**	**F**
24.	I am convinced that it is possible to gain information about the thoughts, feelings or circumstances of another person, in a way that does not depend on rational prediction or normal sensory channels	**T**	**F**
25.	For several days at a time I have had such a heightened awareness of sights and sounds that I cannot shut them out	**T**	**F**
26.	I sometimes have a feeling of gaining or losing energy when certain people look at me or touch me	**T**	**F**
27.	Now that I am grown up, I still in some ways believe in such things as elves, witches, leprechauns, fairies, etc.	**T**	**F**
28.	Sometimes people think I'm a bit weird because my ideas are so novel	**T**	**F**
29.	When listening to organ music or other powerful music, I sometimes feel as if I'm being lifted up into the air	**T**	**F**

A.4.1.6 The Boundary Questionnaire: Hartmann (1991)

Please try to rate each of the statements by circling the appropriate number, from 0 to 4, where:

'0' indicates, no, not at all, or not at all true of me.
'4' indicates yes, definitely, or very true of me.

Please try to answer all of the questions and statements as quickly as you can.

1.	When I awaken in the morning, I am not sure whether I am really awake for a few minutes	0	1	2	3	4
2.	I have had unusual reactions to alcohol	0	1	2	3	4
3.	My feelings blend into one another	0	1	2	3	4
4.	I am very close to my childhood feelings	0	1	2	3	4
5.	I am very careful about what I say to people until I get to know them really well	0	1	2	3	4
6.	I am very sensitive to other people's feelings	0	1	2	3	4
7.	I like to pigeonhole things as much as possible	0	1	2	3	4
8.	I like solid music with a definite beat	0	1	2	3	4
9.	I think children have a special sense of joy and wonder that is often later lost	0	1	2	3	4
10.	In an organization, everyone should have a definite place and a special role	0	1	2	3	4
11.	People of different nations are basically very much alike	0	1	2	3	4
12.	There are a great many forces influencing us which science does not understand at all	0	1	2	3	4
13.	I have dreams and daydreams or nightmares in which my body or someone else's body is being stabbed, injured, or torn apart	0	1	2	3	4
14.	I have had unusual reactions to marijuana	0	1	2	3	4

15.	Sometimes I don't know whether I am thinking or feeling	0	1	2	3	4
16.	I can remember things form when I was less than three years old	0	1	2	3	4
17.	I expect other people to keep a certain distance	0	1	2	3	4
18.	I think I would make a good psychotherapist	0	1	2	3	4
19.	I keep my desk and worktable neat and well organized	0	1	2	3	4
20.	I think it might be fun to wear medieval armour	0	1	2	3	4
21.	A good teacher needs to help a child remain special	0	1	2	3	4
22.	When making a decision, you shouldn't let your feelings get in the way	0	1	2	3	4
23.	Being dressed neatly and cleanly is very important	0	1	2	3	4
24.	There is a time for thinking and there is a time for feeling: they should be kept separate	0	1	2	3	4
25.	My daydreams don't always stay in control	0	1	2	3	4
26.	I have had unusual reactions to coffee or tea	0	1	2	3	4
27.	For me, things are black or white; there are no shades of grey	0	1	2	3	4
28.	I had a difficult and complicated childhood	0	1	2	3	4
29.	When I get involved with someone, I know exactly who I am and who the other person is. We may cooperate, but we remain our separate selves.	0	1	2	3	4
30.	I am easily hurt	0	1	2	3	4
31.	I get to appointments right on time	0	1	2	3	4
32.	I like heavy solid clothing	0	1	2	3	4
33.	Children and adults have a lot in common. They should give themselves a chance to be together without any strict roles	0	1	2	3	4
34.	In getting along with other people in an organization, it is very important to be flexible and adaptable	0	1	2	3	4
35.	I believe many of the world's problems could be solved if only people trusted each other more	0	1	2	3	4
36.	Either you are telling the truth or you are lying; that's all there is to it	0	1	2	3	4
37.	I spend a lot of time daydreaming, fantasizing, or in reverie	0	1	2	3	4
38.	I am afraid I may fall apart completely	0	1	2	3	4
39.	I like to have beautiful experiences without analysing them or trying to understand them in detail	0	1	2	3	4
40.	I have definite plans for my future. I can lay out pretty well what I expect year by year at least for the next few years.	0	1	2	3	4
41.	I can usually tell what another person is thinking or feeling without anyone saying anything	0	1	2	3	4
42.	I am usually sensitive to loud noises and to bright lights	0	1	2	3	4
43.	I am good at keeping accounts ad keeping track of my money	0	1	2	3	4
44.	I like stories that have a definite beginning, middle, and end	0	1	2	3	4
45.	I think and artist must in part remain a child	0	1	2	3	4
46.	A good organization is one in which all the lines of responsibility are precise and clearly established	0	1	2	3	4
47.	Each nation should be clear about its interests and its own boundaries, as well as the interests and boundaries of other nations	0	1	2	3	4

48.	There is a place for everything, and everything should be in its place	0	1	2	3	4
49.	Every time something frightening happens to me, I have nightmares or fantasies or flashbacks involving the frightening event	0	1	2	3	4
50.	I feel unsure of who I am at times	0	1	2	3	4
51.	At times I feel happy and sad all at once	0	1	2	3	4
52.	I have a clear memory of my past. I could tell you pretty well what happened year by year	0	1	2	3	4
53.	When I get involved with someone, we sometimes get too close	0	1	2	3	4
54.	I am a very sensitive person	0	1	2	3	4
55.	I like things to be spelled out precisely and specifically	0	1	2	3	4
56.	I think a good teacher must remain in part a child	0	1	2	3	4
57.	I like paintings and drawings with clean outlines and no blurred edges	0	1	2	3	4
58.	A good relationship is one in which everything is clearly defined and spelled out	0	1	2	3	4
59.	People are totally different form each other	0	1	2	3	4
60.	When I wake up, I wake up quickly and I am absolutely sure I am awake	0	1	2	3	4
61.	At times I have felt as if I were coming apart	0	1	2	3	4
62.	My thoughts blend in to one another	0	1	2	3	4
63.	I had a difficult and complicated adolescence	0	1	2	3	4
64.	Sometimes it's scary when one gets too involved with another person	0	1	2	3	4
65.	I enjoy soaking up atmosphere even if I don't understand exactly what's going on	0	1	2	3	4
66.		0	1	2	3	4
67.	I like paintings or drawings with soft and blurred edges	0	1	2	3	4
68.	A good parent has to be a bit of a child too	0	1	2	3	4
69.	I cannot imagine marrying or living with someone of another religion	0	1	2	3	4
70.	It is very hard to empathize truly with another person because people are so different	0	1	2	3	4
71.	All important thought involves feelings too	0	1	2	3	4
72.	I have dreams and daydreams or nightmares in which I see isolated body parts – arms, les, heads, and so on.	0	1	2	3	4
73.	Things around me seem to change their size and shape	0	1	2	3	4
74.	I can easily imagine myself to be an animal or what it might be like to be an animal	0	1	2	3	4
75.	I feel very separate and distinct from everyone else	0	1	2	3	4
76.	When I am in a new situation, I try to find out precisely what is going on and what the rules are as soon as possible	0	1	2	3	4
77.	I enjoy(ed) geometry; there are simple, straightforward rules, everything fits	0	1	2	3	4
78.	A good parent must be able to empathize with his or her children, to be their friend and playmate at the same time	0	1	2	3	4

79.	I cannot imagine living with or marrying a person of another race	0	1	2	3	4
80.	People are so different that I never know what someone else is thinking or feeling	0	1	2	3	4
81.	Beauty is a very subjective thing. I know what I like, but I wouldn't expect anyone else to agree	0	1	2	3	4
82.	In my daydreams, people kind of merge into one another or one person turns into another	0	1	2	3	4
83.	My body sometimes seems to change its size or shape	0	1	2	3	4
84.	I get over-involved in things	0	1	2	3	4
85.	When something happens to a friend of mine or a lover, it is almost as if it happened to me	0	1	2	3	4
86.	When I work on a project, I don't like to tie myself down to a definite outline. I rather like to let my mind wander	0	1	2	3	4
87.	Good solid frames are very important for a picture or a painting	0	1	2	3	4
88.	I think children need strict discipline	0	1	2	3	4
89.	People are happier with their own kind than when they mix	0	1	2	3	4
90.	East is East and Wes is West, and never the twain shall mix (Kipling)	0	1	2	3	4
91.	There are definite rules and standards, which one can learn, about what is and is not beautiful	0	1	2	3	4
92.	In my dreams, people sometimes merge into each other or become other people	0	1	2	3	4
93.	I believe I am influenced by forces which no one can understand	0	1	2	3	4
94.	When I read something, I get so involved that it can be difficult to get back to reality	0	1	2	3	4
95.	I trust people easily	0	1	2	3	4
96.	When I am working on a project, I make a careful detailed outline and then follow it closely	0	1	2	3	4
97.	The movies and TV shows I like best are the ones where there are good guys and bad guys and you always know who they are	0	1	2	3	4
98.	If we open ourselves to the world, we find that things go better than expected	0	1	2	3	4
99.	Most people are sane; some people are crazy; there is no in-between	0	1	2	3	4
100.	I have had déjà vu experiences	0	1	2	3	4
101.	I have a very definite sense of space around me	0	1	2	3	4
102.	When I really get involved in a game or in playing at something, it's sometimes hard when the game stops and the rest of the world begins	0	1	2	3	4
103.	I am a very open person	0	1	2	3	4
104.	I think I would enjoy being an engineer	0	1	2	3	4
105.	There are no sharp dividing lines between normal people, people with problems, and people who are considered psychotic or crazy	0	1	2	3	4
106.	When I listen to music, I get so involved that it is sometimes difficult to get back to reality	0	1	2	3	4

107.	I am always at least a little bit on my guard	0	1	2	3	4
108.	I am a down-to-earth, no-nonsense kind of person	0	1	2	3	4
109.	I like houses with flexible spaces, where you can shift things around and make different uses of the same rooms	0	1	2	3	4
110.	Success is largely a matter of good organization and keeping good records	0	1	2	3	4
111.	Everyone is a little crazy at times	0	1	2	3	4
112.	I have daymares	0	1	2	3	4
113.	I awake from one dream into another	0	1	2	3	4
114.	Time slows down and speeds up for me. Time passes very differently on different occasions	0	1	2	3	4
115.	I feel at one with the world	0	1	2	3	4
116.	Sometimes I meet someone and trust him or her so completely that I can share just about everything about myself on the first meeting	0	1	2	3	4
117.	I think I would enjoy being the captain of a ship	0	1	2	3	4
118.	Good fences make good neighbours	0	1	2	3	4
119.	My dreams are so vivid that even later I can't tell them fro waking reality	0	1	2	3	4
120.	I have often had the experience of different senses coming together. For example, I have felt that I could smell a colour, or see a sound, or hear an odour.	0	1	2	3	4
121.	I read things straight through from beginning to end. (I don't skip or go off on interesting tangents)	0	1	2	3	4
122.	I have friends and I have enemies, and I know which are which	0	1	2	3	4
123.	I think I would enjoy being some kind of creative artist	0	1	2	3	4
124.	A man is a man and a woman is a woman; it is very important to maintain that distinction	0	1	2	3	4
125.	I know exactly what parts of town are safe and what parts are unsafe	0	1	2	3	4
126.	I have had the experience of not knowing whether I was imagining something or it was actually happening	0	1	2	3	4
127.	When I recall a conversation or a piece of music, I hear it just as though it were happening there again right in front of me	0	1	2	3	4
128.	I think I would enjoy a really loose, flexible job where I could write my own job description	0	1	2	3	4
129.	All me have something feminine in them and all women have something masculine in them	0	1	2	3	4
130.	In my dreams, I have been a person of the opposite sex	0	1	2	3	4
131.	I have had the experience of someone calling me or speaking my name and not being sure whether it was really happening or I was imagining it	0	1	2	3	4
132.	I can visualize something so vividly that it is just as though it were happening right in front of me	0	1	2	3	4
133.	I think I could be a good fortune-teller or a medium	0	1	2	3	4
134.	In my dreams, I am always myself	0	1	2	3	4
135.	I see auras or fields of energy around people	0	1	2	3	4
136.	I can easily imagine myself to be someone of the opposite sex	0	1	2	3	4

137.	I like clear, precise borders	0	1	2	3	4
138.	I have had the feeling that someone who is close to me was in danger or was hurt, although I had no ordinary way of knowing it, and later found out it was true	0	1	2	3	4
139.	I have a very clear and distinct sense of time	0	1	2	3	4
140.	I like houses where rooms have definite walls and each room has a definite function	0	1	2	3	4
141.	I have had dreams that later came true	0	1	2	3	4
142.	I like fuzzy borders	0	1	2	3	4
143.	I have had "out of body" experiences during which my mind seems to leave, or actually has left, my body	0	1	2	3	4
144.	I like straight lines	0	1	2	3	4
145.	I like wavy or curved lines better than I like straight ones	0	1	2	3	4
146.	I feel sure that I can empathize with the very old	0	1	2	3	4

APPENDIX 4.2

Participant's written introductory instructions

Thank you for agreeing to take part in this questionnaire study. Enclosed are six questionnaires or checklists. Please complete each one as quickly and honestly as possible. This should take about half an hour.

All responses will be anonymous and treated with utmost confidentiality for the purposes of research only. Please note that if there are any questions that you do not wish to answer you are free to miss these out.

If you would like to receive feedback on the outcome of this study, please write down your student number below and I will email information to your UCN student address.

If you would like further information about this topic, have any questions about the study, or would like to take part in further studies, please contact me, Nicola Holt, on 01604 735500 ext. 2485 or email me at nicola.holt@northampton.ac.uk.

Please could you begin by completing the questions below.

APPENDIX 4.3

Statistics and graphs for parametric assumptions

Table A.4.3.1 illustrates that the Creative Interests and Activities total score is significantly skewed and demonstrates significant kurtosis. This is also the case for two sub-scales, interest and involvement in performance arts and writing. Hence, non-parametric statistics were used for subscales and total scores measuring 'creative behaviour'.

Table A.4.3.1

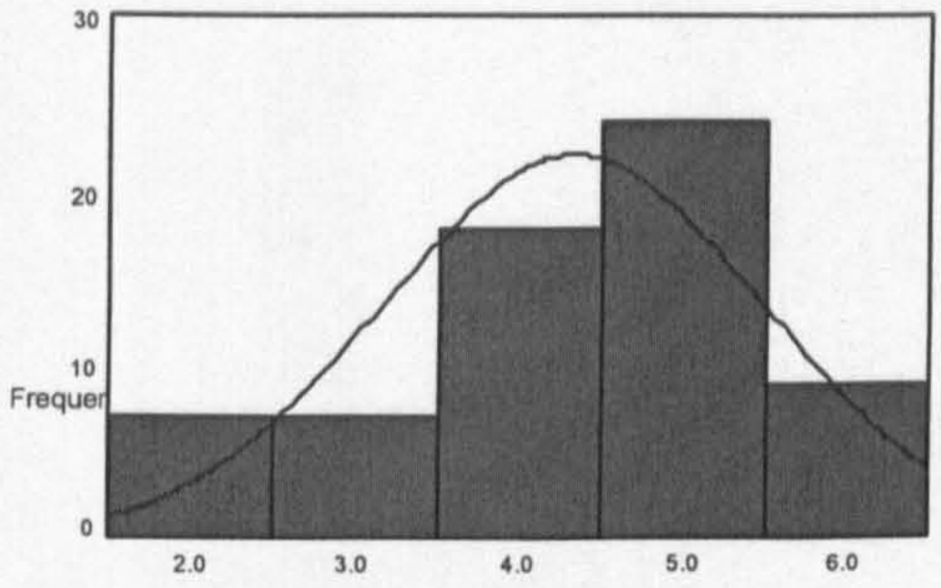
Descriptive statistics indicative of a normal distribution for creativity scales and subscales demonstrating in internal consistency above α = .07

	SP	UT	EC/BS	A	P	W	D	CAC	EC	N	CP
Mean	4.32	55.89	44.60	3.19	1.55	1.70	2.66	9.17	102.59	45.25	3.86
Median	5.00	55.00	44.00	2.5	.00	1.00	2.00	7.00	104.00	46.00	4.00
Std. Deviation	1.17	7.94	8.27	2.86	2.62	2.27	2.58	7.29	11.67	6.45	3.79
Variance	1.38	63.05	68.34	8.19	6.85	5.16	6.67	53.19	136.09	41.56	14.35
Skewness	-.55	.31	.23	.70	**2.51**	**1.64**	.73	**1.14**	-.34	-.40	.27
Std. Error of Skewness	.30	.30	.30	.30	**.30**	**.30**	.30	**.30**	.30	.30	.30
Kurtosis	-.42	.110	.00	-.53	**7.28**	**2.27**	-.52	**1.06**	-.18	.21	-.04
Std. Error of Kurtosis	.59	.590	.59	.59	**.59**	**.59**	.59	**.59**	.59	.59	.60

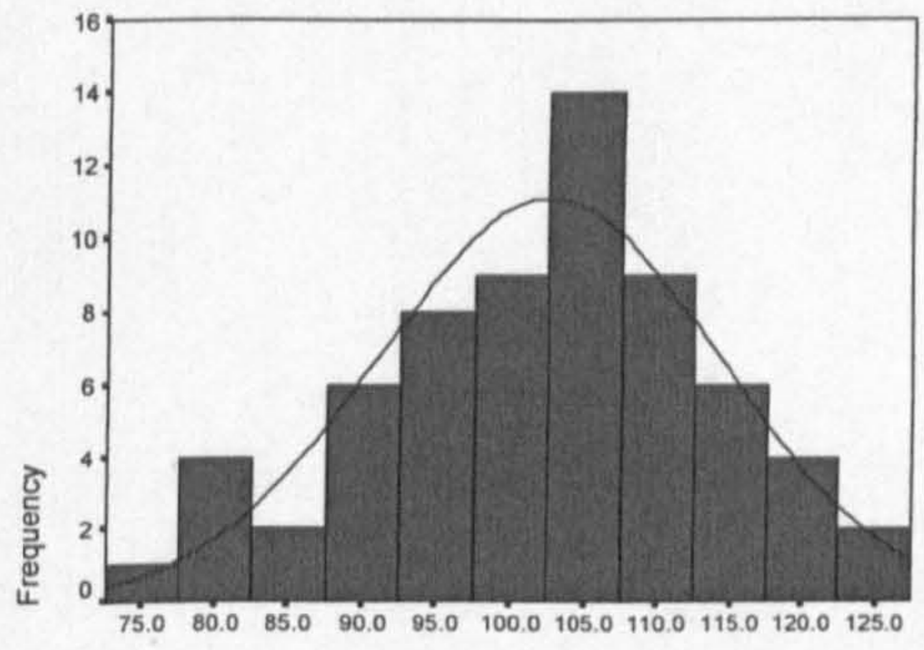
Note: SP= self-perceived creativity; UT= use of techniques; EC/BS = environmental control/ behavioural self-regulation; A = art; P = performance; W = writing; D = domestic crafts; CAC = total creative activity checklist score; EC = emotional creativity; N = novelty; CP = creative personality.

The normal distribution is symmetric, and has a skewness value of zero. A distribution with a significant positive skewness has a long right tail. A distribution with a significant negative skewness has a long left tail. As a rough guide, a skewness value more than twice its standard error is taken to indicate a departure from symmetry, or a skewness value greater than +/- 1. Additionally, for a normal distribution, the value of the kurtosis statistic is 0. Positive kurtosis indicates that the observations cluster more and have longer tails than those in the normal distribution and negative kurtosis indicates the observations cluster less and have shorter tails. These patterns can be observed in the histograms below.

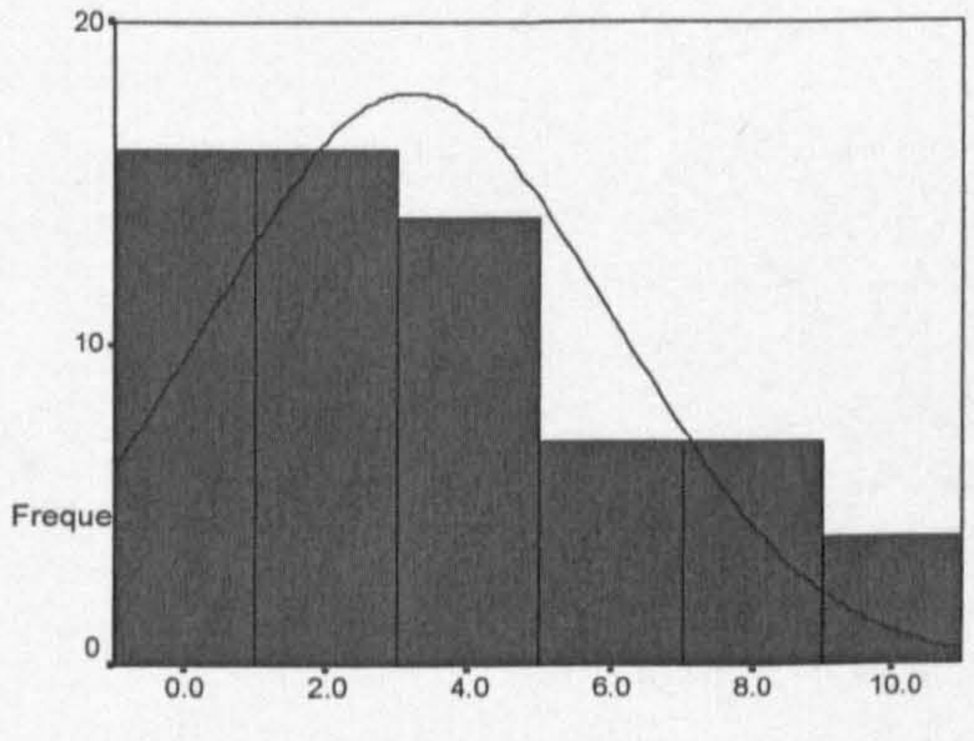
Histogram A.4.1: Self-perceived creativity



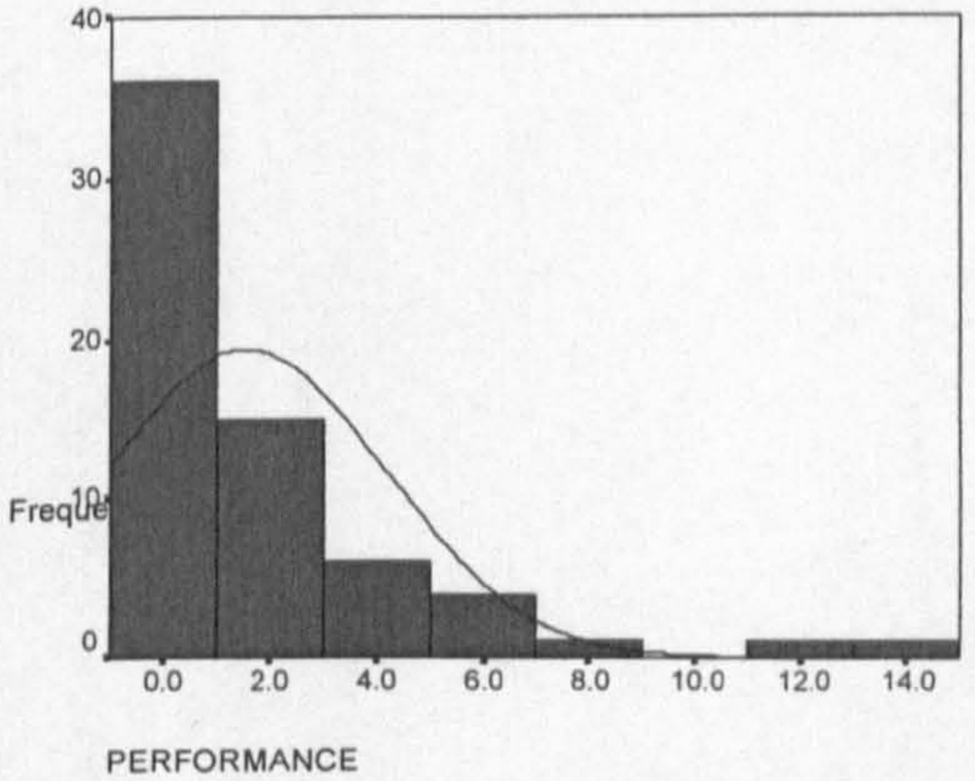
Histogram A.6.4: Total ECI score



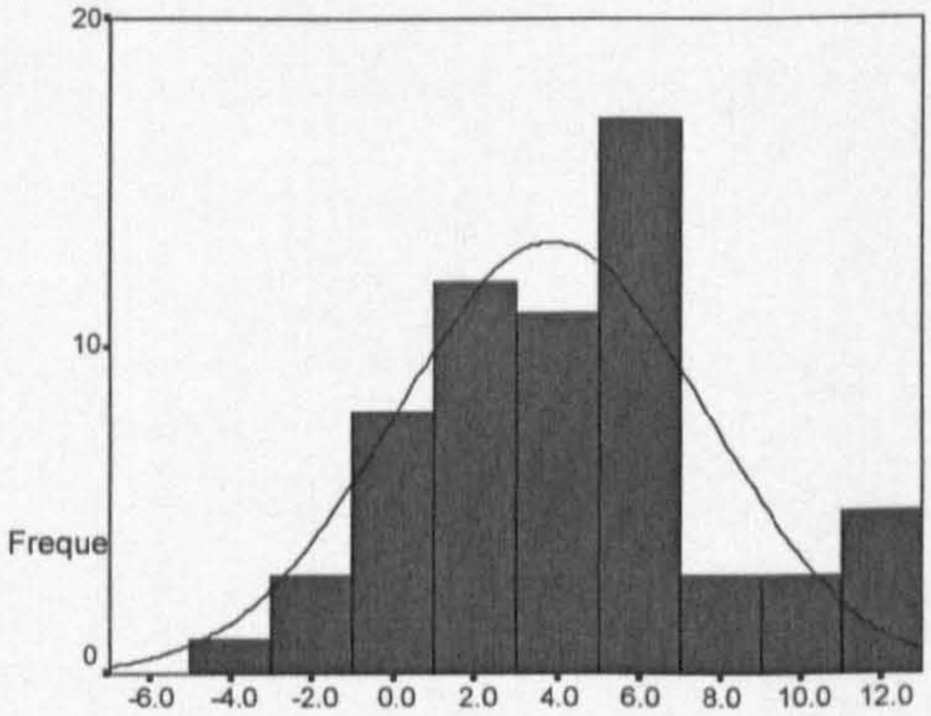
Histogram A.4.2: Art



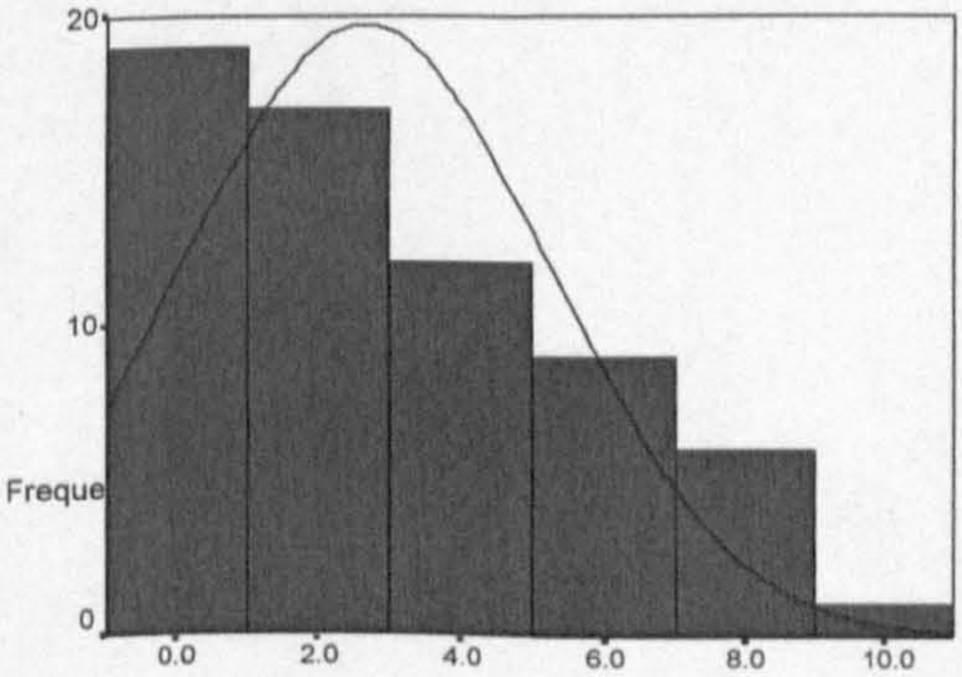
Histogram A.4.3: Performance



Histogram A.4.5: Creative personality



Histogram A.4.6: Domestic arts



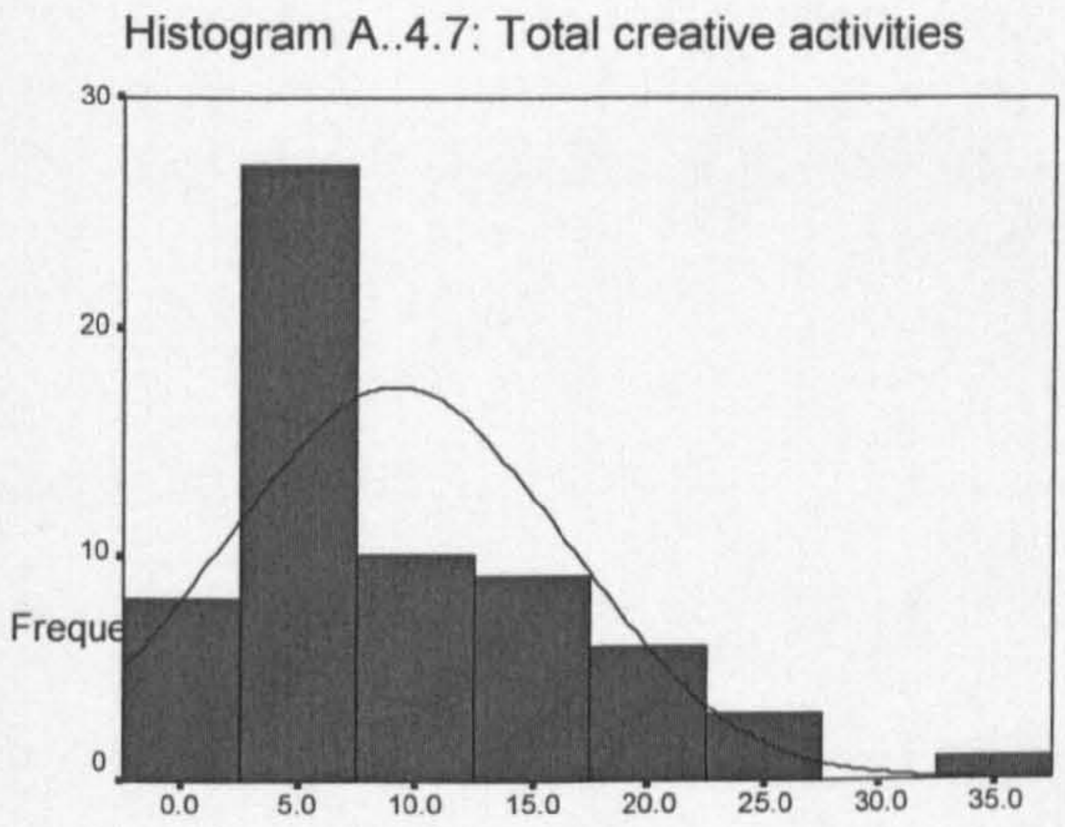


Table A.4.3.2

Descriptive statistics indicative of a normal distribution for boundary permeability scales and subscales demonstrating in internal consistency above α = .07

	Translimin ality	Boundary Thinness	Personal Boundary Thinness	World Boundary Thinness	Sleep/ wake/ dream	Unusual experiences	Thoughts/ feelings/ moods
Mean	9.85	290.58	192.92	97.66	21.05	29.36	31.14
Median	10	287	188.5	99	20.00	30.00	30.00
Std. Deviation	5.77	43.81	35.68	14.66	9.47	11.79	8.46
Variance	33.34	1919.39	1272.84	215.02	89.76	139.06	71.55
Skewness	.47	.07	.09	-.01	.20	.45	-.08
Std. Error of Skewness	.30	.30	.30	.30	.30	.30	.30
Kurtosis	.03	1.43	.76	-.42	-.06	.13	.23
Std. Error of Kurtosis	.60	.60	.60	.60	.60	.59	.59

APPENDIX 4.4

Multiple analysis calculations for Study One: Creativity and Boundaries

Table A.4.4.1

Corrections for multiple analysis using the planned, multi-stage Bonferroni procedure (Larzelere & Mulaik, 1977, cited by Howell, 1992, p. 354)

Pair of correlates	i	Correlation	*p*-value	$\alpha/(k-i+1)$
Boundary Thinness & Transliminality	**1**	**.710**	**.00000000008**	**.003**
Transliminality & Emotional Creativity	**2**	**.477**	**.00004**	**.003**
Transliminality & Creative Personality	**3**	**.432**	**.0003**	**.003**
Boundary Thinness & Emotional Creativity	**4**	**.389**	**.0008**	**.004**
Boundary Thinness & Creative Personality	**5**	**.343**	**.003**	**.004**
Boundary Permeability & Creative Activities and Interests	**6**	**.318**	**.006**	**.004**
Transliminality & Self-Perceived creativity	7	.296	.010	.005
Boundary Thinness & writing	8	.288	.011	.005
Transliminality and Creative Activities and Interests	9	.279	.015	.006
Boundary Permeability and Self-Perceived creativity	10	.277	.013	.006
Transliminality & Domestic Arts	11	.233	.036	.007
Boundary Thinness & Performance Arts	12	.232	.034	.008
Transliminality & Art	13	.222	.043	.008
Boundary Thinness & Art	14	.215	.046	.01
Boundary Thinness & Domestic Arts	15	.191	.066	.01
Transliminality & Performance Arts	16	.178	.085	.03
Transliminality & Writing	17	.127	.165	.05

Note. K = 17. Bold typeface indicates statistical significance as p-value above calculated criterion level (α).

APPENDIX 4.5

Boundary-permeability and creativity replication study with a non-student population

In Chapter Six, the relationship between the measures of creativity and creative personality, emotional creativity, interest and involvement in artistic activities and self-perceived creativity (which were used as measures of creativity in Study One) were used in a second empirical study. In addition, further measures of creativity were used in Study Two: figural divergent-thinking, remoteness of verbal associations and interest in and involvement with science. In Study Two these creativity measures were considered in relation to ASCs and ego-strength. However, the transliminality Scale (TS, Thalbourne, 1998) and the short-form of the BQ (BQ18, Kunzendorf, Hartmann, Cohen & Cutler, 1997) were also included in this study. As these correlations were very similar to those obtained with the total score of the Assessment Schedule for Altered States of Consciousness (ASASC, Quekelberghe, Alstotter-Gleich & Hertweck, 1991) ASASC they were not included in the body of the thesis, due to limited space constraints. However, the results are relevant when viewed as a partial replication of Study One.

Study Two had a sample size of 211 (201 males; 208 females), which included 36 professional artists and 27 professional scientists. For a review of materials, participants and methodology please refer to Section 6.1. Transliminality and boundary-thinness correlated at r = .797, p = .000001 and r = .684, p = .000001, respectively, with the total score on the ASASC and hence were seen as part of the same construct: an openness to and proclivity to 'unusual experiences'. Transliminality and boundary-thinness correlated with each other at r = .638, p = .000001, which is slightly less than, but commensurate with, the correlation between the TS and BQ in Study One: r = .70, p < .0001. As in Study One, non-parametric tests were used with self-perceived creativity and the creative activities scales (as they were positively and negatively skewed respectively) and the remaining correlations were parametric. Again, two items relating to creativity in each of the TS and the BQ18 were removed for these analyses.

Study Two broadly supports the positive relationship between creativity and boundary-permeability that was reported in Study One, the statistics for which are shown in Table A.4.5. There are small to moderate positive correlations between boundary-permeability and both self-perceived creativity and involvement in creative activities (.277 > *rhos* > .377, p < .001). Involvement in artistic domains (especially visual art) was responsible for this effect, whereas involvement in science (e.g. designing experiments and solving mathematical problems) was

correlated negatively and non-significantly with boundary-permeability (*rhos*=-.079 and -.069). This supports and extends earlier work where openness-to-experience was associated with creativity in the arts rather than the sciences (Feist, 1998). Feist (1999) further suggests that scientists and artists have different 'affective dispositions' and are more prone to affective illness (e.g. Andreason & Powers, 1974; Jamison, 1993) but that both experience the tension and excitement of the creative process. Albert and Runco (1987) relate temperamental differences between the 'scientist' and the 'nonscientist' to Hartmann's boundaries. They postulate a mechanism of 'stimulus barriers', where different thresholds of 'stimulus barrier' lead to variations in both external and internal stimulus intensity. They suggest that the 'scientist' versus the 'artist' tends to have a stronger 'stimulus barrier' and as such is less frequently and intensely concerned with internal, affective and intrapersonal/interpersonal content. In the arts, they argue, problems are idiosyncratic and 'internally set' and in the sciences are institutional and 'externally set'.

Table A.4.5

Correlations between creativity and boundary permeability

		Creative Activities and Interests										
	Self-Perceived Creativity	Total	Art	Music	Performance	Writing	Domestic	Science	Emotional Creativity	Creative Personality	Figural divergent-thinking	Remoteness of verbal associations
Transliminality	**.299** (<.001)	**.310** (<.001)	**.335** (<.001)	**.208** (.002)	**.219** (.001)	**.251** (<.001)	.095 (.087)	-.079 (.254)	**.632** (<.001)	**.201** (.002)	.167 (.015)	**.221** (.001)
Total boundary score	**.327** (<.001)	**.277** (<.001)	**.314** (<.001)	.150 (.015)	**.202** (.002)	**.245** (<.001)	.031 (.330)	-.069 (.162)	**.608** (<.001)	.169 (.007)	**.256** (<.001)	.166 (.095)

Note. Effect sizes in bold are significant when correcting for multiple analyses with the Bonferroni method ($p < .002$). All correlations are one-tailed, as positive relationships were predicted, except for 'Science, as a null relationship was predicted, but the direction unspecified.

There are very small positive correlations in Study Two between cognitive measures of creativity and boundary-permeability, ranging between $r = .167$ and .256. Only two of these are significant when corrected for multiple analyses: that between transliminality and remoteness of verbal associations ($r = .221$, $p = .001$); and boundary-thinness and figural divergent-thinking (flexibility and originality of responses) ($r = .256$, $p = .001$). These small effect sizes are similar to those found in earlier studies associating boundary-permeability with cognitive originality, suggesting that there is some degree of overlap between the constructs (2.6 to 6.6%). It is notable that in this sample creative personality formed much smaller effect sizes ($r = .201$, $p = .002$ and r

= 169, p = .007) than in Study One; it might be that scores on the CPS are related to boundary-thinness only in certain domains, such as the arts rather than the sciences, and that as O'Reilly et al. (2001) argued, domain general creativity factors are partialled out by domain involvement. The effect in Study Two may have been reduced by the inclusion of a range of scientists and social scientists, who perhaps endorsed more of the secondary than primary-process related adjectives of this scale.

More striking in Study Two are the high correlations between emotional creativity and transliminality (r = .632, p < .001) and boundary-thinness (r = .608, p < .001). This supports Thalbourne's (2003) description of transliminality as being mediated by affective states, and suggests that the relationship between unusual experiences and creativity may also be mediated by emotional dimensions, for instance access to the 'affective dimension' of the primary-process delineated by Russ (2001).

In summary, Study Two suggests that boundary-permeability may be associated with cognitive flexibility and originality and creative personality at low levels; with involvement in a range of artistic creative activities at low to moderate levels; and correlates most highly with creativity in the emotional/intrapersonal/interpersonal domain.

APPENDIX 5

Summary of the empirical studies exploring ASCs and Creativity

Author/s	ASC measure/correlate	Creativity measure/ correlate	Revealed significant difference/correlation?
O'Reilly, Dunbar & Bentall (2001)	'Unusual Experiences' Subscale of the OLIFE (Oxford-Liverpool Inventory of Feelings and Experiences) Cyclothymia, magical thinking, hallucinatory experiences, other perceptual aberrations, suspiciousness and paranoid ideation.	Torrance Tests of Creative Thinking, TTCT, (Torrance, 1974)	No Did not withstand when degree subject partialled out.
		Involvement in the creative arts (dance, music, drama, art) at degree level versus 'the humanities'	Yes Involvement in creative arts associated with 'unusual experiences'
Barron (1969)	Schizophrenia and paranoia subscales of the MMPI (Minnesota Multiphasic Personality Inventory)	Creative profession: architect or writer	Yes. Mediated by high ego strength.
Martindale and Hines (1975)	Flexibility of arousal	Alternate Uses Test (Wilson, Christensen, Merrifield and Guildford, 1960)	Yes
Taft (1969)	Peak experiences, automatic thought, acceptance of fantasy and intellectual control.	Creative Activities Scale (Zimmerman and Guildford, 1963)	Yes
Ayers, Beaton and Hunt (1999)	Hood's (1975) Mysticism Scale. Positive ASCs: lucid dreaming, OBES, archetypal-mythological dreaming and mystical experience	Creative profession: performing/exhibiting artist or actor	Yes
Wolfradt and Pretz (2001)	Scale of Depersonalisation Experiences (SPDE)	Creative Personality Scale (Gough, 1979); List of creative hobbies; Scores on a story writing task	No No No
Alvarado, Zingrone and Dalton (1999)	Out-of-body experiences	Self-perceived creativity	No
Kumar, Kemmler & Holman (1997)	Belief in unconscious processes, including the importance of dreams to creativity	Self Perceived Creativity Creative Characteristics Measure (Holman & Kumar, 1997) Creative Personality Scale (Gough, 1979)	Yes Yes No
Sladeczek & Domino (1985)	Quick Sleep onset Have solved a problem through dreams	Composite measure: Creative Personality Scale (Domino, 1970) Drawing Completion Task (Franck & Rosen, 1969) Consequences (Christensen, Merrifield & Guildford, 1958)	Yes. High creatives more likely to have both quick sleep onset and have used dreams in creative problem solving.
Domino (1976)	Primary Process Cognition in Dreams	Teacher nomination for creative achievement. Of these, those who scored in the 50th percentile on both the Remote Associates Test, RAT (Mednick & Mednick, 1967) and the Alternate Uses Test (Wilson, Christensen, Merrifield and Guildford, 1960).	Yes. Creatives significantly more: Condensation Unlikely combination Symbolism Contradiction

Author/s	ASC measure/correlate	Creativity measure/ correlate	Revealed significant difference/correlation?
Sladeczek & Domino (1985)	Regressive Dream content Dream distortion More visual mentation	Domain/peer judged creative professionals (architects, musicians, novelists, sculptors, research scientists)	Yes
Wood, Sebba & Domino (1990)	Dream bizarreness	Creative Personality (Domino, 1979) Barron-Welsh Art Scale (Welsh & Barron, 1963) Figural Originality (OFT) Remoteness of Associates (RAT)	No No Yes. Partialled out by verbal IQ Yes. Partialled out by verbal IQ
Brodsky, Esquerre and Jackson (1990-1991)	Frequent lucid dreams	Originality and imaginativeness in creative problem solving task	Yes Frequent lucid dreamers obtained higher creativity scores
Snyder and Gackenbach (1988)	Frequent lucid dreams	TTCT	Figural divergent thinking scores significantly higher for female lucid dreamers, but not males
Blagrove and Tucker (1994)	Frequent lucid dreams	Domino's (1970) Creative Personality scale	No
Blagrove and Hartnell (2000)	Frequent lucid dreams	Gough's (1979) Creative Personality Scale	Yes (Controlling for dream recall ability)
Thalbourne, Bartemucci, Delin, Fox, and Nofi (1997)	Fantasy proneness	Creative Personality (Thalbourne and Delin, 1994)	Yes
Lynn & Rhue (1986)	Fantasy proneness	Barron-Welsh Art Scale (Welsh & Barron, 1963)	Yes
Rhue, Bukh & Henry (1991)	Fantasy proneness	Consequences (Christensen, Merrifield & Guildford, 1958)	Yes
Holt, Simmonds and Roe (2001)	Hypnagogia	Self-perceived creativity	Yes
Whitton, Moldofsky and Lue (1978)	EEG patterns of hallucinations and divergent thinking similar?	Seven DT tasks (Guildford, 1967)	Yes. No change in alpha from baseline, but increase in theta and delta waves.
Csikszentmihalyi (1996)	The flow state	Eminent scientists and artists – i.e. have made a significant contribution to their field	Self-reports of flow state as part of creative process
Gruzelier (2001)	Neurofeedback training to enter the flow state while playing music	Blind ratings by musical experts on creative performance	Creative performance enhanced by entering flow state
Thalbourne, Bartemucci, Delin, Fox, and Nofi (1997)	Absorption (Tellegen & Atkinson, 1974)	Creative Personality (Thalbourne and Delin, 1994)	Yes
Thalbourne & Delin (1994)	Mystical experience (Thalbourne, 1991)	Creative Personality (Thalbourne and Delin, 1994)	Yes
Averill (1999)	Mystical experience (Hood, 1975)	Emotional Creativity	Yes
Kennedy & Kanthamani (1994)	Transcendent/ mystical experiences	Self rated importance of artistic activities to life	Yes

APPENDIX 6.1

The Creative Cognition Inventory

To what extent are the following experiences or processes important to your creativity? Please respond from '0' indicating 'not at all important' to '4' indicating 'extremely important'. (If the word 'idea' used in some of the questions below seems inappropriate, please replace with a word more fitting for the context of your creative endeavours, e.g. image, form, music, solution, poem, formula, problem. . . .)

		Not important				Important
1.	Making discoveries through trial and error	0	1	2	3	4
2.	Trusting hunches or instincts	0	1	2	3	4
3.	Ideas arising whilst dreaming	0	1	2	3	4
4.	Methodical and systematic problem solving	0	1	2	3	4
5.	Sudden moments of inspiration in waking life	0	1	2	3	4
6.	Rational, logical thought	0	1	2	3	4
7.	A sense of communicating with a deeper sense of self	0	1	2	3	4
8.	The careful selection of ideas	0	1	2	3	4
9.	Loose, unconstrained thinking	0	1	2	3	4
10.	Following your intuition	0	1	2	3	4
11.	Ideas arising as falling asleep or waking up	0	1	2	3	4
12.	Meditation	0	1	2	3	4
13.	Paying attention to visual imagery	0	1	2	3	4
14.	Experiences of losing track of time when involved in creative work	0	1	2	3	4
15.	Playing with ideas	0	1	2	3	4
16.	Luck, chance, 'fortunate accidents'	0	1	2	3	4
17.	The use of analogy	0	1	2	3	4

		Not important				Important
18.	A sense of purpose that seems to come from beyond the self	0	1	2	3	4
19.	Recombining existing elements in new ways	0	1	2	3	4
20.	Working with a set goal or outcome in mind	0	1	2	3	4
21.	A sense of channelling information	0	1	2	3	4
22.	Paying attention to auditory impressions	0	1	2	3	4
23.	Day dreaming	0	1	2	3	4
24.	The release of negative emotions	0	1	2	3	4
25.	Non-verbal modes of thinking	0	1	2	3	4
26.	Positive emotions, e.g. joy, excitement, euphoria	0	1	2	3	4
27.	Paying attention to bodily feelings	0	1	2	3	4
28.	A sense of communicating with something other	0	1	2	3	4
29.	A sense of being in tune with nature or the universe	0	1	2	3	4

APPENDIX 6.2

Creativity and Personality

Participant information

(Please circle as appropriate)

Participant Number

Gender	Male	Female
Age Range	20 or below	21-30 31-40 41-50 51-60 61-70 70+
Occupation	(If a student/academic, please state your subject areas)	

Thank you for agreeing to take part in this study, exploring how different kinds of creativity relate to personality, thinking styles and experiences of different states of consciousness. This study is based on the idea that everybody is creative in some way, whether this be through problem solving, invention, artistic endeavours or interpersonal creativity, for example. Enclosed are eight brief questionnaires or checklists, following some preliminary questions, and two timed creativity activities or 'games'. Please complete each section as quickly and honestly as possible There are no right or wrong answers and you are requested to answer on the basis of your own experiences and beliefs, not on the basis of logic. Simply describe your self and state your opinions as accurately as possible. Your first intuitive response is usually the best. If you change your mind, please erase your first answer completely.

While there is no interest in any response at an individual level, your participation is greatly appreciated as an important contribution to this research. All responses will be anonymous and treated with utmost confidentiality and the questionnaire data will be used for research purposes only. Please try to answer all of the questions in each scale, but note that you are of course free to skip a question or to discontinue with the study if you wish. Please could you begin by responding to the items below.

If you would like to receive feedback on the overall results of this study, please add your contact details below, if I did not send this questionnaire directly to you. For purposes of anonymity, you do not need to attach your name, your participant number can be used as an identifier. Alternatively you may contact me directly at a later date (details provided at the end of the questionnaire).

Address:

Or email address:

Please send me:

Findings and conclusions of this study ☐

Details about future studies: Creativity and altered states of consciousness ☐

Ganzfeld (GESP, general extrasensory perception) ☐

1. How creative would you describe yourself to be?

Not at all creative						Highly creative
1	2	3	4	5	6	7

2. Is involvement in a creative practice an important purpose in your life?

Not at all important						Highly important
1	2	3	4	5	6	7

3. Do you practice meditation or any form of spiritual practice? If yes, please describe.

Please continue overleaf . . .

In the space below, please write freely in response to the following questions. (As a guideline, please describe the experiences that spring most vividly to your mind).

4. What motivates you to be creative?

5. Have you ever experienced a loss of self-awareness or an alteration to your usual self-awareness as a part of the creative process? If yes, please describe such an experience.

6. Have you ever experienced a moment of inspiration or insight as part of a creative process? If yes, please describe such an experience.

Please continue overleaf . . .

TEXT BOUND INTO

THE SPINE

The Transliminality Scale
(Thalbourne, 1998)

Please respond to each of the statements below by circling the appropriate response, where 'T' indicates 'true' and 'F' indicates 'false'.

1	Horoscopes are right too often for it to be a coincidence	T	F
2	At times I perform certain little rituals to ward off negative influences	T	F
3	I have experienced an altered state of consciousness in which I felt that I became cosmically enlightened	T	F
4	At the present time, I am **very good** at make-believe and imagining	T	F
5	I have felt that I had received special wisdom, to be communicated to the rest of humanity	T	F
6	I have sometimes behaved in a much more impulsive or uninhibited way than is usual for me	T	F
7	I am fascinated by new ideas, whether or not they have practical value	T	F
8	I have sometimes sensed an evil presence around me, although I could not see it	T	F
9	My thoughts have sometimes come so quickly that I couldn't write them all down fast enough	T	F
10	If I could **not** pretend or make-believe anymore, **I wouldn't be me – I wouldn't be the same person**	T	F
11	Sometimes I experience things as if they were doubly real	T	F
12	It is sometimes possible for me to be completely immersed in nature or in art and to feel as if my whole state of consciousness has somehow been temporarily altered	T	F
13	Often I have a day when indoor lights seem so bright that they bother my eyes	T	F
14	I am convinced that I have had at least one experience of telepathy between myself and another person	T	F
15	I am convinced that I am psychic	T	F
16	I have experienced an altered state of awareness which I believe utterly transformed (in a positive manner) the way I looked at myself	T	F
17	I am convinced that I have had a premonition about the future that came true and which (I believe) was not just a coincidence	T	F
18	I think I really know what some people mean when they talk about mystical experiences	T	F
19	I have gone through times when smells seemed stronger and more overwhelming than usual	T	F
20	I can clearly feel again in my imagination such things as: the feeling of a gentle breeze, warm sand under bare feet, the softness of fur, cool grass, the warmth of the sun and the smell of freshly cut grass	T	F
21	A person should try to understand their dreams and be guided by or take warnings from them	T	F
22	While listening to my favourite music, in addition to feeling calm, relaxed, happy etc, I often have a feeling of oneness with the music, or of being in another place or time, or vividly remembering the past	T	F
23	At times, I somehow feel the presence of someone who is not physically there	T	F
24	I am convinced that it is possible to gain information about the thoughts, feelings or circumstances of another person, in a way that does not depend on rational prediction or normal sensory channels	T	F
25	For several days at a time I have had such a heightened awareness of sights and sounds that I cannot shut them out	T	F
26	I sometimes have a feeling of gaining or losing energy when certain people look at me or touch me	T	F
27	Now that I am grown up, I still in some ways believe in such things as elves, witches, leprechauns, fairies, etc.	T	F
28	Sometimes people think I'm a bit weird because my ideas are so novel	T	F
29	When listening to organ music or other powerful music, I sometimes feel as if I'm being lifted up into the air	T	F

Please continue overleaf. . .

Emotional Creativity Inventory
(Averill, 1999)

This questionnaire contains 30 items concerning the way you think, feel, and react in a variety of situations, and your opinions on a variety of issues. Please read each statement carefully. Be particularly careful when responding to negatively worded statements (e.g., "I do not like working alone"), for they can be especially confusing. If a statement seems confusing to you, it may be helpful to prefix it with the phrase, "Compared to the average person . . . " Then, indicate your degree of agreement or disagreement.

	Compared to the average person	Much less	Some what less	About the same	Some what more	Much more
1.	My emotional reactions are different and unique.	1	2	3	4	5
2.	When I have strong emotional reactions, I search for reasons or my feelings.	1	2	3	4	5
3.	I try to be honest about my emotional reactions, even when it causes me problems.	1	2	3	4	5
4.	I respond well in situations that call for new and unusual emotional responses.	1	2	3	4	5
5.	I believe that people should work on their emotional development as hard as they work on their intellectual development.	1	2	3	4	5
6.	I can imagine myself being lonely, angry, and joyful, all at the same time.	1	2	3	4	5
7.	I think about and try to understand my emotional reactions.	1	2	3	4	5
8.	I sometimes experience feelings and emotions that cannot be easily described in ordinary language.	1	2	3	4	5
9.	I am good at expressing my emotions.	1	2	3	4	5
10.	I have felt combinations of emotions that other people probably have never experienced.	1	2	3	4	5
11.	I am not particularly interested in the emotional aspects of my life.	1	2	3	4	5
12.	The way I experience and express my emotions helps me in my relationships with others.	1	2	3	4	5
13.	My emotions are almost always an authentic expression of my true thoughts and feelings.	1	2	3	4	5
14.	I like music, dance, and paintings that arouse new and unusual emotional reactions.	1	2	3	4	5
15.	I think about past emotional experiences to help me cope with current emotional problems.	1	2	3	4	5
16.	I have emotional experiences that would be considered unusual or out of the ordinary.	1	2	3	4	5
17.	My emotions help me achieve my goals in life.	1	2	3	4	5
18.	When in emotional situations, I tend to respond in a unique manner.	1	2	3	4	5
19.	I like to imagine situations that call for unusual, uncommon, or unconventional emotional reactions.	1	2	3	4	5
20.	After an intensely emotional experience, I try to step back and examine my reactions objectively.	1	2	3	4	5
21.	When responding emotionally, I can be quite inventive and innovative.	1	2	3	4	5
22.	My outward emotional reactions accurately reflect my inner feelings.	1	2	3	4	5

Please continue overleaf . . .

	Compared to the average person	Much less	Somew hat less	About the same	Somew hat more	Much more
23.	I would have to be a poet or novelist to describe the kinds of emotions I sometimes feel, they are so unique.	1	2	3	4	5
24.	I can experience a variety of different emotions at the same time.	1	2	3	4	5
25.	My emotions are a major source of meaning in my life; without them, my life would lack significance.	1	2	3	4	5
26.	I prefer movies and books that depict complex and improbable emotional situations.	1	2	3	4	5
27.	I pay attention to other people's emotions so that I can better understand my own feelings.	1	2	3	4	5
28.	The range and diversity of my emotional reactions sometimes exceed my ability to describe how I feel.	1	2	3	4	5
29.	I try to disguise and hide my emotions.	1	2	3	4	5
30.	I am able to experience a large number of different emotions.	1	2	3	4	5

Activity One: Remoteness of Associations

(Holt 2002)

As quickly as you can, please write down a word which you associate with each of those listed below. Please try to make your associations as <u>unusual</u> but as clearly <u>relevant</u> as you can

Foot _____

Symbol _____

Boat _____

Mind _____

Yellow _____

Idea _____

Apple _____

Time _____

Sky _____

Command _____

Please continue overleaf . . .

The Adjective Checklist
(Gough, 1979; Domino, 1970)

This answer sheet contains a list of adjectives. Please read them quickly and mark those that describe you as you really are. Do not worry about duplications or contradictions. Skip any adjectives that you may not know the definition of.

Absentminded	☐	Independent	☐
Active	☐	Individualistic	☐
Adaptable	☐	Industrious	☐
Adventurous	☐	Informal	☐
Affected	☐	Ingenious	☐
Alert	☐	Insightful	☐
Aloof	☐	Intelligent	☐
Ambitious	☐	Interests narrow	☐
Argumentative	☐	Interests wide	☐
Artistic	☐	Intolerant	☐
Assertive	☐	Inventive	☐
Autocratic	☐	Logical	☐
Capable	☐	Mannerly	☐
Careless	☐	Moody	☐
Cautious	☐	Original	☐
Clear-thinking	☐	Outspoken	☐
Clever	☐	Quick	☐
Commonplace	☐	Rational	☐
Complicated	☐	Rebellious	☐
Confident	☐	Reflective	☐
Conservative	☐	Reserved	☐
Conventional	☐	Resourceful	☐
Curious	☐	Restless	☐
Cynical	☐	Sarcastic	☐
Demanding	☐	Self-centred	☐
Disorderly	☐	Self-confident	☐
Dissatisfied	☐	Sensitive	☐
Distractible	☐	Serious	☐
Egotistical	☐	Sexy	☐
Energetic	☐	Sharp-witted	☐
Enthusiastic	☐	Sincere	☐
Honest	☐	Snobbish	☐
Humorous	☐	Spontaneous	☐
Hurried	☐	Submissive	☐
Idealistic	☐	Suspicious	☐
Imaginative	☐	Tactless	☐
Impulsive	☐	Unconventional	☐

Please continue overleaf . . .

The Creative Cognition Inventory
(Holt, 2002)

To what extent are the following experiences important to your creativity?

Please respond from '0' indicating 'not at all important' to '4' indicating 'extremely important'

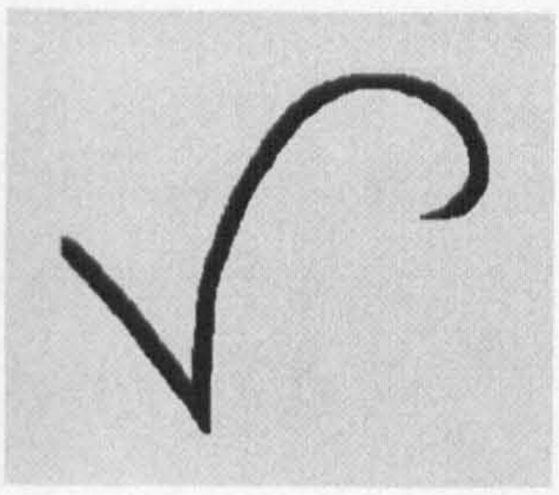
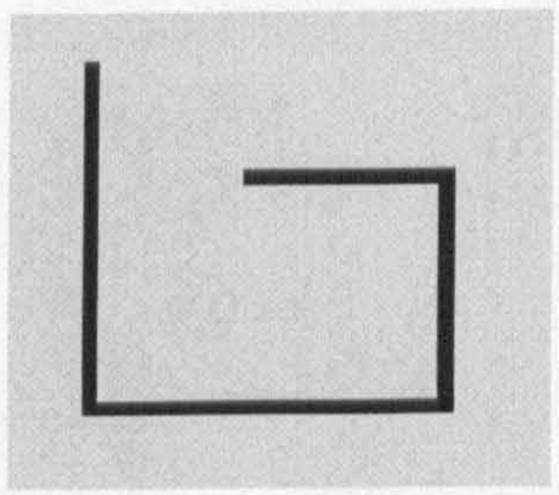
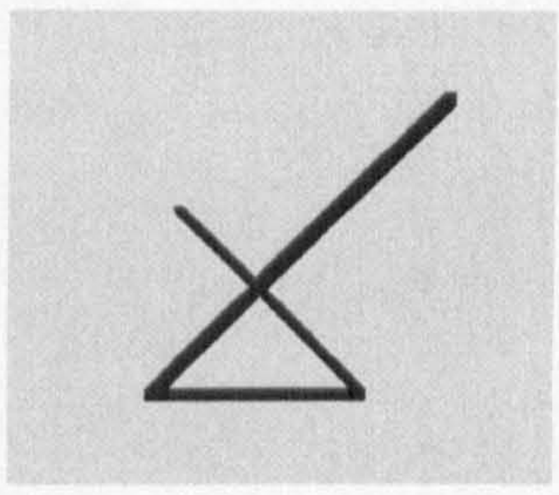
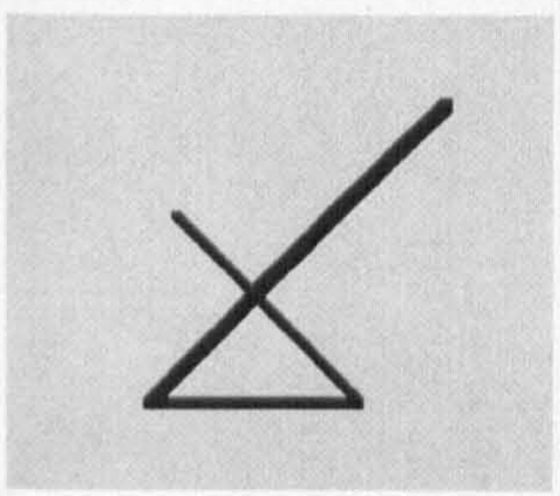
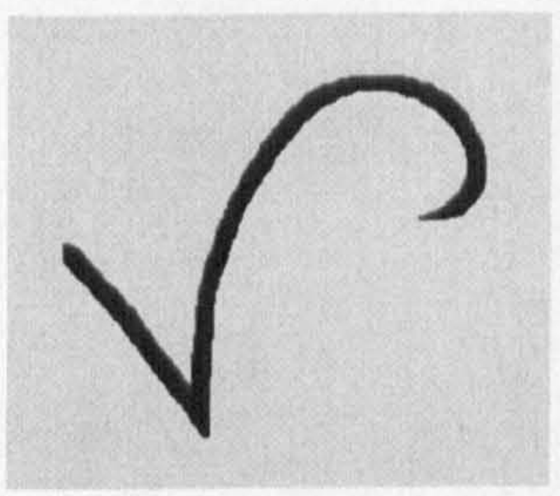
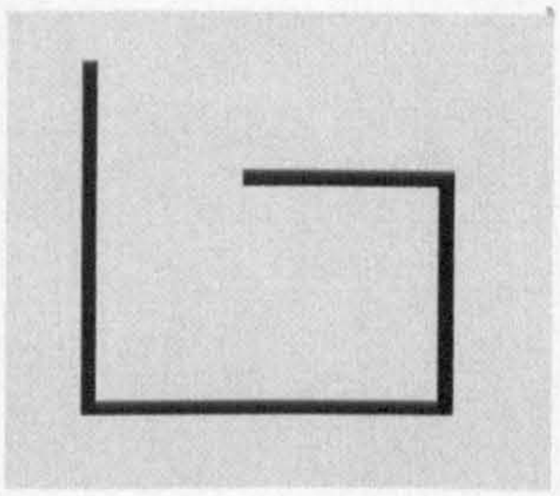
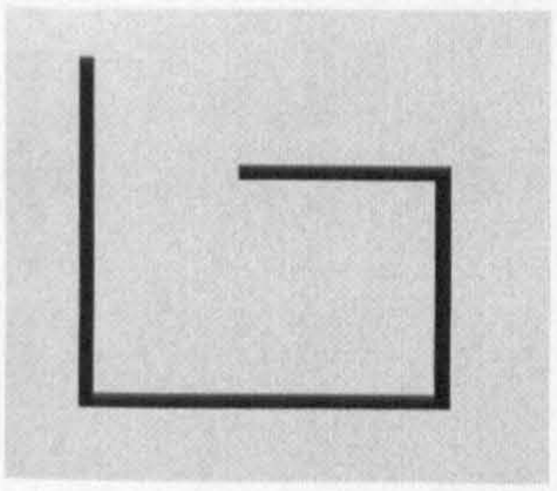
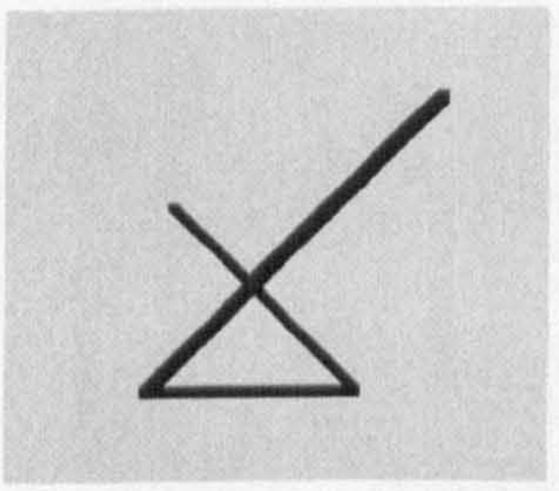
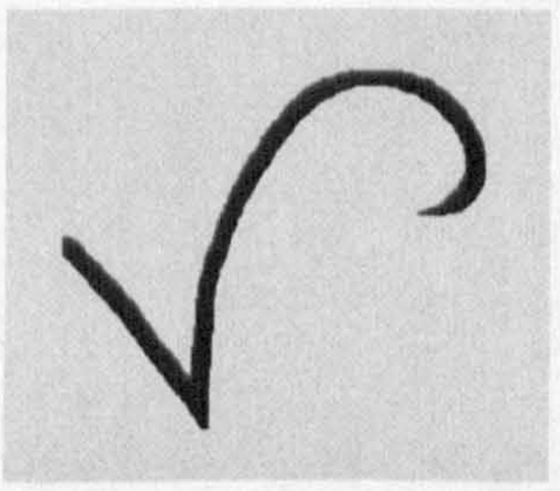
1.	Making discoveries through trial and error	0	1	2	3	4
2.	Trusting hunches or instincts	0	1	2	3	4
3.	Ideas arising whilst dreaming	0	1	2	3	4
4.	Methodical and systematic problem solving	0	1	2	3	4
5.	Sudden moments of inspiration in waking life	0	1	2	3	4
6.	Rational, logical thought	0	1	2	3	4
7.	A sense of communicating with a deeper sense of self	0	1	2	3	4
8.	The careful selection of ideas	0	1	2	3	4
9.	Loose, playful, unconstrained thinking	0	1	2	3	4
10.	Following your intuition	0	1	2	3	4
11.	Ideas arising as falling asleep or waking up	0	1	2	3	4
12.	Meditation	0	1	2	3	4
13.	Paying attention to visual imagery	0	1	2	3	4
14.	Experiences of losing track of time when involved in creative work	0	1	2	3	4
15.	Playing with ideas	0	1	2	3	4
16.	Luck, chance, 'fortunate accidents'	0	1	2	3	4
17.	The use of analogy	0	1	2	3	4
18.	A sense of purpose that seems to come from beyond the self	0	1	2	3	4
19.	Recombining existing elements in new ways	0	1	2	3	4
20.	Working with a set goal or outcome in mind	0	1	2	3	4
21.	A sense of channelling information	0	1	2	3	4
22.	Paying attention to auditory impressions	0	1	2	3	4
23.	Day dreaming	0	1	2	3	4
24.	The release of negative emotions	0	1	2	3	4
25.	Non-verbal modes of thinking	0	1	2	3	4
26.	Positive emotions, e.g. joy, excitement, euphoria	0	1	2	3	4
27.	Paying attention to bodily feelings	0	1	2	3	4
28.	A sense of communicating with something other	0	1	2	3	4
29.	A sense of being in tune with nature or the universe	0	1	2	3	4

Note: *if the word 'idea' used in some of the questions above, seems inappropriate, please replace with a word more fitting for the context of your creative endeavours, such as image, form, music, solution, poem, formula, problem. . . . . .*

Please continue overleaf . . .

Activity Three: Shapes
(Holt, 2002)

Please see how many objects or pictures you can make from the shapes below by drawing on them. Try to think of as many things as you can that no one else will think of and give names of titles to the objects you create.

Assessment Schedule for Altered States of Consciousness

(Van Quekelberghe, Alstotter-Gleich & Hertweck, 1991)

This questionnaire is an attempt to examine the subject of altered states of consciousness in a scientific manner. The assessment system serves as a tool for investigating the incidence of various states of consciousness and life experiences, some of which may be labelled as extraordinary. Certain spheres of consciousness or types of experience addressed in this questionnaire may concern issues that one does not usually talk about. A number of items may even be labelled "pathological". The aim is to eliminate the disrepute such experiences may have and to make an unprejudiced, scientific approach possible.

The following statements describe certain occurrences, abilities or states of consciousness which you have perhaps experienced in the way described or in a similar fashion in the course of your life. These may have taken place a long time ago, for example during your childhood, or may have occurred recently. For each of the following statements please indicate the extent to which it applies to you by checking the appropriate box.

		Not at all	Just a little	To some extent	To a large extent	Comp-letely
1.	I have had experiences which seemed so strange to me that I either kept them to myself or disclosed them only to very close friends	0	1	2	3	4
2.	At times I am amazed at how sure I am that certain things will happen which ultimately come true	0	1	2	3	4
3.	Things or events which were absolutely real seemed like dreams or fantasies to me	0	1	2	3	4
4.	I have had the feeling as if I were experiencing everything from behind a curtain, without being able to partake actively	0	1	2	3	4
5.	Suddenly I had the urge to carry out certain actions which I subsequently found difficult to stop	0	1	2	3	4
6.	Once in a while I have the feeling that my thoughts would come true in the near future	0	1	2	3	4
7.	My thoughts changed so rapidly that I hardly had any control over them	0	1	2	3	4
8.	I have loved persons or animals so fervently that I could no longer discern a boundary between them and myself	0	1	2	3	4
9.	While experiencing something for the first time in my life, I had the feeling of having lived through this situation before	0	1	2	3	4
10.	Sometimes I see something for the first time and although I do not know anything about it, it still appears completely familiar to me	0	1	2	3	4
11.	I have dreamt about something which really came true at a later date	0	1	2	3	4
12.	I have been successful in influencing a person to do something or in preventing him/her from doing something, exactly as I wanted, just by concentrating on this person intensely	0	1	2	3	4
13.	Sometimes I feel a strange tension in my body, which serves as a kind of warning signal for a dangerous situation	0	1	2	3	4
14.	I have experienced the ability to transmit thoughts, feelings or certain symbols across a great distance to a person close to me by the power of thought alone	0	1	2	3	4
15.	Sometimes I am able to perceive an aura around another person	0	1	2	3	4
16.	I have explicitly pursued the intention of establishing contact with deceased persons	0	1	2	3	4

Please continue overleaf

		Not at all	Just a little	To some extent	To a large extent	Comp-letely
17.	I have seen UFOs flying through the air	0	1	2	3	4
18.	I have been cured by a spiritual healer or healed someone myself	0	1	2	3	4
19.	A detailed horoscope applied quite well to my individual case	0	1	2	3	4
20.	Sometimes I happen to read a horoscope that gives me important tips for the near future	0	1	2	3	4
21.	I try to protect myself against black magic practised by others	0	1	2	3	4
22.	When confronted with certain issues important to me, I try to find an answer by using a pendulum	0	1	2	3	4
23.	During a séance I have experienced that tables and glasses really move	0	1	2	3	4
24.	I felt so at one with nature that my own death seemed unimportant to me	0	1	2	3	4
25.	I had the feeling of having acquired a deep understanding of the things happening around me	0	1	2	3	4
26.	Time appeared to stand still; moments seemed like an eternity to me	0	1	2	3	4
27.	I had the feeling that neither contradictions nor conflicts existed any longer	0	1	2	3	4
28.	Everything I experienced was perfect; nothing seemed to be superfluous	0	1	2	3	4
29.	My joy seemed boundless	0	1	2	3	4
30.	Everything seemed to merge together easily, freely moving and flowing	0	1	2	3	4
31.	I was full of intensive feelings of surrender for all creatures	0	1	2	3	4
32.	I stopped making comparisons and differentiations	0	1	2	3	4
33.	I felt united with the whole universe	0	1	2	3	4
34.	I have had the feeling of being in contact with “infinity”	0	1	2	3	4
35.	I was so tormented by visions of horror that I felt my life was at stake	0	1	2	3	4
36.	For a while I was filled with a fear of dying which seized me completely	0	1	2	3	4
37.	I was completely occupied with concrete thoughts of suicide	0	1	2	3	4
38.	My whole life seemed a pointless tragedy	0	1	2	3	4
39.	It was as if I were in a dark tunnel, without being able to perceive a thread of light	0	1	2	3	4
40.	To me everything seemed absurd and lifeless	0	1	2	3	4
41.	I felt an aggressive surge of power arising from within myself, capable of destroying everything	0	1	2	3	4
42.	Somehow or other I felt myself capable of committing the most terrible deeds	0	1	2	3	4
43.	At times I believed I had gone mad	0	1	2	3	4
44.	I have had the feeling that my self was disintegrating, that I was losing my “ego”	0	1	2	3	4
45.	I have had an experience as though my thoughts and feelings were walking on a tightrope. I felt the need to take care not to fall down or lose contact with myself	0	1	2	3	4
46.	I have had the feeling that I was going to be completely smattered, destroyed and annihilated	0	1	2	3	4
47.	I have observed that my thoughts and feelings constantly went around in circles and I was afraid of going insane	0	1	2	3	4
48.	I have had the feeling that somehow my thoughts were detached from the rest of me and that I could lose control over myself	0	1	2	3	4
49.	I have had a lively imagination since my childhood	0	1	2	3	4
50.	I have no trouble in forming true-to-life mental images of past situations	0	1	2	3	4

Please continue overleaf .

		Not at all	Just a little	To some extent	To a large extent	Comp-letely
51.	It's easy for me to imagine the faces of friends or relatives	0	1	2	3	4
52.	It's easy for me to imagine the exact taste of an orange or a banana	0	1	2	3	4
53.	Once in a while I notice that I am in the middle of a daydream	0	1	2	3	4
54.	I pay attention to my dreams	0	1	2	3	4
55.	I wrote down my dreams for a period of time	0	1	2	3	4
56.	I can vividly recall dreams I had during my childhood	0	1	2	3	4
57.	I have had similar dreams occurring over and over again	0	1	2	3	4
58.	In not quite a conscious manner I have thought about the meaning of a dream while dreaming it	0	1	2	3	4
59.	I often experience hypnagogic imagery (dream like imagery while falling asleep)	0	1	2	3	4
60.	I have had sexual dreams which were so intensive that they could hardly be distinguished from real sexual feelings	0	1	2	3	4
61.	A being with a celestial aura I had never seen before appeared to me in a dream	0	1	2	3	4
62.	In a dream I have dissolved or transformed myself into light	0	1	2	3	4
63.	I am able to concentrate so intensely on a task that nothing can distract me	0	1	2	3	4
64.	I can relax myself completely if I want to	0	1	2	3	4
65.	When pursuing boring activities it doesn't take long for me to sink into a state of consciousness somewhere between sleeping and waking	0	1	2	3	4
66.	If I close my eyes and relax myself for a short while, it doesn't take long for me to be able to concentrate completely on my inner world	0	1	2	3	4
67.	Somebody made such an impression on me that I acted and felt just like this person	0	1	2	3	4
68.	Sometimes I am so sunken in thought that I can't remember what other people told me	0	1	2	3	4
69.	Once, while thinking about my childhood, I distinctly felt my body or parts of it shrinking	0	1	2	3	4
70.	Sometimes I have the feeling as if inanimate objects have some kind of inner life	0	1	2	3	4
71.	Everything I looked at was much more colourful than usual	0	1	2	3	4
72.	Everything I experienced, heard or saw had a much higher significance for me than it usually had	0	1	2	3	4
73.	I have experienced an inner voice commanding me to do something or to stop doing something	0	1	2	3	4
74.	After a great strain, a sleepless night or taking drugs I have seen objects, animals or persons before me which were not present in reality	0	1	2	3	4
75.	I have had the feeling of a deceased person being somewhere around me	0	1	2	3	4
76.	Once in a while I have had the impression that a strange force would like to seize me	0	1	2	3	4
77.	I perceived voices although nobody was around me	0	1	2	3	4
78.	Sometimes my thoughts appear as real to me as actual events	0	1	2	3	4
79.	Although nobody is present, I sometimes see the faces of another person in front of me	0	1	2	3	4
80.	I had the impression that other persons were able to influence my thoughts or feelings	0	1	2	3	4
81.	Once a radiant figure floating towards me gave me an electric shock	0	1	2	3	4
82.	Occasionally I can feel my body vibrating in the rhythm of my pulse	0	1	2	3	4
83.	Sometimes I am overly sensitive to minimal noises	0	1	2	3	4

Please continue overleaf . . .

		Not at all	Just a little	To some extent	To a large extent	Comp-letely
84.	The facial expression and gestures of other persons have made such an impression on me that I immediately knew what their intentions, thoughts or feelings were	0	1	2	3	4
85.	For a while I was convinced of being able to detect hardly discernible odours as dogs and other animals do	0	1	2	3	4
86.	I had the feeling that I was seeing the individual notes of a tune in bright colours	0	1	2	3	4
87.	When sounds became louder, colours appeared brighter to me	0	1	2	3	4
88.	I have had the experience as if I were floating, so to speak, above my own body	0	1	2	3	4
89.	I have often been so concentrated on my task that afterwards I believed time had stood still	0	1	2	3	4
90.	It felt as if everyday events were taking place in slow motion	0	1	2	3	4
91.	Within the span of a few minutes so many thoughts and images came to my mind that I had the feeling that half an hour or more had passed	0	1	2	3	4
92.	I have experienced time almost standing still	0	1	2	3	4
93.	My body felt so hot as if it were ready to burn up	0	1	2	3	4
94.	My body felt so cold as if it were about to grow completely stiff	0	1	2	3	4
95.	Objects seemed to change their shapes constantly	0	1	2	3	4
96.	I had the feeling that my body had shrunk	0	1	2	3	4
97.	My body felt much bigger and larger than usual	0	1	2	3	4

Please continue overleaf . . .

Shortened Ego Strength Scale
(Barron, 1968)

Please respond the statements below by circling the appropriate response, where 'T' indicates true and 'F' indicates false.

1.	During the past few years I have been well most of the time	T	F
2.	I am in just as good physical health as most of my friends	T	F
3.	I have never had a fainting spell	T	F
4.	I feel weak all over much of the time	T	F
5.	My hands have not become clumsy or awkward	T	F
6.	I have a cough most of the time	T	F
7.	I have a good appetite	T	F
8.	I have diarrhoea once a month or more	T	F
9.	At times I hear so well it bothers me	T	F
10.	I seldom worry about my health	T	F
11.	My sleep is fitful and disturbed	T	F
12.	I feel unable to tell anyone all about myself	T	F
13.	I feel sympathetic towards people who tend to hang on to their grief's and troubles	T	F
14.	I brood a great deal	T	F
15.	I frequently find myself worrying about something	T	F
16.	I have met problems so full of possibilities that I have been unable to make up my mind about them	T	F
17.	I get mad easily and then get over it soon	T	F
18.	When I leave home, I do not worry about whether the door is locked and the windows closed	T	F
19.	Sometimes some unimportant thought will run through my mind and bother me for days	T	F
20.	Often I cross the street not to meet someone I see	T	F
21.	I dream frequently about things that are best kept to myself	T	F
22.	I have had very peculiar and strange experiences	T	F
23.	I have strange and peculiar thoughts	T	F
24.	I have had blank spells in which my activities were interrupted and I did not know what was going on around me	T	F
25.	When I am with people, I am bothered by hearing very queer things	T	F
26.	At times I have fits of laughing and crying that I cannot control	T	F
27.	I have had no difficulties in keeping my balance in walking	T	F
28.	Parts of my body often have sensations like burning, tingling, crawling, or like "going to sleep"	T	F
29.	My skin seems to be unusually sensitive to touch	T	F
30.	My plans have often seemed so full of difficulties that I have had to give them up	T	F
31.	I am easily downed in an argument	T	F
32.	I find it hard to keep my mind on a task or job	T	F
33.	My way of doing things is apt to be misunderstood by others	T	F
34.	I sometimes feel that I am about to go to pieces	T	F
35.	I feel tired a good deal of the time	T	F
36.	If I were an artist, I would like to draw flowers	T	F
37.	If I were an artist, I would like to draw children	T	F
38.	I like collecting flowers or growing house plants	T	F
39.	I like to cook	T	F
40.	When someone says silly or ignorant things about something I know, I try to set him right	T	F
41.	I am not afraid of fire	T	F
42.	I am made nervous by certain animals	T	F
43.	Dirt frightens or disgusts me	T	F
44.	I am afraid of finding myself in a closet or small closed place	T	F
45.	I have often been frightened in the middle of the night	T	F

Please continue overleaf...

Boundary Questionnaire
(Kunzendorf & Hartmann, 1997)

Please rate each of the statements from 0 to 4 (0 indicates "not at all true of me"; 4 indicates "very true of me"). Try to respond to all of the statements as quickly as you can.

1.	My feelings blend into one another	0	1	2	3	4
2.	I am very close to my childhood feelings	0	1	2	3	4
3.	I am easily hurt	0	1	2	3	4
4.	I spend a lot of time daydreaming, fantasizing or in reverie	0	1	2	3	4
5.	I like stories that have a definite beginning, middle and end	0	1	2	3	4
6.	A good organization is one in which all the lines of responsibility are precise and clearly established	0	1	2	3	4
7.	There is a place for everything, and everything should be in its place	0	1	2	3	4
8.	Sometimes its scary when one gets too involved with another person	0	1	2	3	4
9.	A good parent has to be a bit of a child too	0	1	2	3	4
10.	I can easily imagine what it might be like to be an animal	0	1	2	3	4
11.	When something happens to a friend of mine or to a lover, it is almost as if it happened to me	0	1	2	3	4
12.	When I work on a project, I don't like to tie myself down to a definite outline. I rather like to let my mind wander.	0	1	2	3	4
13.	In my dreams, people sometimes merge into each other or become other people	0	1	2	3	4
14.	I believe I am influenced by forces that no one can understand	0	1	2	3	4
15.	There are no sharp dividing lines between normal people, people with problems and people who are considered psychotic or crazy	0	1	2	3	4
16.	I am a down-to-earth no-nonsense kind of person	0	1	2	3	4
17.	I think I would enjoy being some kind of creative artist	0	1	2	3	4
18.	I have had the experience of someone calling me or speaking my name and not being sure whether it was really happening to me or whether I was imagining it.	0	1	2	3	4

Creative Activities and Interests Checklist
(Griffin & McDermott, 1998; Holt, 2002)

*Please tick those of the following in which you have an **active personal interest**:*

The painting of pictures ☐
The drawing of pictures ☐
The making of sculpture ☐
The taking of artistic photographs ☐
The making of useful or decorative objects ☐
The renovation of old or antique objects ☐

Participating in drama production ☐
Performing in a play ☐
Performing in a band ☐
Performing in an orchestra ☐
Performing in dance ☐
Performing in comedy ☐
Going busking ☐
Participating in video production ☐

Recording music ☐
Writing music ☐
Writing poetry ☐
Writing plays ☐
Writing short stories ☐
Writing magazine articles ☐
Writing journal articles ☐

Interior decorating ☐
Exterior decorating ☐
Inventing new recipes ☐
Making clothes ☐
Growing or gardening ☐

The construction of scientific or technical objects ☐
The invention of scientific or technical objects ☐
The development of scientific experimental designs ☐
Presenting scientific or mathematical papers ☐
Entering projects or papers into a science contest ☐
Applying maths in an original way to solve a practical problem ☐
Writing an original computer program ☐

*Please tick those of the following you have **done in the last 12 months**:*

Completed a painting ☐
Completed a drawing ☐
Completed a sculpture ☐
Completed some photographic art ☐
Made a useful or decorative object ☐
Renovated an old or antique object ☐

Been actively involved in the production of drama ☐
Performed in a play ☐
Performed in a band ☐
Performed in an orchestra ☐
Performed in dance ☐
Performed in comedy ☐
Gone busking ☐
Been actively involved in the production of a video ☐

Recorded music ☐
Written music ☐

Please continue overleaf . . .

Written poetry ☐
Written plays ☐
Written short stories ☐
Written magazine articles ☐
Written journal articles ☐
In the last 12 months how many of these have you had published? ☐

Interior decorating ☐
Exterior decorating ☐
Invented new recipes or recipe ☐
Made clothes ☐
Created a garden or part of a garden ☐

Constructed something that required scientific knowledge
e.g. a radio, telescope, scientific apparatus etc. ☐
Invented a technical or scientific object ☐
Presented an original maths or science paper ☐
Developed a design for a scientific experiment ☐
Entered a project or paper into a science contest ☐
Applied maths in an original way to solve a practical problem ☐
Written an original computer program ☐

Please list any other creative things that you have done in the last 12 months

Thank you very much for participating in this study!

Please return your responses in the SAE provided

If you would like further information about the topic, of creativity, have any questions about this study or would like to inquire about future studies, please feel free to contact me:

Nicola Holt: Psychology Department, University College Northampton, Park Campus, Boughton Green Road, Northampton, NN2 7AL. Tel: 01604 735500, ext. 2485 Email: Nicola.holt@northampton.ac.uk

APPENDIX 6.3

Screening the data of Study Two

A.6.3.1 Accuracy

The minimum and maximum scores (as recorded in *Tables A.6.1* and *A.6.2*) were checked to see if they fitted into the 'correct range', to check that no large input errors were inflating any scores. All scores fit into the expected ranges, and means and standard deviations seemed plausible.

Table A.6.3.1

Descriptive data for the creativity scales

	Self-perceived creativity	Involvement in creative practice	Academic writing	Artistic writing	Visual art	Performance arts	Music	Domestic	Science	Heightened internal awareness	Intuition
N	210	209	208	208	209	209	208	208	208	204	204
Missing	1	2	3	3	2	2	3	3	3	7	7
Mean	5.06	5.33	1.06	1.29	3.17	1.14	.83	3.64	1.54	21.70	12.07
Median	5.00	6.00	.00	.50	2.00	.00	.00	3.00	.00	23.00	12.00
Std. Deviation	1.49	1.58	1.35	1.67	2.89	1.88	1.61	2.97	2.65	10.56	2.95
Skewness (S)	-.53	-.74	.95	1.23	.79	2.33	2.12	.84	2.29	-.05	-.62
Std. Error of Skewness (S_s)	.17	.17	.17	.17	.17	.17	.17	.17	.17	.17	.17
Z[1]	-3.12	-4.35	5.59	7.24	4.64	13.7	12.35	4.94	13.47	0.29	-3.65
Kurtosis (K)	-.31	-.37	-.44	.92	-.20	6.22	3.66	.03	5.48	-.74	-.00
Std. Error of Kurtosis (K_s)	.33	.34	.34	.34	.34	.34	.34	.34	.34	.34	.34
Z^2	-.94	-1.01	-1.29	2.71	-.59	18.29	10.76	.09	16.12	-2.18	0
Minimum	1.00	1.00	.00	.00	.00	.00	.00	.00	.00	.00	3.00
Maximum	7.00	7.00	4.00	8.00	12.00	10.00	7.00	13.00	14.00	43.00	16.00
Correct range	1-7	1-7	0-4	0-11	0-12	0-11	0-9	0-13	0-15	0-44	0-16

	Linear	Playful	Analogy	Oneiric	Emotional creativity	Remoteness of associations	Creative personality (Gough)	Flexibility	Drawing across the boundary	Originality
N	204	204	204	204	206	200	210	168	168	168
Missing	7	7	7	7	5	11	1	43	43	42
Mean	10.38	7.87	7.25	6.94	100.17	39.41	5.65	7.26	3.47	33.65
Median	11.00	8.00	7.00	7.00	100.00	40.00	6.00	8.00	3.00	35.00
Std. Deviation	3.22	2.75	2.67	3.15	16.37	8.24	4.08	1.92	2.80	10.03
Skewness (S)	-.55	-.37	-.27	-.18	-.17	-.16	-.20	-1.10	.39	-.59
Std. Error of Skewness (S_s)	.17	.17	.17	.17	.17	.17	.17	.19	.21	.19
Z	-3.26	-2.18	-1.59	-1.06	-.94	-.23	-1.18	-5.79	1.86	-3.11
Kurtosis (K)	.16	-.61	-.32	-.82	.30	-.49	-.55	.53	-.88	-.02
Std. Error of Kurtosis (K_s)	.34	.34	.34	.34	.34	.34	.33	.37	.41	.37
Z	.47	1.79	-.94	-2.41	.88	-1.44	-1.67	1.43	-2.15	-.05
Minimum	1.00	.00	.00	.00	53.00	19.00	-5.00	1.00	.00	6
Maximum	16.00	12.00	12.00	12.00	145.00	59.00	14.00	9.00	9.00	53.00
Correct range	0-16	0-12	0-12	0-12	30-150	10-60	-12-18	1-9	0-9	6-63

[1] Z-score for skewness, the degree to which the skewness statistic deviates from zero (z=S-0/Ss).
[2] Z-score for kurtosis, the degree to which the kurtosis statistic deviates from zero (z=K-0/Ks).

Table A.6.2

Descriptive data for the ASC and ego-strength scales

	Extraordinary mental processes	Parapsychological experiences	Esoterics	Positive mystical experiences	Negative mystical experiences	Imagination	Dissociation	Dreams
N	211	210	209	209	209	210	209	209
Missing	0	1	2	2	2	1	2	2
Mean	11.87	8.87	5.25	14.04	12.20	12.93	10.76	13.42
Median	11.00	8.00	3.00	12.00	8.00	13.00	11.00	13.00
Std. Deviation	6.56	5.39	5.53	11.58	12.84	4.22	4.98	7.78
Skewness	.49	.61	1.22	.79	1.43	-.35	.28	.34
Std. Error of Skewness	.17	.17	.17	.17	.17	.17	.17	.17
Z	2.88	3.59	7.18	4.65	8.41	-2.06	1.65	2.00
Kurtosis	-.06	-.25	.64	-.30	1.40	-.38	.14	-.38
Std. Error of Kurtosis	.33	.33	.34	.34	.34	.35	.34	.34
Z	-.18	-6.06	-.98	-.88	4.12	-1.09	.41	-1.12
Minimum	.00	.00	.00	.00	.00	2.00	.00	.00
Maximum	32.00	24.00	22.00	44.00	56.00	20.00	26.00	35.00
Correct range	0-32	0-24	0-36	0-44	0-56	0-20	0-27	0-36

	Hallucinations	Hypersensitivity	Changed feelings of time and space	Total score on the ASASC	Ego strength	Boundary Questionnaire	Transliminality score
N	208	208	208	208	204	210	209
missing	3	3	3	3	7	1	2
Mean	11.27	5.49	9.45	115.40	27.49	34.21	13.56
Median	9.00	4.00	8.00	106.00	28.00	35.00	14.00
Std. Deviation	9.31	4.45	7.64	59.64	6.02	10.84	6.37
Skewness	1.12	1.23	1.33	.77	-.57	.07	-.07
Std. Error of Skewness	.17	.17	.17	.17	.17	.17	.17
Z	6.59	7.24	7.83	1.1	-3.35	.41	-.41
Kurtosis	1.05	1.75	1.81	.42	-.28	-.24	-.79
Std. Error of Kurtosis	.34	.34	.34	.34	.34	.33	.34
Z	3.06	5.15	5.32	1.24	-.82	-.73	-2.32
Minimum	.00	.00	.00	4.00	12.00	9.00	.00
Maximum	43.00	24.00	37.00	303.00	39.00	62.00	28.00
Correct range	0-48	0-24	0-40	0-388	0-41	0-72	0-29

A.6.1.2 Missing values

It was checked that missing values were coded correctly. If more than two missing values in a scale or sub-scale existed, this measure was not used for that participant. Otherwise, for dichotomous scales a midpoint value was input (0.5) and for Likert response scales the average response for the overall sub-scale was input. If the question was a single question, not part of a sub-scale, then this was left as 'missing' and not included in further analyses. Clearly for the

remoteness of associations task and the figural divergent thinking tasks some missing values are expected as this constitutes degree of cognitive 'fluency' and are scored as a 'zero'.

Missing data were at low levels, apart from for the figural divergent thinking task (N = 43). Sometimes this task was left blank, on occasions this was because individuals returned the questionnaire by email rather than by post (N = 7). Two people wrote on the form that they could not complete this task because they found it difficult to visualize and hence to associate the shapes with objects or images. Because of the high degree of missing data for the figural divergent thinking variables, a missing value analysis was performed, creating a dummy variable with two levels: 'figural task completed' and 'figural task not completed'. Due to the non-normal distribution for some data (particularly involvement in particular creative domains and some altered states) two sets of non-parametric tests of difference (Mann-Whitney) were carried out with independent variables being: a) figural divergent thinking task completed (N = 168) versus task not completed (N = 43).

Table A.6.3 shows the test-statistics and significance values (two-tailed) for the difference between those who did and did not complete the figural divergent thinking test across all the other variables. None of these reached significance, although there was a trend (z=-1.74, p=.08, 2-t) for those who did not complete the task to report using less 'loose, playful, absorbed' cognition in the creative process.

Table A.6.3

Mann-Whitney test for figural DT task completed versus not completed with creativity, demographics and ASCs as dependent variables

	Gender	Age	How creative?	Imp of creative involvement	Writing academic	Writing artistic	Visual art	Performance art	Music	Domestic crafts	Science
Z	-1.10	-.90	-.19	-.39	-1.05	-1.50	-.66	-.66	-1.53	-.524	-.848
Sig. (2-t)	.27	.37	.85	.70	.29	.13	.51	.51	.13	.60	.40

	Emotional creativity	Remoteness of associations	Heightened internal awareness	Intuition	Linear	Playful	Analogy	Oneiric	Creative personality	Extraordinary mental processes
Z	-.77	-1.01	-.10	-.52	-1.24	-1.74	-1.63	.52	-.53	-.42
Sig. (2-t)	.44	.31	.32	.61	.22	.08	.10	.60	.60	.67

	Parapsychological experiences	Esoterics	Positive mystical experiences	Negative mystical experiences	Imagination	Dreams	Dissociation	Hallucinations
Z	-1.61	-.74	-.12	-1.02	-.63	-1.01	-.08	-.08
Sig. (2-t)	.11	.46	.89	.31	.53	.28	.94	.94

	Hypersensitivity	Changed feelings of time and space	Total score on the ASASC	Ego strength	Boundary Questionnaire	Transliminality score
Z	-.88	-.66	-.02	-.40	-1.09	-.34
Sig. (2-t)	.38	.51	.98	.69	.27	.74

From this missing value analysis it was concluded that there were no significant differences between those who did and those who did not take part in the figural divergent thinking test, especially when taking corrections for multiple analysis into account (where the significance level would have to be below .008 (.05/62, using the Bonferroni method) to be confident that a

type I error had not taken place). The missing values appeared to be scattered randomly throughout the data. In light of this it was decided to replace missing values for divergent thinking with the 'mean value' in the principal components analysis, rather than sacrificing large amounts of valuable data.

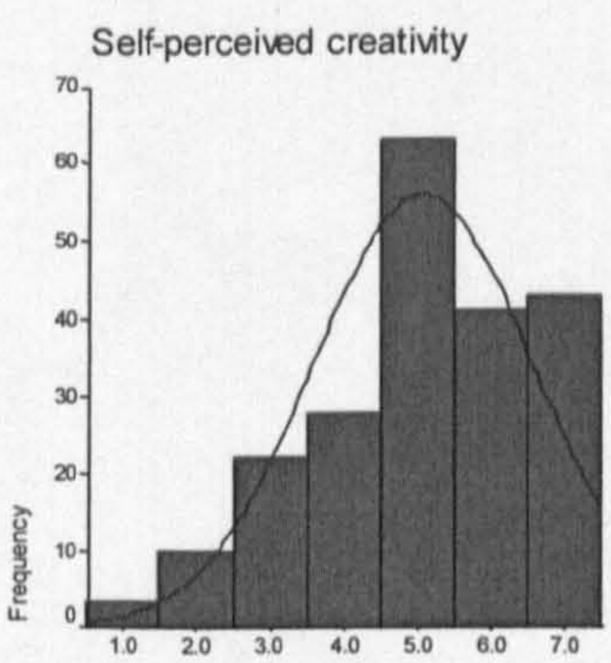
A.6.1.3 Honest correlations

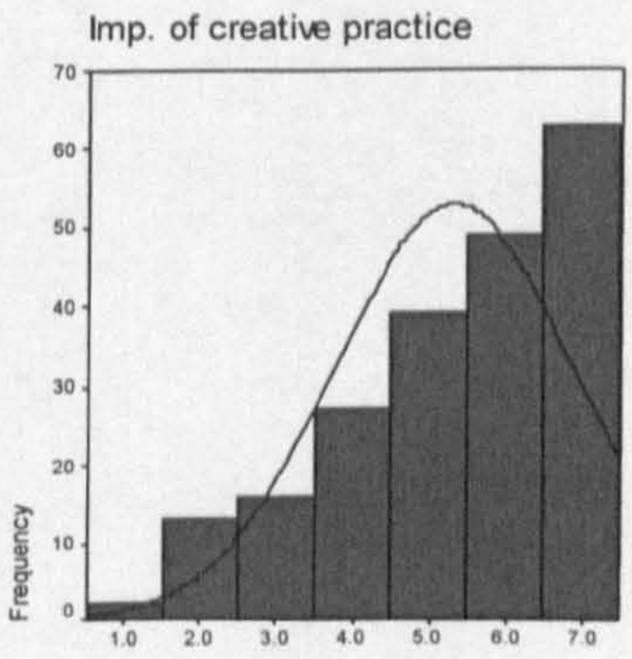
No composite variables were constructed from pooling responses that were included in other variables, avoiding the inflation of correlations. The transliminality scale included two questions that related to creativity: item 7, "I am fascinated by new ideas, whether or not they have any practical value" and item 28, "Sometimes people think I'm a bit weird because my ideas are so novel". These were not included in the transliminality score.

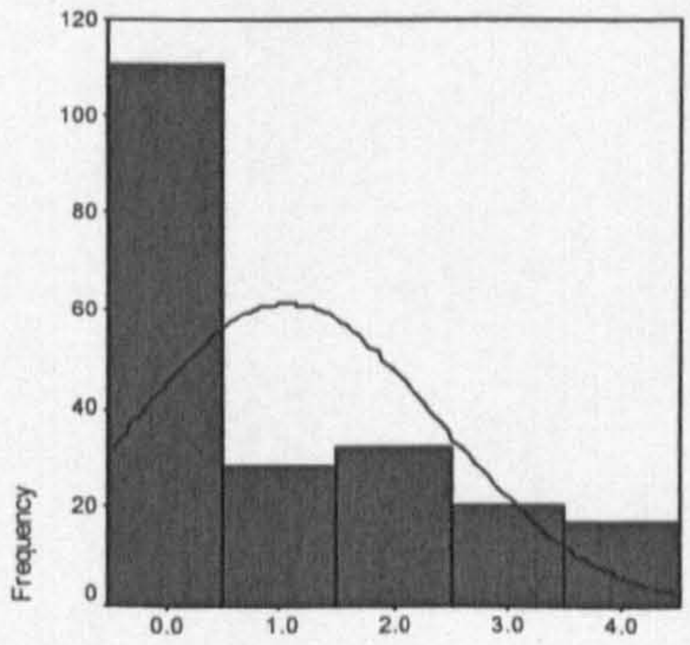
The mean and median scores for some of the creative activities were very low, which may lead to deflated correlations with these measures due to not many people in the sample being involved in these activities, although efforts were made to recruit professionals in the domains of visual art, performance art, music and science. Despite this, the low means, the range of scores is broad. This can be seen more clearly in the histograms for creativity in *figure A.6.1*. Because of the skewed distributions of several variables it was decided to use the non-parametric or 'distribution-free' Spearman's *rho* as a measure of association.

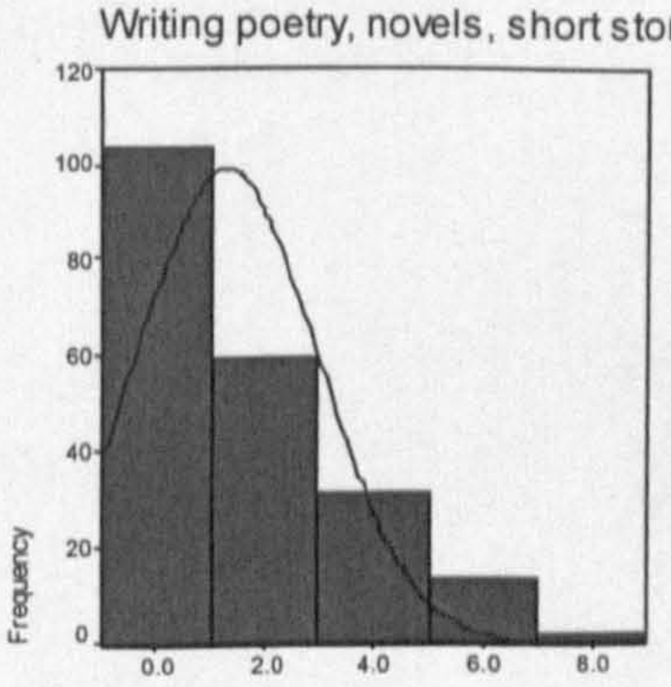
Figure A.6.1

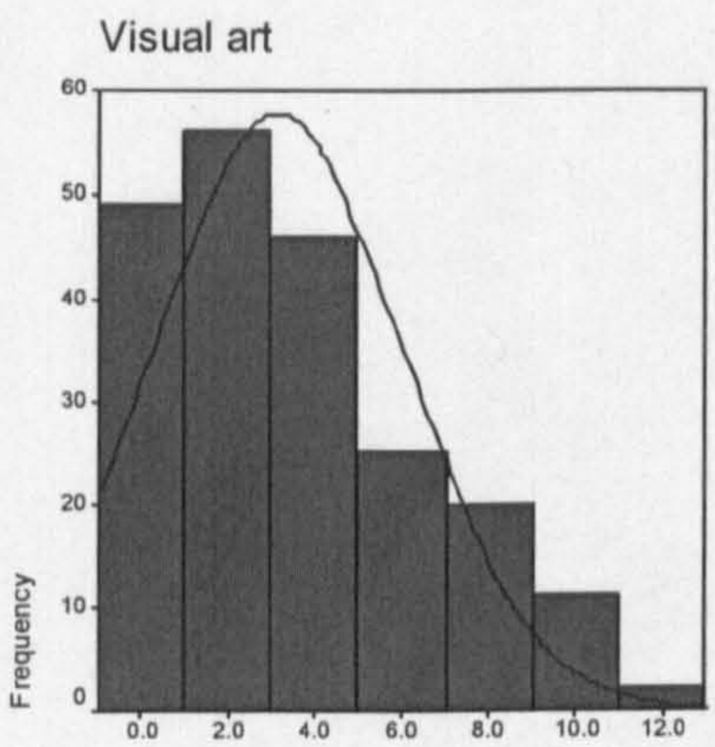
Histograms of creativity variables

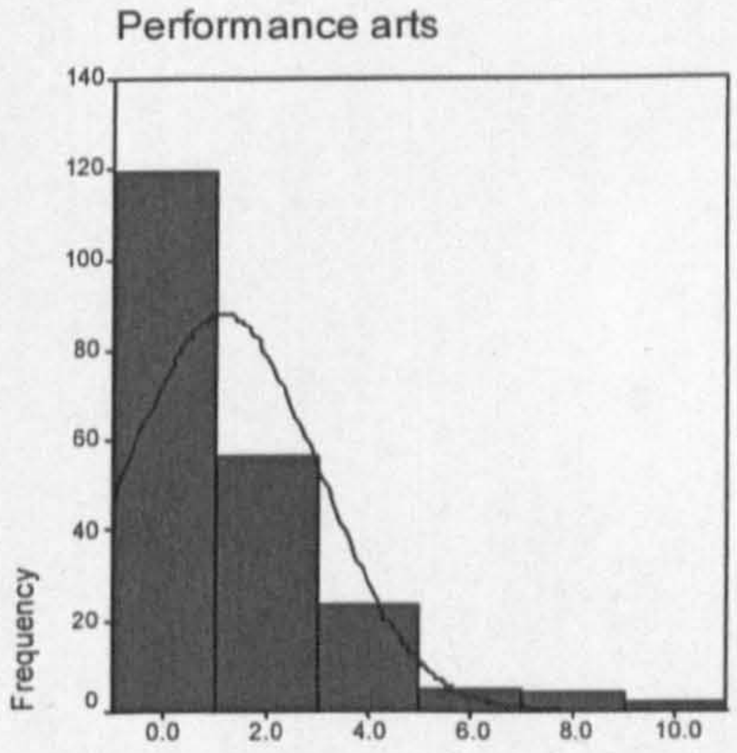









Visual art
Frequency
0
10
20
30
40
50
60
0.0
2.0
4.0
6.0
8.0
10.0
12.0


Performance arts
Frequency
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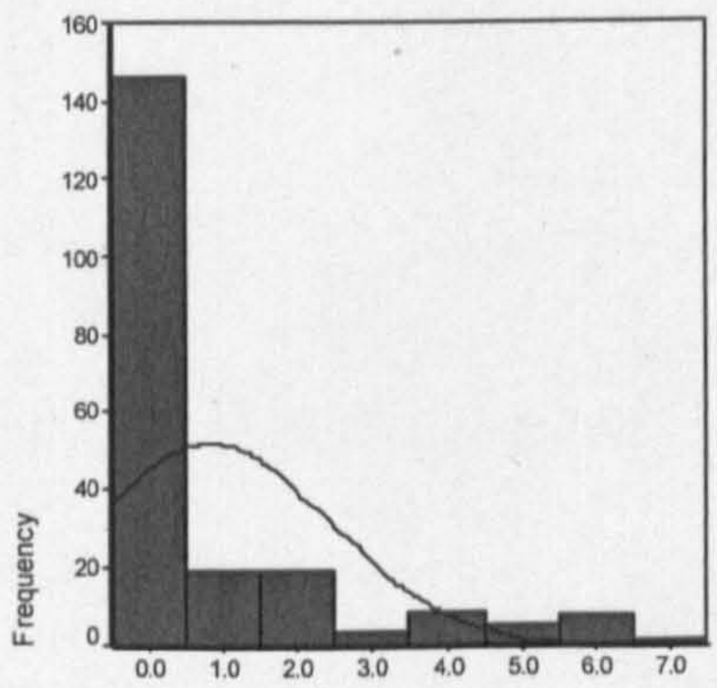
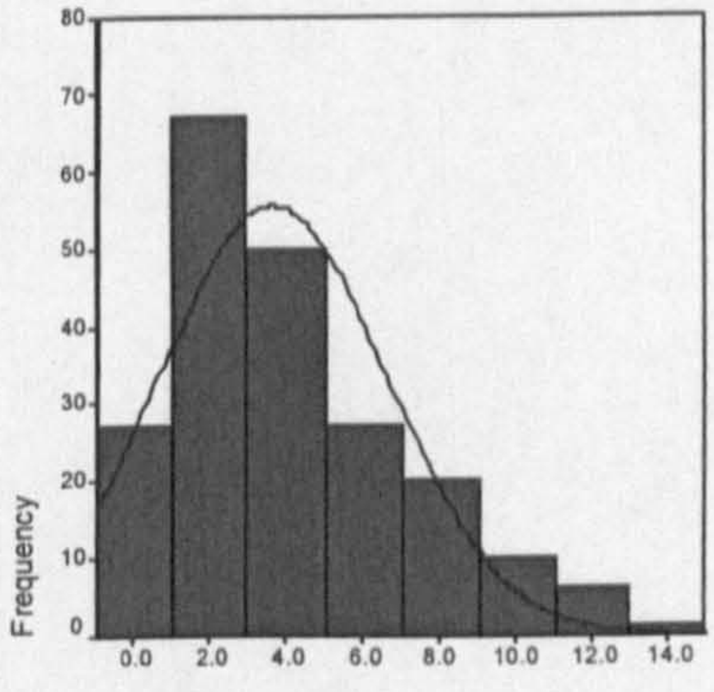
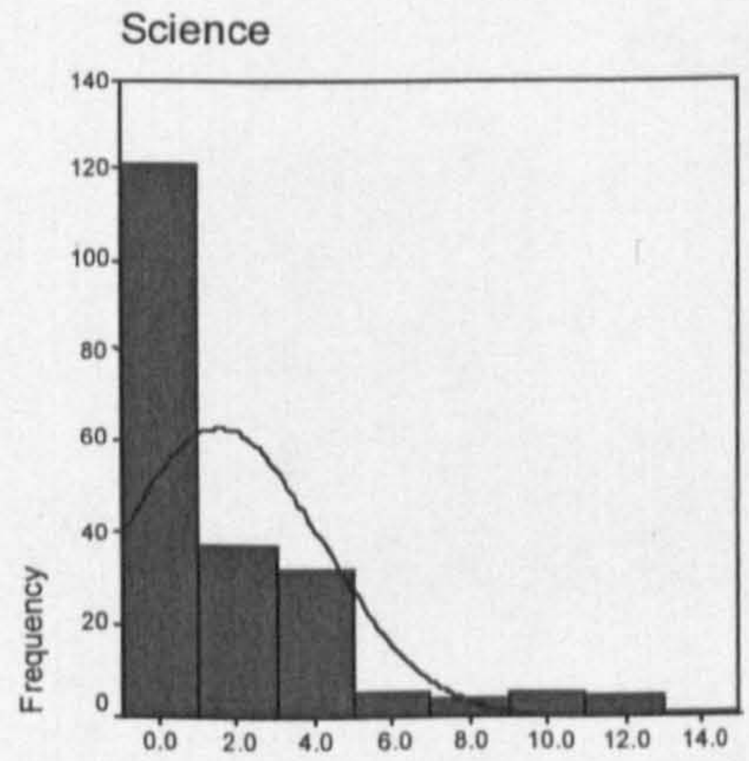
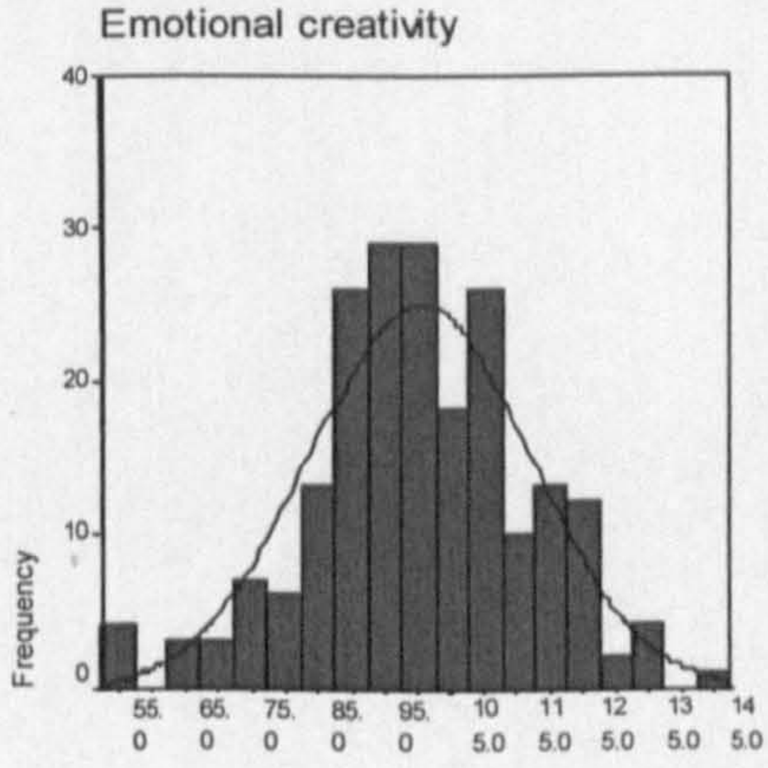
60
80
100
120
140
0.0
2.0
4.0
6.0
8.0
10.0


Music
Frequency
0
20
40
60
80
100
120
140
160
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0


Domestic crafts
Frequency
0
10
20
30
40
50
60
70
80
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0


Science
Frequency
0
20
40
60
80
100
120
140
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0


Emotional creativity
Frequency
0
10
20
30
40
55.0
65.0
75.0
85.0
95.0
105.0
115.0
125.0
135.0
145.0

Creative personality
Frequency
50
40
30
20
10
0
-6.0
-2.0
2.0
6.0
10.0
14.0
-4.0
0.0
4.0
8.0
12.0

Divergent thinking
Frequency
50
40
30
20
10
0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
5.0
15.0
25.0
35.0
45.0
55.0

Originality
Frequency
40
30
20
10
0
0.0
10.0
20.0
30.0
40.0
50.0
5.0
15.0
25.0
35.0
45.0
55.0

Flexibility
Frequency
70
60
50
40
30
20
10
0
0.0
2.0
4.0
6.0
8.0
10.0

Drawing across the edge of the grey box.
Frequency
40
30
20
10
0
0.0
2.0
4.0
6.0
8.0
10.0

Remoteness of associations
Frequency
30
20
10
0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
60.0

A.6.1.4 Univariate outliers

Univariate outliers were looked for both by 'eye-balling' the frequencies of the distributions and looking at the histograms in *Figures A.6.1* and *A.6.2*. Box plots for each variable were also perused. The cases that were identified as potential outliers through this process are delineated in *Table A.6.5*. Outliers on the boxplot are values which are more than 1.5 to 3 'box lengths' from the box, which is the interquartile range, i.e. the 50% of the scores that cluster around the median. It was checked that the data was entered correctly for potential outliers.

For self-perceived creativity, three participants placed themselves at the lowest value '1', which came up as outliers. There were quite a few outliers for involvement in various creative domains, however this is to be expected for the higher-level involvement, when the interquartile range will be composed of mostly '0'. There were also a few low outliers for emotional creativity and one high outlier. As the z-scores for these were not so large (see *Table A.6.6*), even though they stand out slightly on the histogram (see *Figure A.6.1*), it was decided to retain them. For using intuitive and playful cognitive processes in the creative process, there were a few low scores, however, again, the z-scores for the most extreme value was not excessively large (z=-3.00). More 'extreme' scores were found for some sub-scales of the ASASC, where negative mystical experiences, hallucinations, hypersensitivity and changed feelings of space and time had a number of outliers, with z-scores ranging from 3.41 to 4.17. That there are so may outliers for these variables, indicates that the distribution of these experiences is not normal, and transformation of the data may be more appropriate for principal components analysis than the deletion of these potential sources of valuable information. The extreme scores on these variables are not all contributed by the same cases, indicating that these extreme scores are not due for example to a few individuals scoring patterns throughout the ASASC, and that they are due to 'meaningful' patterns.

As indicated, standardized scores were also computed in order to look for cases with large scores, as shown in *Table A.6.6*. There were large z-scores for artistic writing, visual art, performance art, music and science. However, these distributions are not normal, and are not expected to be so. There may be advantage in dividing them into dichotomous variables, simply 'involvement' versus 'non-involvement' in these activities. There were also large z-scores in the negative direction for flexibility and originality, and in the positive direction for some classes of ASC: negative mystical experience, hallucinations, hypersensitivity and changed feelings of space and time. These were all greater than the guideline of 3.29, z-scores above which indicate potential outliers (Tabachnick & Fidell, 1996, p. 67), although in a large sample, some large standardized scores are to be expected. It may be that 'unusual states' of consciousness are not normally distributed in the population, hence these values may be retained, or the values may be changed so that the outlier has less impact. It was decided to retain the original values, the 'outlying' cases not appearing to be exceptionally extreme and disconnected from other data points, but mostly at the far end of a continuum of scores, in a skewed distribution (and possibly distributions with significant kurtosis, where the cases that have been sampled are from the right population but there are too many cases in the 'tails'). However, it may be advisable to run the planned analyses with the original data and with the most extreme potential outliers removes, these being those which: have large z-scores, are indicated as an outlier on the boxplot and are slightly discontinuous with the other scores. Fitting these criteria are the most extreme values of 'hypersensitivity' (case 119 with a score of 24) and 'changed feelings of time and space' (cases 23 and 82, with scores of 37), however, even these are not at an 'extreme distance' from other cases.

Table A.6.5

Potential outliers

Variable	Outliers	
	Scores	Cases
Self-perceived creativity	1	210,153,37
Importance of creative practice		-
Academic writing		-
Artistic writing	5,5,5,5,5,5,6,5,8,6,5,5,5	4,28,29,52,55,114,115,121, 127,128,150,175,185
Visual art	12,11	118, 131
Performance arts	5,6,6,10,8,6,6,10,7,8,8	1,12,15,23,32,85,97,114,123,131,200
Music	6,5,4,6,6,6,5,4,4,4, 5,5,5,4,3,6,4,7,6,4,6,3,4	1,4,22,25,32,38,62,63,85,92,99,106,107, 114,158,165,191,195,196,198,201,207,208
Domestic crafts	11,13,11,11,11,11,11	4,44,72,101,121,131,150
Science	11,8,10,6,9,9,9,8,5,14,5,9, 11,7,5,12,11,5	5,43,59,68,100,105,126,135,139,154, 156,158,166,167,168,174,184,190
Emotional creativity	145	180
	56,53,56,57	41,47,84,176
Remoteness of associations		-
Creative personality		-
Heightened internal awareness		-
Flexibility	1,1	129,114
Originality		
Drawing across the boundary		
Intuition	4,4,4,3	8,142,183,184
Linear, systematic cognition		-
Loose, playful cognition	0	210
Analogy, recombination	0,0,0	49,199,210
Oneiric cognition		-
Extraordinary mental processes	30,32,30	34,165,197
Parapsychological experiences		-
Esoterics	19,20,20,21,21,19,21	32,108,110,111,143,152,193
Positive mystical experiences		-
Negative mystical experiences	39,38,53,55,38,52,45,46, 45,56,48	15,23,34,64,65,88,162,171,180,185,197
Imagination		-
Dreams	35	32
Dissociation	26,26	32,64
Hallucinations	43,34,32,34,36,32,35, 33,37,35,37	23,27,42,75,88,114,121,143,165,180,185
Hypersensitivity	19,21,20,24,17	23,83,88,119,165
Changed feelings of space and time	31,37,30,28,37,31,29, 32,33	4,23,32,64,82,144,145,165,185
Total scores on the ASASC	302,284,275,303	23,32,64,185
Ego strength	12	171
Boundary thinness		-
Transliminality		-

Table A.6.6

Minimum and maximum z-scores for creativity, ASCs and ego-strength variables

	How creative?	Imp of creative involvement	Writing (academic)	Writing (artistic)	Visual art	Performance art	Music	Domestic crafts	Science	Emotional creativity
Minumum	-2.71	-2.74	-.79	-.77	-1.10	-.61	-.52	-1.22	-.58	-2.88
Maximum	1.30	1.06	2.19	4.00	3.06	4.70	3.84	3.15	4.70	2.74

	Remoteness of associations	Creative personality (Gough)	Flexibility	Originality	Drawing across the boundary	Heightened internal awareness	Intuition	Linear	Playful
Minumum	-2.48	-2.61	-3.62	-3.24	-1.24	-2.05	-3.01	-2.91	-2.86
Maximum	2.38	2.05	.89	1.89	1.97	2.02	1.33	1.74	1.50

	Analogy	Oneiric	Parapsychological experiences	Esoterics	Extraordinary mental processes	Positive mystical experiences	Negative mystical experience	Imagination	Dreams
Minumum	-2.71	-2.20	-1.64	-.95	-1.81	-1.21	-.95	-2.59	-1.73
Maximum	1.77	1.60	2.80	3.03	3.07	2.59	3.41	1.68	2.77

	Dissociation	Hallucinations	Hypersensitivity	Changed feelings of time and space	Total score on the ASASC	Ego strength	Boundary Questionnaire	Translimina lity score
Minumum	-2.16	-1.21	-1.23	-1.24	-1.87	-2.57	-2.33	-2.13
Maximum	3.06	3.41	4.17	3.61	3.15	1.91	2.56	2.27

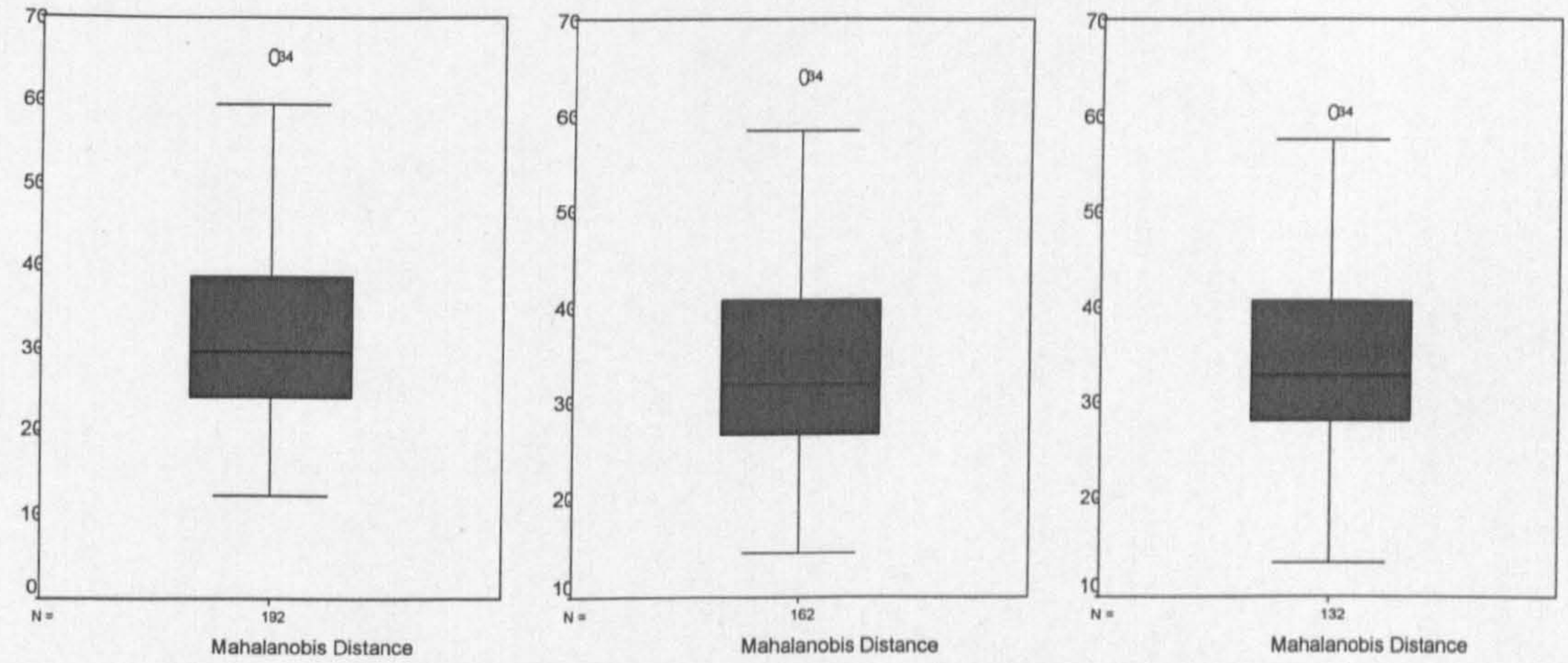
A.6.1.5 Multivariate outliers

These are cases that have an unusual pattern of scores. Mahalanobis distance was calculated to assess this - a measure of how much a case's values on variables differ from the average of all cases. A large Mahalanobis distance identifies a case as having extreme values on one or more of the variables. Because all variables are required in the analysis, this was made more difficult by missing variables. If including all variables the sample size is reduced to N = 132. Hence, analyses were re-run without 'boundary crossing' and again without figural divergent thinking, as these two variables had a large amount of missing data. Boxplots for these three Mahalanobis distance scores analyses can be seen in *Figure A.6.3*. This still meant that 14 cases were not included in the analysis (1,2,3,4,5,6,16,30,49,95,108,113,114,143,147,166,170,200,21). These values were checked against the cases with outliers listed above, which revealed the following cases had extreme scores on the following variables: 1 and 200 (performance); 4 (music); 108 (esoterics); 114 (hallucinations); 116 (science); and 143 (esoterics and hallucinations). Hence, analyses were re-run with the variable for which these individual cases were missing not included.

In each of the above boxplots in *Figure A.6.2*, the only potential multivariate outlier is for case number 34, with a z-score of between 2.74 and 3.24. Case 34 was also a potential univariate outlier on the variable of 'extraordinary mental experiences'.

Figure A.6.2

Mahalbolis distances for A) all variables except divergent thinking and boundary crossing; B) All variables except boundary crossing; C) all variables.



For cases 1 and 4 both 'ego-strength' and 'remoteness of associations' were missing. With these items deleted from the analysis there were no additional potential outliers. For case 108, both divergent thinking and transliminality were missing. With these deleted, both cases 34 and 82 emerged as potential outliers (with z-scores of 2.9 and 2.8 respectively). For 114, the missing values were ego-strength and boundary crossing, with these deleted, two potential outliers emerged, 34 and 114 (with z-scores of 3.01 and 4.06 respectively). Finally, for case 143 the importance of creative practice was missing. With this deleted, the only potential outlier was again 34. From this analysis it is therefore suggested that the cases 34 and 114 might be considered as multivariate outliers, with 114 a large z-score.

Cases 34 and 114 were examined individually. We have already seen that case 34 was a potential outlier on 'extraordinary mental experiences' and 'negative mystical experiences' that case 114 was a potential outlier on hallucinations (high) and 'flexibility' (low). This pattern of scoring may seem unusual, however, this is because this individual was one of two cases that had a flexibility score of only '1' because they changed all the nine shapes into one big picture, of which the nine 'shapes' were a part, rather than creating nice separate pictures. This gets a higher originality score, but a lower flexibility of response score.

Table A.6.7

Patterns of potential multivariate outliers – cases 34 and 114

	Self-perceived creativity	Involvement in creative practice	Academic writing	Artistic writing	Visual art	Performance arts	Music	Domestic	Science	Heightened internal awareness	Intuition
Mean	5.06	5.33	1.06	1.29	3.17	1.14	.83	3.64	1.54	21.70	12.07
Median	5.00	6.00	.00	.50	2.00	.00	.00	3.00	.00	23.00	12.00
Std. Deviation	1.49	1.58	1.35	1.67	2.89	1.88	1.61	2.97	2.65	10.56	2.95
Case 34	6	6	0	0	4	0	0	**8**	0	24	11
Case 114	5	7	0	**5**	**10**	**10**	**4**	**8**	3	34	15

	Linear	Playful	Analogy	Oneiric	Emotional creativity	Remoteness of associations	Creative personality (Gough)	Flexibility	Drawing across the boundary	Originality
Mean	10.38	7.87	7.25	6.94	100.17	39.41	5.65	7.26	3.47	33.65
Median	11.00	8.00	7.00	7.00	100.00	40.00	6.00	8.00	3.00	35.00
Std. Deviation	3.22	2.75	2.67	3.15	16.37	8.24	4.08	1.92	2.80	10.03
Case 34	2	10	8	10	134	45	10	5	1	19
Case 114	4	12	9	8	123	46	6	1	8	43

	Extraordinary mental processes	Parapsychological experiences	Esoterics	Positive mystical experiences	Negative mystical experiences	Imagination	Dissociation	Dreams
Mean	11.87	8.87	5.25	14.04	12.20	12.93	10.76	13.42
Median	11.00	8.00	3.00	12.00	8.00	13.00	11.00	13.00
Std. Deviation	6.56	5.39	5.53	11.58	12.84	4.22	4.98	7.78
Case 34	30	9	15	6	53	19	21	6
Case 114	14	14	6	37	25	17	16	13

	Hallucinations	Hypersensitivity	Changed feelings of time and space	Total score on the ASASC	Ego strength	Boundary Questionnaire	Transliminality score
Mean	11.27	5.49	9.45	115.40	27.49	34.21	13.56
Median	9.00	4.00	8.00	106.00	28.00	35.00	14.00
Std. Deviation	9.31	4.45	7.64	59.64	6.02	10.84	6.37
Case 34	17	0	1	177	15	43	15
Case 114	32	9	22	205	-	38	24.5

Case 34 scores highly on emotional creativity and domestic crafts, but low on divergent thinking and on the use of linear, systematic cognition. Most notable is that case 34 also scores very highly on extraordinary mental experiences, negative mystical experiences and low on ego strength.

Case 114 scored highly on artistic involvement, playful thinking and emotional creativity, and low on flexibility (for reasons described above) and the use of linear cognition. They also scored particularly highly on parapsychological experiences, positive and negative mystical experiences hallucinations and changed feelings of space and time.

Outliers - summary

There were a number of potential univariate outliers, however, it is expected that the best way to handle these is through transforming the variables in order to make the distributions more closely approximate the normal curve. There were two multivariate outliers, which might be expected in a large sample size. It is suggested that the impact of these is assessed by conducting further analyses with and without these cases (34 and 114), in order to consider their impact.

A.6.1.6 Distributions

As statistical inference is argued to become less and less robust as distributions (univariate and multivariate) depart from normality, linearity and homoscedasticity (i.e. the variance of one variable is the same at all values of the other variable). Hair, Anderson, Tatham and Black (1998) argue that argue that these apply only to the extent to which they diminish the observed

correlations, and that normality is only necessary if a statistical test is applied to the significance of the factors. Tabachnick and Fidell (1996) state that for ungrouped multivariate analyses (e.g. principal components analysis) multivariate normality is required. Multivariate normality is the assumption that each variable and all linear combinations of these are normally distributed. However, just because univariate normality has been obtained, this does not mean that multivariate normality has been obtained, although it is more likely. It is normally impossible to check multivariate normality (Gorsuch, 1986, p. 301). Multivariate normality is assumed in determining the number of factors in factor anlaysis.

As can has already been indicated from the discussion of outliers, and from *Figures A.6.1* and *A.6.2* several variables may have skewed distributions. Expected normal probability plots were also examined. The extent of the skewness and kurtosis will be assessed in this section, and potential transformations of the data will be considered.

Tables A.6.1 and *A.6.2* show the test statistics for skewness and kurtosis and their standard error. As a rough guide, a skewness value more than twice its standard error is taken to indicate a departure from symmetry. For a normal distribution, the skewness statistic is zero – the mean is in the center of the distribution. The z-score of the skewness statistic (as compared to the expected score of zero) can be used as a test of normality (you can reject normality if the ratio is less than -2 or greater than +2). A large positive value for skewness indicates a long right tail; an extreme negative value, a long left tail. Kurtosis is a measure of the extent to which observations cluster around a central point. For a normal distribution, the value of the kurtosis statistic is zero. Positive kurtosis indicates that the observations cluster more and have longer tails than those in the normal distribution (too peaked) and negative kurtosis indicates the observations cluster less and have shorter tails (too flat). The z-score of kurtosis can be used as a test of normality (you can reject normality if the ratio is less than -2 or greater than +2). A large positive value for kurtosis indicates that the tails of the distribution are longer than those of a normal distribution; a negative value for kurtosis indicates shorter tails (becoming like those of a box-shaped uniform distribution).

In a large sample, the significance of the z-scores of skewness and kurtosis is not as important as its size (the degree of the deviation from zero) as even small deviations from the normal curve may be significant with a large N. Tabachnick and Fidell (1996) argue that with large sample sizes (over N=200) the impact of degree of departure from zero for kurtosis diminishes, as the underestimates of the variance that is associated with kurtosis disappears.

A.6.1.7 Skewness

Of the creativity variables, both self-perceived creativity and the important of creative involvement were significantly skewed, with a long tail to the left (that is most people gave themselves a higher rather then a lower rating), while all the creative activity measurements were significantly skewed positively, with a long tail to the right, that is most people had a low or no involvement in each domain. Such distributions are to be expected. Intuitive, linear and playful cognition used in the creative process were significantly negatively skewed, as were flexibility and originality on the figural divergent thinking task.

Of the altered state and ego-strength variables, all of the altered state sub-scales are significantly positively skewed except for dreams, dissociation and imagination. This indicates that for most ASC scales, people were more likely to have a low score. Imagination is just significantly skewed in a negative direction, indicating that people were more likely to have a high score. The overall ASC scale is not significantly skewed however. Ego strength was significantly negatively skewed, i.e. most people scored towards the higher end of the scale.

Because variables are skewed in both positive and negative directions, i.e. the distributions are non-normal in different ways, this may make the solution of interential statistics more 'degraded' (Tabachnick & Fidell, 1996, p. 71).

A.6.1.8 Kurtosis

For creativity variables artistic writing, performance arts, music and science have significant positive kurtosis, (indicating that scores cluster around the measure of central tendency more) while heightened internal awareness, oneiric cognition and drawing across the boundary have significant negative kurtosis (indicating that scores are more spread out).

For altered state and ego-strength variables those with significant positive kurtosis were: negative mystical experiences, hallucinations, hypersensitivity and changed feelings of space and time, while those with significant negative kurtosis were parapsychological experiences and transliminality.

A.6.1.9 Tests of normality

The Kolmogorov-Smirnov (Lilliefors) test is a modification of the Kolmogorov-Smirnov test that tests for normality when means and variances are not known, but must be estimated from the data. The Kolmogorov-Smirnov test is based on the largest absolute difference between the observed and the expected cumulative distributions. These analyses indicated that the only variables with significantly normal distributions were: boundary thinness, emotional creativity, remoteness of associations and heightened internal awareness.

A.6.1.10 Linearity

Tabachnick and Fidell (1996) suggest assessing through bivariate scatterplots if the relationships between non-normally distributed variables are normal or not. This was only done for the creativity variables as they are the ones that are planned to go into the principal components analysis. All combinations were perused. No curvilinear relationships were present, most relationships with the domains of creative activity showed skewness, as can be seen in scatter plot A below, where there are far more cases at low that high levels of 'performance', and far more cases at high than low levels of flexibility, while scatterplot B shows a linear positive correlation typical of those variables with a normal distribution.

Figure A.6.4 **Example scatterplots of variables to assess linearity**

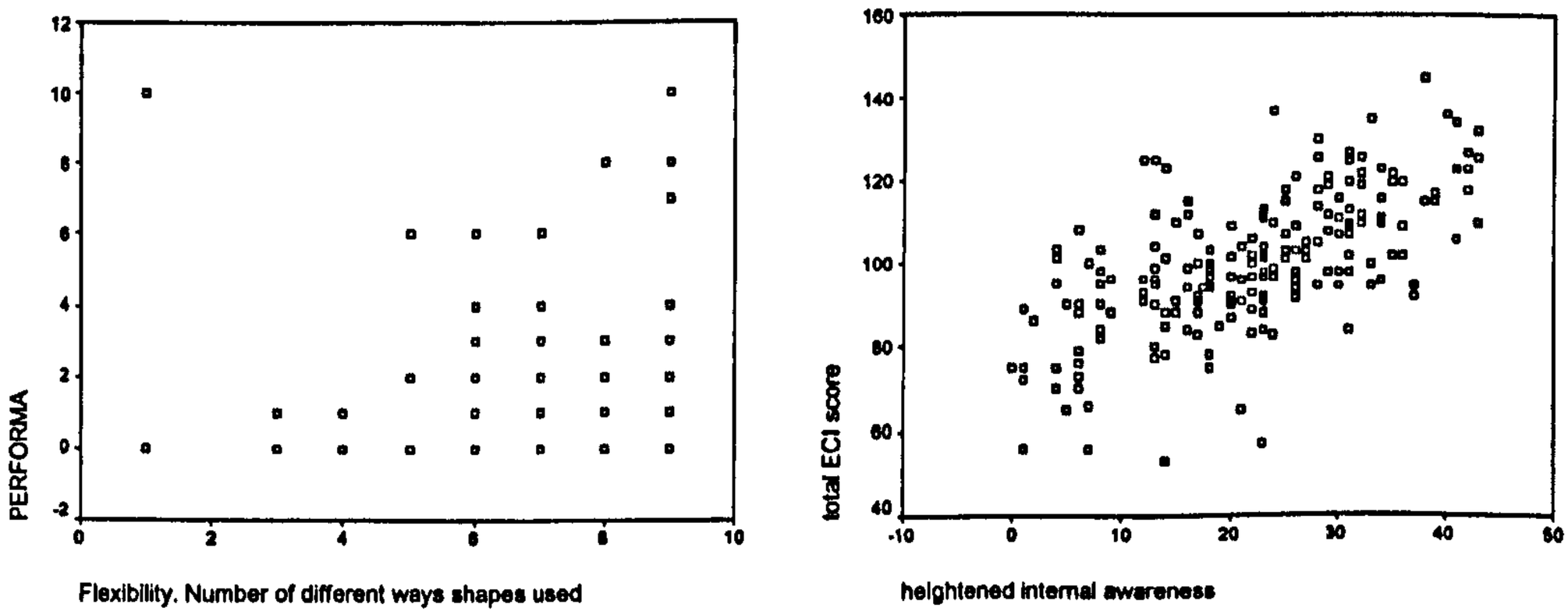


Table A.6.8

Skewness and kurtosis z-scores of transformed and non-transformed data

Variable	Untransformed data		Square root		Inverse		Logarithm	
	z-skewness	z-kurtosis	z-skewness	z-kurtosis	z-skewness	z-kurtosis	z-skewness	z-kurtosi
Self-perceived creativity	-3.12	-.94	.21	-2.35	.34	-1.15	-2.46	-2.52
K-S [3]	.183	$p<.001$	.168	$p<.001$	.278	$p<.001$	.215	$p<.001$
Importance of creative practice	-4.35	-1.01	1.97	-2.93	3.21	-4.03	-.20	-3.81
K-S	.200	$p<.001$	.183	$p<.001$	.249	$p<.001$	.204	$p<.001$
Academic writing	5.59	-1.29	2.52	-4.49	-1.66	-5.29	3.08	-4.15
K-S	.318	$p<.001$	.345	$p<.001$	.352	$p<.001$	.340	$p<.001$
Artistic writing	7.24	2.79	2.59	-3.90	-1.07	-5.32	2.77	-3.62
K-S	.280	$p<.001$	.322	$p<.001$	.333	$p<.001$	.316	$p<.001$
Visual art	4.64	-.59	-1.25	-3.09	5.31	-2.44	-1.31	-3.51
K-S	.159	$p<.001$	.166	$p<.001$	.257	$p<.001$	.263	$p<.001$
Performance arts	13.70	18.29	5.38	-.72	-2.86	-4.62	5.80	-.56
K-S	.298	$p<.001$	.353	$p<.001$	.368	$p<.001$	.348	$p<.001$
Music	12.35	10.76	7.92	1.1	-5.57	-2.01	8.40	1.83
K-S	.399	$p<.001$	.429	$p<.001$	.438	$p<.001$	.426	$p<.001$
Domestic crafts	4.94	.09	-1.71	-1.40	8.55	2.86	-2.12	-2.07
K-S	.161	$p<.001$	.110	$p<.001$	.253	$p<.001$	.121	$p<.001$
Science	13.47	16.12	6.02	-.25	-3.07	-4.61	5.86	.92
K-S	.302	$p<.001$	.356	$p<.001$	.375	$p<.001$	.354	$p<.001$
Creative personality	-1.17	-1.97	-1.91	-1.21	21.53	63.35	-5.83	2.92
K-S	.078	$p=.004$	.095	$p<.001$	.245	$p<.001$	.129	$p<.001$
Flexibility	5.79	-1.43	2.95	-2.31	1.22	-4.38	4.84	-3.01
K-S	.222	$p<.001$	.216	$p<.001$	.261	$p<.001$	.226	$p<.00$
Originality	-3.11	-2.15	-.084	.23	36.04	156.81	-5.52	5.30
K-S	.119	$p<.001$	.075	$p=.023$	.122	$p<.001$	.292	$p<.00$
Drawing across the boundary	1.86	-.05	-2.36	-2.31	12.96	15.12	-2.41	2.61
K-S	.133	$p<.001$	.152	$p<.001$	.324	$p<.001$	.163	$p<.00$

[3] Kolmogorov-Smirnov test of normality statistic (the differences between observed and expected cumulative distributions) and associated probability value (where if significant, is probably not normally distributed).

In this analysis the following potential outliers were detected. Remember that two individuals scored a flexibility score of '1' because they turned all nine shapes into one big picture. These 'outliers' may be best being 'not scored' for flexibility at all, as this may artificially reduce the relationship between flexibility and other variables.

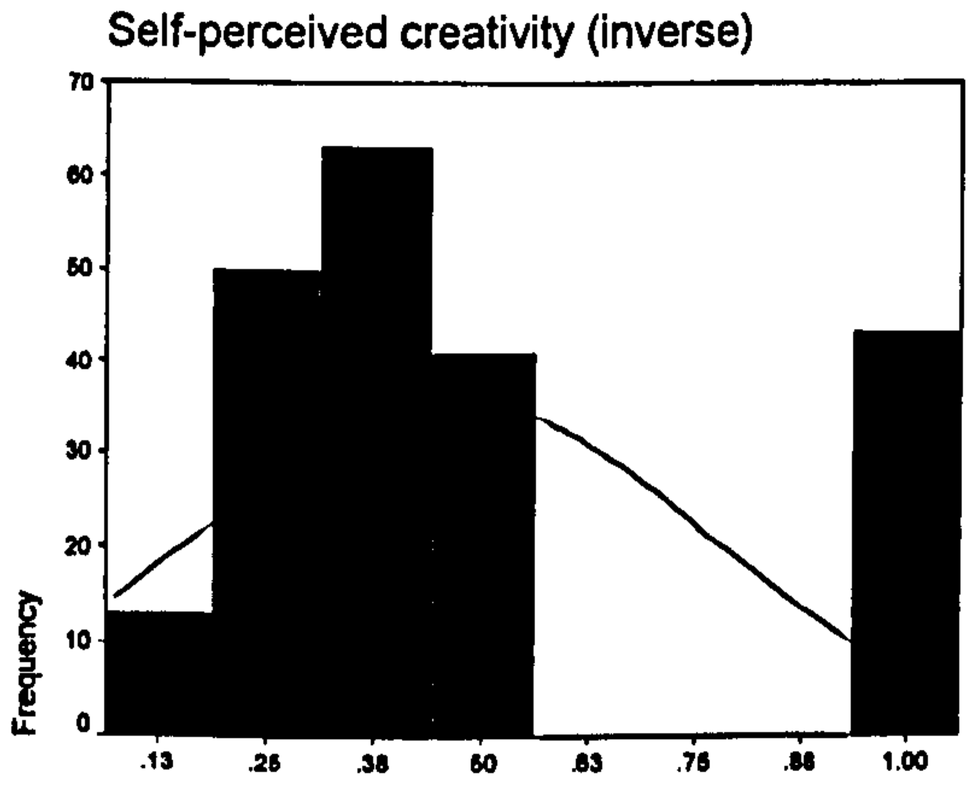
A.6.1.11 Homoscedasticity

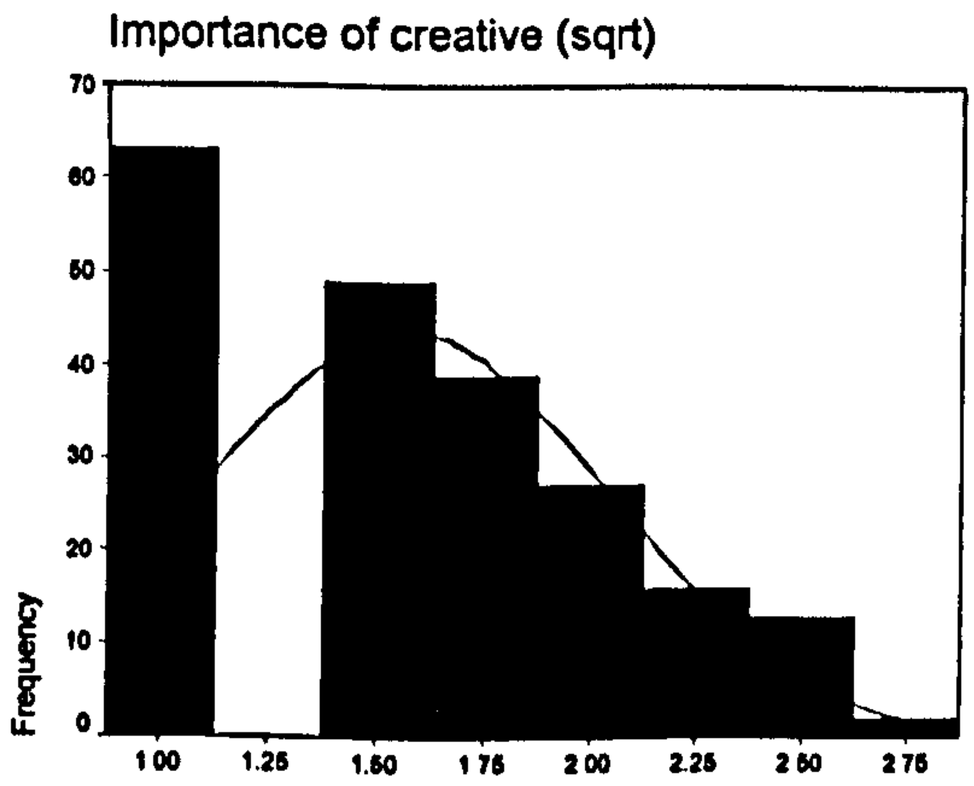
Homoscedasticity is the assumption that the variability in scores for one continuous variable is roughly the same at all values of another continuous variable (Tabachnick & Fidell, 1996, p. 80). Heteroscedasticity is caused by non-normality of one of the variables or by the fact that one variable is related to some transformation of the other. For example in scatterplot A above, it might be argued that as people become more cognitively flexible, they vary more in the degree to which they may or may not take part in performance arts. In scatterplot B however, the degree of emotional creativity seems to vary to about the same extent across different levels of using heightened internal awareness in the creative process. Homoscedasticity is not essential for a principal components analysis, but it may strengthen it. A number of heteroscedastic plots were evidenced, particularly for correlations with involvement in different creative domains.

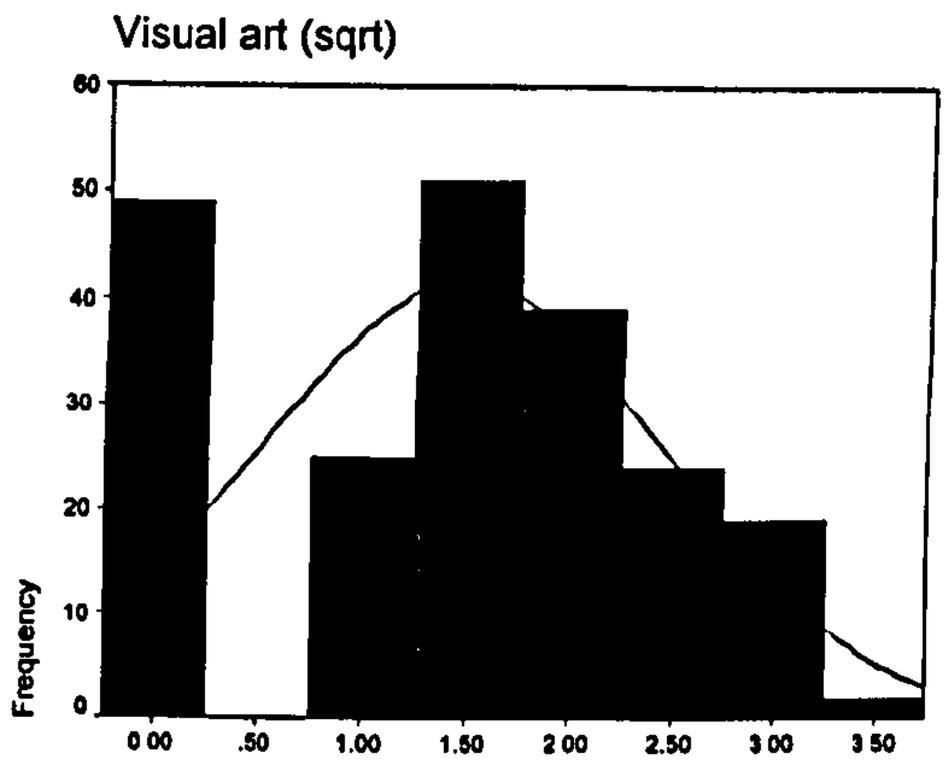
A.6.1.12 Transformations

Tabachnick and Fidell (1996) argue that transformed variables are sometimes harder to interpret. However, they suggest that transformation is preferred, unless this renders interpretation of results difficult. It was decided only to transform the creativity variables, as these would be used in the principal components analysis and to use distribution-free correlations for other analyses. For all the variables skewed in a negative direction it was also necessary to reflect the variables, as well as conduct square root, logarithm and inverse transformations to see which of these produced the most normal distributions. No transformations were applied to emotional creativity, remoteness of associations or heightened internal awareness, as these did not differ significantly from the normal curve or have outliers with large z-scores.

Figure A.6.5
Histograms of transformed variables






Visual art (sqrt)
Frequency
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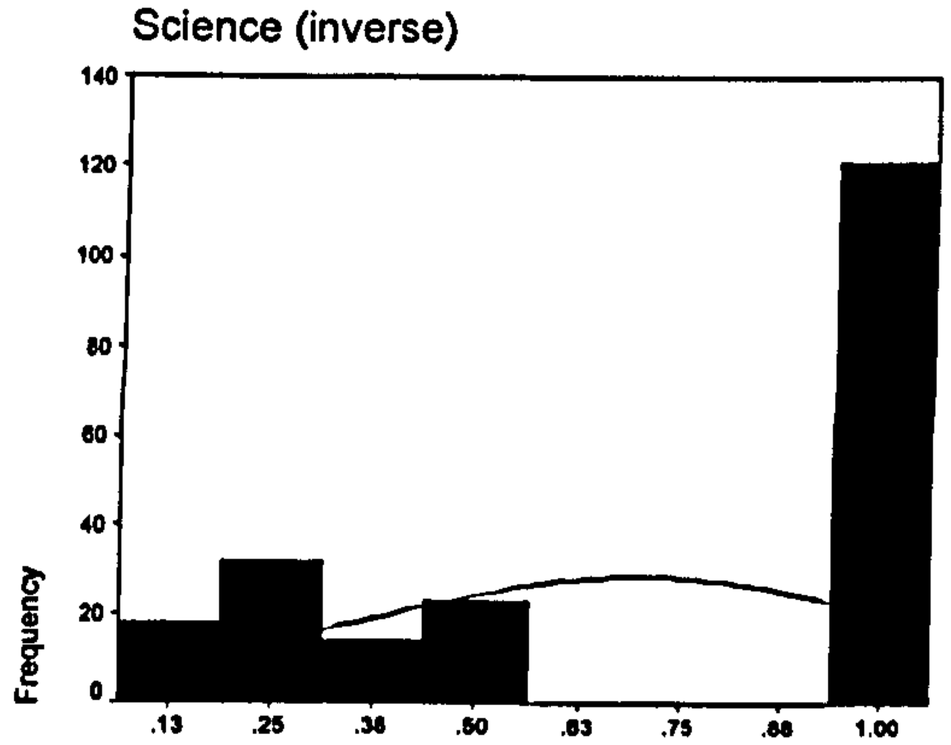
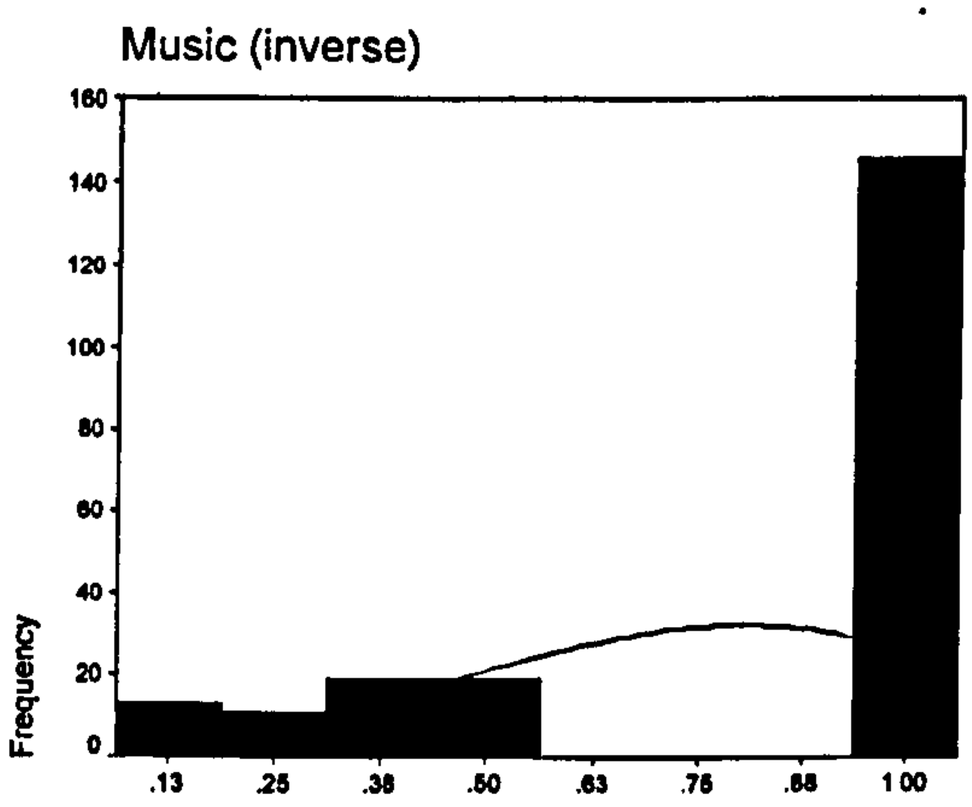
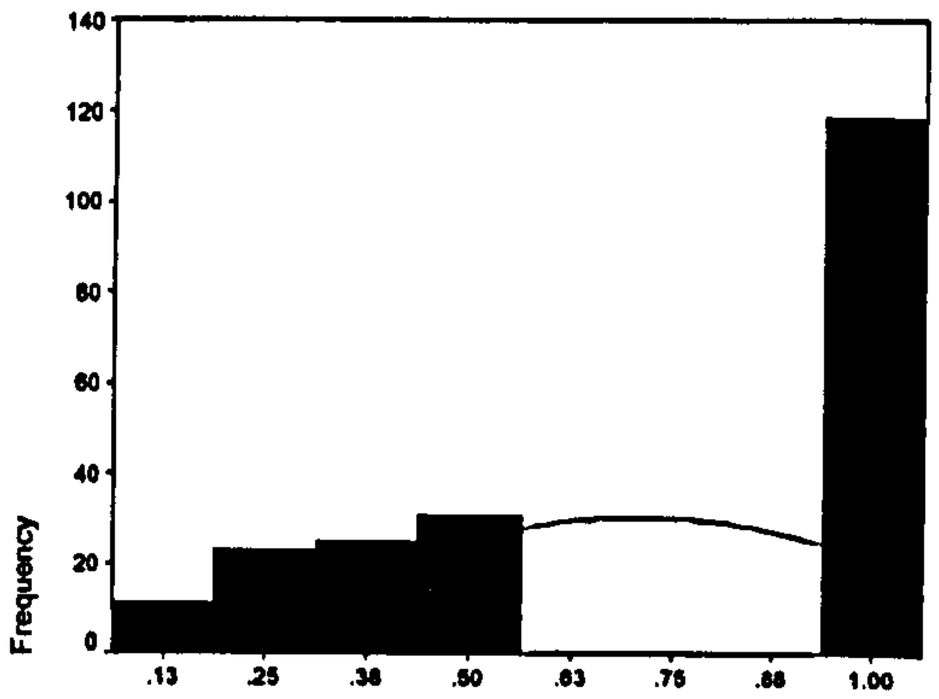
10
20
30
40
50
60
0 00
.50
1.00
1.50
2 00
2.50
3 00
3 50


Science (inverse)
Frequency
0
20
40
60
80
100
120
140
.13
.25
.38
.50
.63
.75
.88
1.00


Music (inverse)
Frequency
0
20
40
60
80
100
120
140
160
.13
.25
.38
.50
.63
.75
.88
1 00


Performance (inverse)
Frequency
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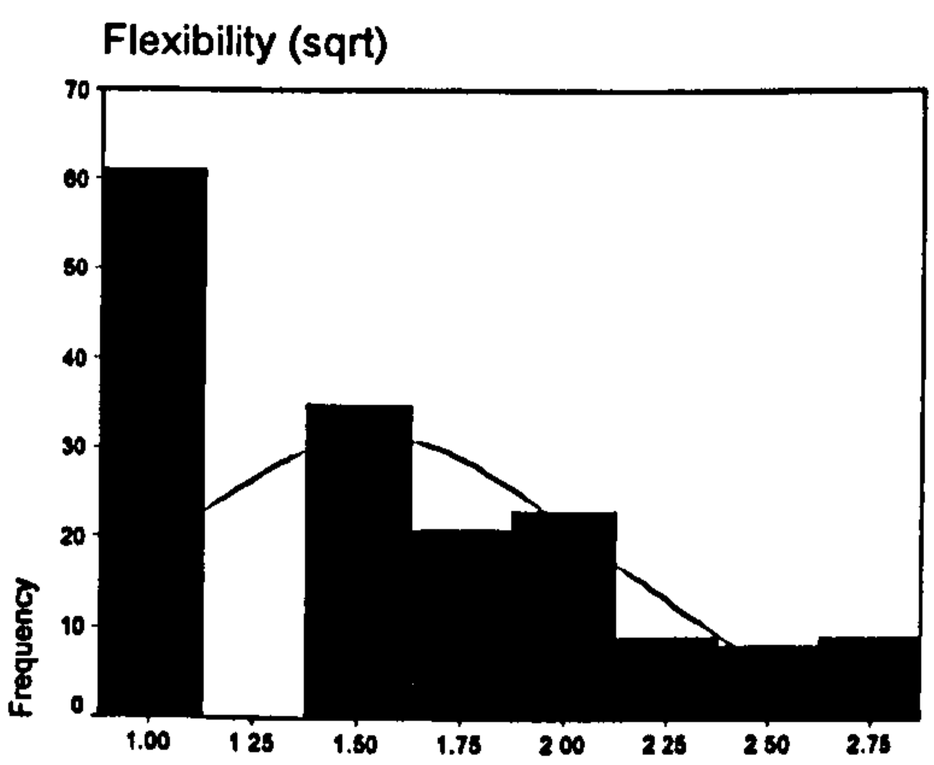
60
80
100
120
140
.13
.25
.38
.50
.63
.75
.88
1.00


Flexibility (sqrt)
Frequency
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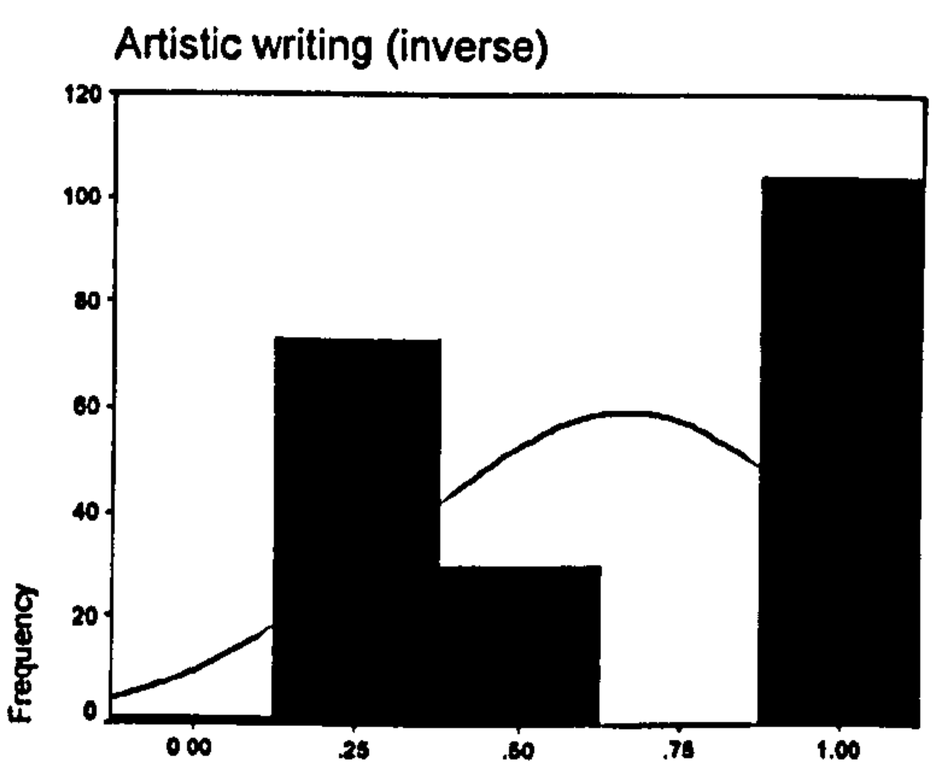
10
20
30
40
50
60
70
1.00
1 25
1.50
1.75
2 00
2 25
2 50
2.75


Artistic writing (inverse)
Frequency
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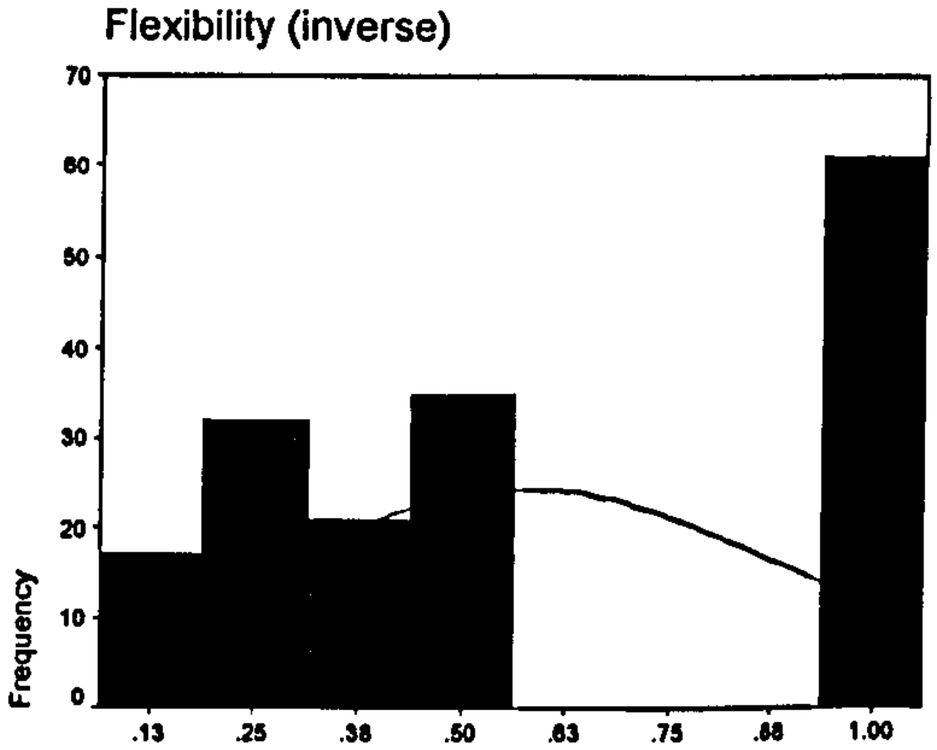
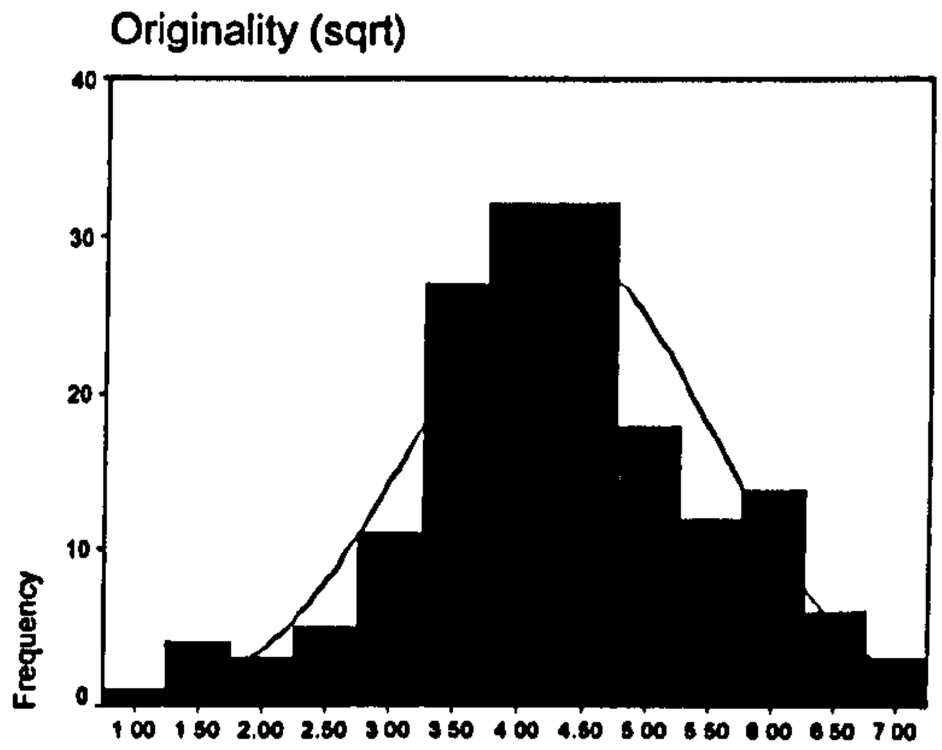
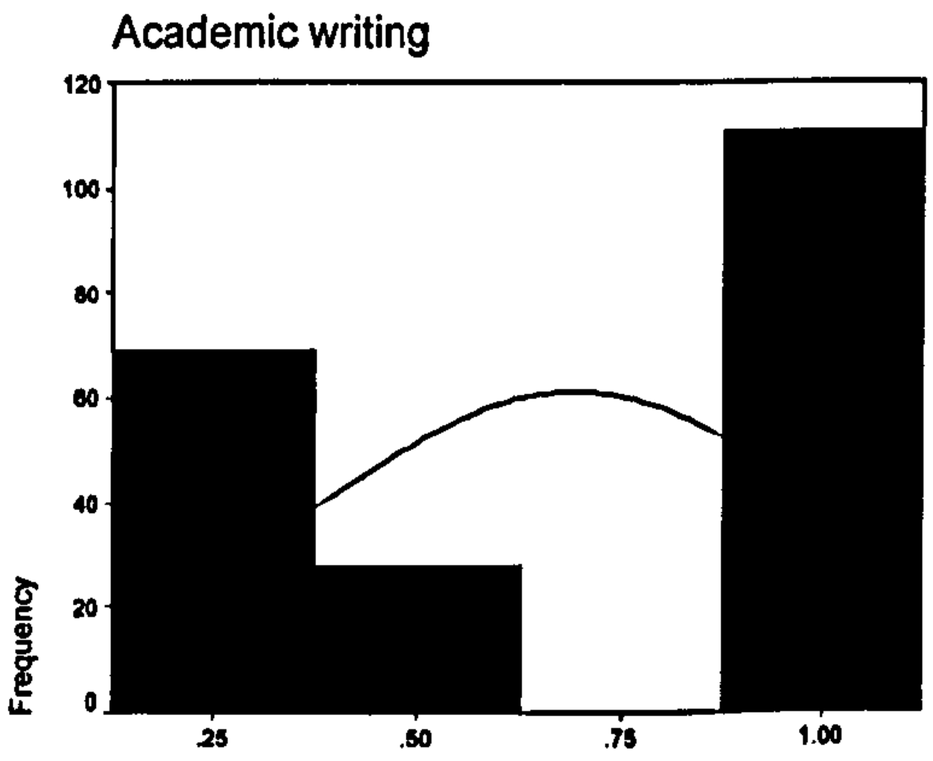
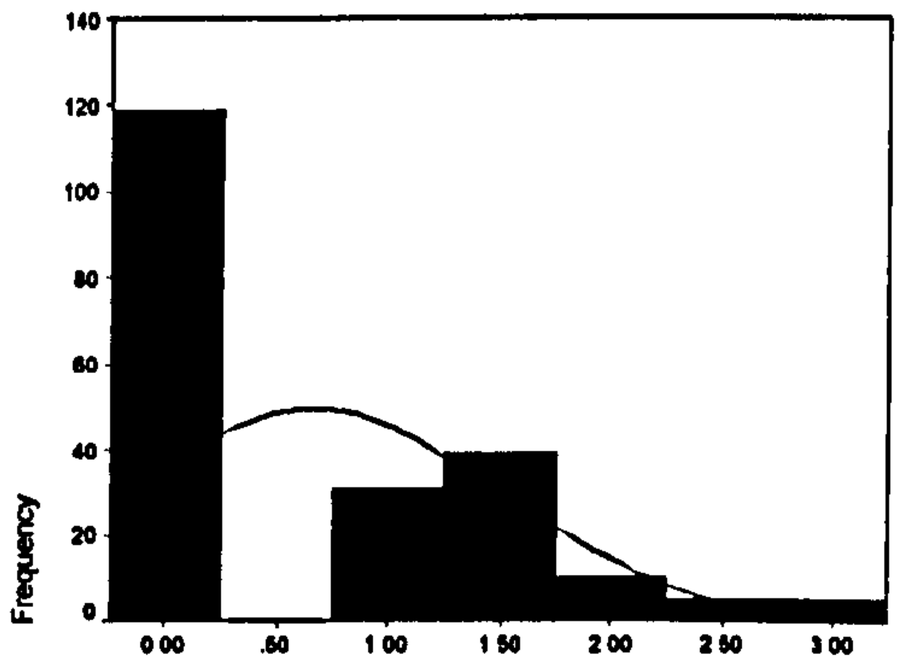
20
40
60
80
100
120
0 00
.25
.50
.75
1.00









As T&F argue that kurtosis affects inferential statistics to a reduced degree with sample sizes over 200, the focus was on the skewness statistic in the choice of transformation. Those highlighted in red were considered the best approximations to the normal curve, however, those highlighted in blue represent those with the least difference from the normal curve as approximated by the Kolmogorov-Smirnov test of normality, all of which differ significantly from the normal curve, however, with such as large sample size, this is not surprising, some of the tiny deviations are still significant.

It was wondered whether the activities variables should be changed into dichotomous variables as clear distinctions are seen in the histograms between involvement and no involvement, the latter being predominant (particularly music, performance arts and science which are still skewed after an inverse transformation). However, dichotomous data may distort factor analysis Gorsuch (1983, p. 291), as there is a reduction in correlations as many individuals receive the same score.

It was decided to use as an indicator of the approximation to the normal curve, the K-S statistic, as a more objective measure than eye-balling the histograms and skewness and kurtosis statistics. Clearly, this means that some skewed distributions are used in the planned principal components analysis, however, Tabachnick and Fidell state that while they recommend

transformations, when PCA is used descriptively, to summarize the relationships in a large set of variables, assumptions regarding the distributions are not in force.

A.6.1.12 Potential univariate outliers of transformed data

Outliers were still present, as discussed earlier, for involvement in creative domains. Basically non-transformed data was used for all variables except where a square root transformations improved approximation to the normal curve, for: originality, flexibility, self-perceived creativity, the importance of creative practice and domestic crafts. For the latter there were no outliers, except: three low scorers on self-perceived creativity and for originality one high scorer (case 152) and four low scorers (cases 48, 88, 202 and 130). These however were not extreme, the highest and lowest z-scores for self-perceived creativity being -2.91 and 2.22; and for originality being -1.11 and 1.84. Hence it was decided to leave these in the analysis.

A.6.1.13 Potential multivariate outliers of transformed data

Mahalanobis distance scores were computed to look for potential multivariate outliers with the transformed creativity data. Cases 174, 184, 48 and 50 were identified on box plots as outliers. These had z-scores of 3.77, 3.11, 2.17 and 3.07 respectively. The patterns of scoring for these cases can be seen in *Table A.6.9.*

Table A.6.9
Patterns of potential multivariate outliers for creativity variables intended to use in multivariate analysis

	Self-perceived creativity	Involvement in creative practice	Academic writing	Artistic writing	Visual art	Performance arts	Music	Domestic	Science	Heightened internal awareness	Intuition
Mean	5.06	5.33	1.06	1.29	3.17	1.14	.83	3.64	1.54	21.70	12.07
Std. Deviation	1.49	1.58	1.35	1.67	2.89	1.88	1.61	2.97	2.65	10.56	2.95
Case 48	5	5	**3**	**1**	**0**	0	0	4	0	**18**	**8**
Case 50	**2**	6	0	0	**9**	0	**1**	4	0	**6**	**11**
Case 174	7	7	**2**	**1**	**2**	0	0	**10**	**12**	**0**	**16**
Case 184	4	4	0	0	4	0	0	2	**11**	**6**	**3**

	Linear	Playful	Analogy	Oneiric	Emotional creativity	Remoteness of associations	Creative personality (Gough)	Flexibility	Drawing across the boundary	Originality
Mean	10.38	7.87	7.25	6.94	100.17	39.41	5.65	7.26	3.47	33.65
Std. Deviation	3.22	2.75	2.67	3.15	16.37	8.24	4.08	1.92	2.80	10.03
Case 48	9	6	6	4	**75**	46	**13**	4	0	**52**
Case 50	**16**	8	8	8	**73**	**25**	3	-	-	-
Case 174	10	4	**12**	7	**75**	47	**12**	**3**	2	**17**
Case 184	**15**	5	7	2	90	34	**12**	9	4	**49**

Three cases score very low on heightened internal awareness (50,174,184), all cases score low on emotional creativity and three cases score highly on creative personality. Cases 48 and 184 score highly on originality and on linear thinking, while cases 174 and 184 score high on scientific involvement. It was decided to leave these multivariate outliers in the analyses as they provide valuable information about different styles of being creative and as such are from the

intended population. However, to check their impact, the principal components analysis will be run with and without them.

A.6.2 Principal components analysis (PCA)

A.6.2.1 The use of PCA versus factor analysis (FA)

These techniques are used to help discover which variables are relatively independent of one another in a set of variables. In this case, to see which measures of creativity or coherent sub-groups of creativity measures are relatively independent of each other – reducing a number a variables to a smaller number of factors (FA) or components (PCA) in order to understand the relationships between the variables. Such 'components' are thought to reflect underlying processes that have created the correlations among variables – latent dimensions. In this study, the PCA will be exploratory, seeking to describe and summarize data, rather than to test a specific theory. PCA and FA are similar, except in the preparation of the observed correlation matrix (correlations between variables). In PCA all of the variance is analyzed, while in FA only the shared variance is analyzed (it attempts to eliminate error and variance unique to one variable). Limitations concerning assumptions (e.g. normality, outliers) apply with greater force to confirmatory FA. Hair et al. suggest that PCA be used when the minimum number of factors are required to explain the greatest amount of variance. However, they suggest that both FA and PCA will arrive at very similar results if the number of variables exceeds 30 or if most of the communalities exceed .60. As this analysis was exploratory, it was decided to examine all of the variance and choose PCA. PCA extracts factors by forming linear combinations between variables. The first component is the linear combination that accounts for the most variance. The second component accounts for the second greatest amount of variance, that is not accounted for by the first component, and so on. All are uncorrelated with each other.

A.6.2.2 Sample size

Hair, Anderson, Tatham and Black (1998) argue that a minimum of 50 cases is required, and preferably there should be 100 or above. They suggest that the minimum requirement is to have at lease five times as many cases as there are variables to be analyzed, and preferably to have ten cases per variable. Tabachnick and Fidell (1996) argue that the reliability of the analysis depends upon the reliability of the correlation coefficients, hence if these are strong, a smaller sample size is adequate, if they are weak, a larger sample size is required. As a general guide they state that a sample size of 100 is poor, 200 is fair and 300 is good, and that solutions with several high factor loadings (.80) require sample sizes of about 150.

With a sample of size of 211, this concurs with all recommendations. There are 15 creativity variables in the PCA, which means that there are over ten cases per variable. Further, the PCA had loadings above and just below .80, suggesting again, that the sample size, while being less than the ideal 300, is adequate for this analysis.

A.6.2.3 Missing values, normality, linearity and outliers

These issues have been addressed in previous sections.

A.6.2.4 The assumption of adequate degree of correlations

The data matrix must have sufficient correlations, that is, a number of correlations over .30. The observed correlation matrix, shows the correlations between the creativity variables. There were indeed a number of correlations above or near .30. This indicated that the data matrix is suitable for PCA. However, some variables correlated with the others to a greater degree than others, these variables that are more independent are more likely to form separate components. The general small to moderate effect sizes in this matrix was striking, illustrating the multi-dimensionality of the creativity construct.

A related assumption is that if there are 'true components' when partial correlations are conducted, these should be small – i.e. taking the scores of other variables are into account reduces the correlation, because it can be explained by the 'components'. This information is provided in the 'anti-image correlation matrix'. An examination of this showed all of the pairwise correlations are small, most being less than .10. The correlations of each variable with itself are reduced (from .10), but not small, ranging from .31 (self-perceived creativity) to .87 (music). These provide interesting information about how much each variable can be accounted for by the others. Self-perceived creativity and the importance of creative practice, were accounted for by the other variables to the greatest degree, while involvement in music, science, domestic crafts, academic writing and performance arts were more independent.

The Bartlett test of sphericity is a test that looks for the presence of correlations between variables, giving the statistical probability that the correlations matrix has enough significant correlations. It tests the hypothesis that the correlations in a matrix are zero. The approximate Chi-square was 666.536, df = 153, $p < .001$, indicating that the hypothesis that there are no significant correlations in the matrix can be rejected. However, Bartlett's test is very sensitive with large sample sizes, hence another way of assessing the issue of having enough significant correlations is the measure of sampling adequacy. The Kaiser-Meyer-Olkin measure of sampling adequacy is a ratio of the sum of squared correlations to the sum of squared correlations plus sum of squared partial correlations. If the value of partial correlations is small, this value approaches 1.0 (it ranges from 0 to1). Tabachnick and Fidell suggest that this statistic should be above. 60 to proceed with PCA, while Hair et al. suggest that .80 or above is meritorious, .70 or above is middling and .60 or above is mediocre, and below .50 is unacceptable. The Kaiser-Meyer-Olkin measure of sampling adequacy for the data matrix was .704, indicating that it is suitable for PCA.

The Kaiser-Meyer-Olkin measure of sampling adequacy can be assessed for each variable also, where only coefficients including that variable are included. These statistics were examined. All were between .62 and .93, except for: flexibility (.58) and domestic crafts (.53). According to the guidelines, this means that all of the variables fit adequately into the factor structure.

A.6.2.5 How many factors to extract

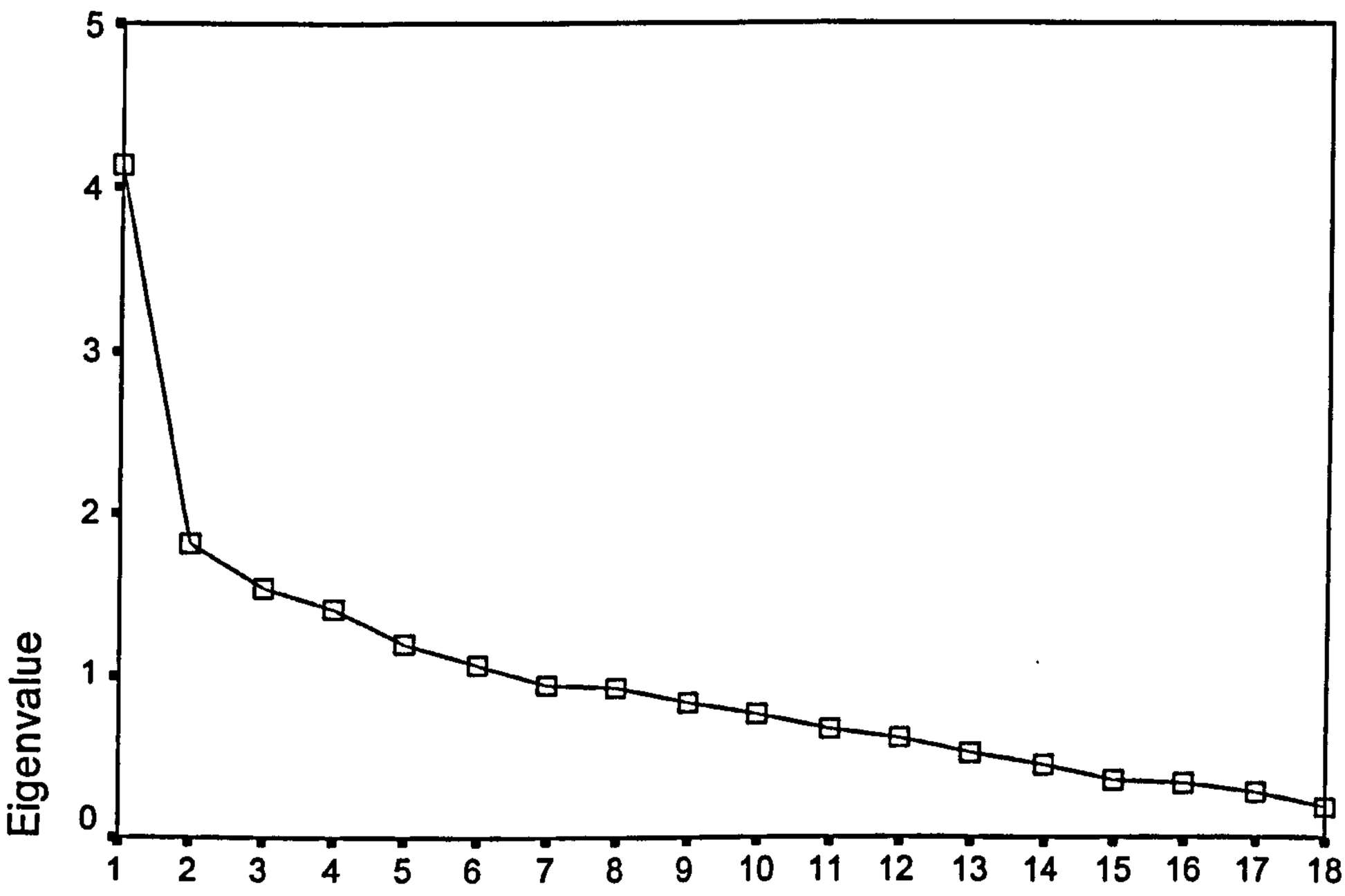
SPSS automatically selects factors with eigenvalues over 1, in this case six factors. The rationale for this approach is that each factor should be able to explain the variance of at least one variable. Each variable contributes a value of up to one to the 'eigenvalue' for a factor (hence it could range from zero to 20 in this case). Those factors with an eigenvalue of less than one are rejected as 'non-significant'. However, this accounts for only 62% of the total variables, which Hair et al. suggest is common practice in the social sciences. There are other ways of assessing how many factors should be extracted: by deciding for example to retain factors that explain more than a certain amount of variance, e,g, 5%; by looking at the scree plot, to see when the amount of variance that factors explain 'levels out'; or by deciding to include all factors that explain up to a set amount of variance, e.g. 90%. Hair et al. suggest that the eigenvalues method is most reliable

when there are between 20 and 50 variables, and that with less than 20 variables sometimes too few factors can be extracted, not representing the dimensions adequately, and with more than 50 variables, too many factors may be extracted. Hair et al. also suggest that if a sample is heterogenous, then the first factors will represent more homogenous variance (across the entire sample) while later factors may reflect the variance of sub-groups. In this sample, with people drawn from difference domains of creative endeavour, one might therefore expect these to emerge as later factors, and it might be advisable to explore this.

Through an analysis of the eigenvalues and scree plot and based on the meaningfulness of the factors, it was decided to extract seven factors, rather than the initial 6 factors. The eighth factor however, was difficult to interpret and hence was not seen as adding extra value to the analysis.

Figure A.6.6

Scree plot



A.6.2.6 Rationale for choice of rotation

Rotations are used to maximize high correlations and minimize low ones, in order to make interpretation of factors easier, and observe the key patterns. Orthogonal rotations maintain the axes of the rotation at 90 degrees in contrast to oblique rotations. The latter are used less commonly as the analytic procedures are less developed (Hair et al., 1998, p. 109). Orthogonal rotation maximize the differences between the factors, hence they are not correlated with each other. The varimax rotation is the most commonly used orthogonal rotation, as it simplifies both the rows and the columns of the factor matrix, attempting to minimize the number of variables

that have high loadings on a factor. Oblique rotations allow correlations between factors, instead of maintaining independence. Hair et al argue that if the goal of research is to reduce the number or original variables, no matter how meaningful they are, then an orthogonal rotation should be chosen. However, oblique rotations may be more meaningful as it is likely that factors are correlated in reality. The drawback of oblique rotations is that they may simplify the factor pattern (Norusis, 1988). However, the oblique rotation was selected, as this was considered to provide meaningful information about the relationships between the factors. However, the value of examining the relationship with orthogonal components of creativity with ASCs is also seen, as this may provide a more abstract but 'purer' analysis – as they represent the unique contribution of each factor, and do not share variance. Hence both are seen as valuable. The orthogonal factors and oblique factors were compared – both rotations led to a similar factor structure.

When an oblique rotation is conducted two matrices are produced. The pattern matrix fives the factor loadings and the values in this represent *unique* variance – and the components represent the 'pure' non-overlapping variance. However, the second matrix – the structure matrix represents the degree of correlation between each component and each constituent variable – including overlap with the correlated factors.

A.6.2.7 Factor scores

Regression factor scores were estimated for each case for use in future analyses. These can be correlated with each other. When PCA is used, all available methods for producing factor scores on SPSS result in the same score. Factor score for each case are obtained by multiplying standardized values for each variable on a factor (factor scores coefficients) with the score obtained by the case, and summing these.

A.6.2.9 Checks post analysis

Data with similar 'splits' in the distribution can correlate more highly with each other. Spurious factors can arise for such reasons (Gorsuch, p. 293), typically extra factors. Variables in such factors typically have similar mean scores. These are called 'difficulty' factors, for example, if scores pile up at one end because everyone finds them easy, while some variables scores pile up at the other end the 'easy variables will correlate with each other, and the difficult variables will correlate with each other. Gorsuch hence recommends avoiding variables with extreme skews. However, in this analysis, the variables with skews are those concerning creative involvement in various domains, and these do not represent 'easyness' or difficulty, simply different patterns of behaviour. Support for this is evidenced in that these variables load on different factors.

APPENDIX 6.4

Group comparisons

In order to further explore the characteristics of the seven components of creativity that emerged from the PCA, factor scores (computed for each participant based on regression equations of loadings for each component) were compared across the following group differences: gender; age; profession (artists, scientists and 'other'); and the practice of a mental discipline (e.g. meditation) versus no practice. The scores on the ASASC and ego-strength were also compared across the same groups. Kruskal Wallis one-way MANOVAs, and post hoc Mann-Whitney-U tests where required, were performed. Non-parametric tests were used as two creativity components were slightly skewed (music and performance arts and scientific creative personality).

A.6.4.1 Gender and creativity components

Females scored significantly higher than males on both emotional creativity (z = -3.46, p = .001) and involvement with domestic crafts and visual arts (z = -3.17, p = .002), while males scored significantly higher on 'scientific creative personality' (z = -2.81, p = .005). There were no significant gender effects for the remaining creativity components (artistic creative personality, music and performance arts, figural-DT and writing and remoteness-of-verbal-associations) the means scores for which are displayed in *Table A.6.4.1.*

Table A.6.4.1

Mean creativity component scores for males and females

	Males (N=101)	Females (N=108)
Emotional creativity	-.25	.23
Writing and remoteness-of-verbal-associations	.09	-.07
Figural divergent-thinking	.02	.01
Artistic creative personality	-.09	.10
Domestic crafts and visual art	-.24	.23
Music and performance arts	.01	.01
Scientific creative personality	.24	-.23

A.6.4.2 Gender, ASC-proclivity and ego-strength

Females had significantly higher scores on ASC-proclivity than males (z = .-2.97; p = .003). They also had significantly higher scores for: extraordinary mental processes; parapsychological experiences; esoterics; positive mystical experiences; dreams; and hallucinations (the mean

values and associated probabilities for which are displayed in *Table A.6.4.2*). There were no differences between males and females on the ASC sub-scales of: negative mystical experiences; vividness of imagination; a tendency for dissociation; hypersensitivity; or changed feelings of space and time. However, males scored significantly higher than females on ego-strength (z = -3.37, p = .001).

Table A.6.4.2

Mean ASC and ego-strength scores for males and females

	Males (N=101)	Females (N=108)	*Z*	*p*-value (2-t)
Extraordinary mental processes	10.78	13.03	-2.36	.02
Parapsychological experiences	7.910	9.85	-2.58	.01
Esoterics	3.64	6.81	-4.15	.00003
Positive mystical experiences	12.46	15.65	-2.29	.02
Negative mystical experiences	11.51	13.04	-.46	.64
Imagination	12.61	13.33	-1.44	.15
Dreams	11.96	14.84	-2.72	.006
Dissociation	10.66	10.89	-.40	.69
Hallucinations	9.72	12.81	2.74	.006
Hypersensitivity	5.14	5.87	-1.07	.28
Changed feelings of time and space	8.30	10.61	-1.89	.06
Total score on the ASASC	104.42	126.70	-2.97	.003
Ego strength	28.98	26.06	-3.37	.001

A.6.4.3 Age and creativity components

The only creativity component with a significant age effect was involvement in 'music and performance arts' (*Chi-square* = 139.98, df = 6, p = .03), where involvement steadily decreased as age increased. The mean level of involvement for each of seven age groups can be seen in *Table A.6.4.3.*

Table A.6.4.3

Mean music and performance scores according to age groups

	< 20 (N=6)	21-30 (N=51)	31-40 (N=51)	41-50 (N=42)	51-60 (N=38)	61-70 (N=10)	70 + (N=11)
Music and performance arts	.95	.16	.04	.01	-.21	-.40	-.47

A.6.4.4 Age, ASC-proclivity and ego-strength

There were no significant differences between age groups on total ASC-proclivity, but one category of ASC, negative mystical differences did differ with age (*Chi-square* = 38.27, df = 6, p = .000001). There was also a significant age difference for ego-strength (*Chi-square* = 16.75, df

= 6, p = .01). *Table A.6.4.4* shows that mean scores for negative mystical experiences tended to decrease with age, while ego-strength tended to increase with age.

Table A.6.4.4

Mean negative mystical experience and ego-strength scores according to age groups

	< 20 (N=6)	21-30 (N=51)	31-40 (N=51)	41-50 (N=42)	51-60 (N=38)	61-70 (N=10)	70 + (N=11)
Negative mystical experience	15.67	13.81	16.41	12.33	9.69	3.00	1.18
Ego-strength	24.08	26.47	26.07	27.94	28.37	32.05	31.36

A.6.4.5 Practice of a mental discipline and creativity components

The group that practiced a mental discipline (e.g. meditation, yoga, daily prayer) had significantly higher scores on emotional creativity than those who did not report practicing a mental discipline (z = -4.74, p = .000002). There were no other significant differences between the groups, although there was a trend for those that practiced a mental discipline to have higher scores on artistic creative personality (z = 1.88, p = .06), as can be seen in *Table A.6.4.5.*

Table A.6.4.5

Mean creativity scores according to practice of a mental discipline

	Practice a mental discipline (N=85)	No practice of a mental discipline (N=125)	*Z*	*p*-value (2-t)
Emotional creativity	.40	-.27	-4.74	.000002
Writing and remoteness-of-verbal-associations	.13	-.08	-1.57	.12
Figural divergent-thinking	.03	-.02	-.023	.98
Artistic creative personality	.17	-.12	-1.88	.06
Domestic crafts and visual art	.02	-.01	-.16	.87
Music and performance arts	.06	-.04	-1.44	.15
Scientific creative personality	-.04	-.02	-.38	.70

A.6.4.6 Practice of a mental discipline, ASC-proclivity and ego-strength

The group that practiced a mental discipline had significantly higher total ASC scores (z = -3.93, p = .0001) as well as significantly higher scores on all of the ASC sub-scales except negative mystical experiences and imagination (z = -1.8, p = .89). The mean values and probability values are displayed in *Table A.6.4.6.* The biggest difference between the groups was on positive mystical experiences (z = -4.72, p = .000002). There was no significant difference between the

groups on ego-strength, suggesting that those who practice a mental discipline are more likely to report 'unusual experiences', but not those associated with dissolution of self or negative emotions, and do not differ from those who do not practice a mental discipline in terms of resilience or mental health.

Table A.6.4.6

Mean ASC and ego-strength scores according to practice of a mental discipline

	Practice a mental discipline (N=85)	No practice of a mental discipline (N=125)	*Z*	*p*-value (2-t)
Extraordinary mental processes	12.91	11.17	-2.17	.030
Parapsychological experiences	9.988	8.116	-2.43	.015
Esoterics	7.15	3.94	-3.39	.001
Positive mystical experiences	18.47	11.00	-4.72	.000002
Negative mystical experiences	13.69	11.19	-.18	.86
Imagination	13.52	12.53	-1.8	.07
Dreams	15.52	11.98	-2.9	.003
Dissociation	12.07	9.85	-3.22	.001
Hallucinations	13.92	9.43	-3.05	.002
Hypersensitivity	6.71	4.64	-3.38	.001
Changed feelings of time and space	11.14	8.28	-2.30	.02
Total score on the ASASC	135.09	101.79	-3.93	.00001
Ego strength	27.16	27.71	-.28	.78

A.6.4.7 Professional involvement and creativity components

There were significant group differences between artists, scientists and other professions on emotional creativity (*Chi-square* = 12.46, df = 6, p = .002), artistic creative personality (*Chi-square* = 27.84, df = 6, p=.000001), music and performance arts (*Chi-square* = 17.23, df = 6, p = .0002) and scientific creative personality (*Chi-square* = 42.39, p = .0000000001).

As shown in *Table A.6.4.7*, artists had the highest mean scores for emotional creativity, artistic creative personality and music and performance arts, while scientists had the lowest scores on these components. Artists scored significantly higher than other professions on emotional creativity (z = -3.15, p = .002), artistic creative personality (z = -5.12, p = .0000002) and music and performance arts (z = -2.97, p = .003). Scientists scored significantly higher than other professions on 'scientific creative personality (z = -6.41, p = .0000000002) and there was a trend for scientists to score higher than other professions on writing and remoteness of associations (z = -1.93, p = .05). Artists scored significantly higher than scientists on emotional creativity (z = -2.94, p = .003), artistic creative personality (z = -3.75, p = .0002) and music and performance arts (z = -4.25, p = .00002). Finally, scientists scored significantly higher than artists

on scientific creative personality (z = -5.18, p = .0000002). The different professions do not differ on figural-DT scores or on domestic crafts and arts.

Table A.6.4.7

Mean creativity scores and omnibus significance statistics according to professional group

	Artists (N=36)	Scientists (N=27)	Other (N=148)	*Chi-Square*	df	*p*-value
Emotional creativity	.51	-.34	-.06	12.46	6	.002
Writing and remoteness-of-verbal-associations	.14	.29	.09	4.94	6	.08
Figural divergent-thinking	.12	.05	-.04	.45	6	.80
Artistic creative personality	.82	-.26	-.15	27.84	6	.000001
Domestic crafts and visual art	-.09	.11	.00	1.00	6	.61
Music and performance arts	.60	-.51	-.05	17.23	6	.0002
Scientific creative personality	.21	-1.50	.22	42.39	6	.000000001

These group differences provide some construct validity for the components of creativity, as professional scientists score significantly higher than other professions on the scientific creative personality sub-scale, and professional artists score higher than other professions on artistic creative personality and music and performance arts.

A.6.4.8 Professional involvement, ASC-proclivity and ego-strength

There was a significant difference across the professions (artists, scientists and 'other') on total ASC scores (*Chi-square* = 17.42, df = 2, p = .0001). Artists have the highest and scientists the lowest mean scores on each ASC sub-scale, as delineated in *Table 6.13*. These all reach statistical significance apart from dissociation. There were also significant group differences for ego-strength, where conversely, scientists scored the highest and artists the lowest.

Post hoc tests showed that artists scored significantly higher than scientists (p < .02) on all ASC sub-scales except for dissociation, and higher on total ASC-proclivity where z = -3.93, p = .00008. There were less significant differences between scientist and other professions, however, the latter scored significantly higher on: extraordinary mental experiences, esoterics, negative mystical experiences and hallucinations (p < .04) and on total ASC-proclivity (z = -2.49, p = .01). Finally, artists scored significantly higher than other professions on: extraordinary mental processes, positive mystical experiences, imagination, dreams, hallucinations, hypersensitivity and changed feelings of time and space (p < .02), and on total ASC-proclivity (z = -3.15, p = .002).

Table A.6.4.8

Mean ASC-proclivity and ego-strength scores and omnibus significance statistics according to professional group

	Artists (N=36)	Scientists (N=27)	Other (N=148)	*Chi-Square*	df	*p*-value
Extraordinary mental processes	14.90	8.11	11.82	16.36	2	.0003
Parapsychological experiences	10.25	6.78	8.92	6.01	2	.05
Esoterics	7.14	2.04	5.38	15.977	2	.0003
Positive mystical experiences	21.47	12.04	12.58	14.65	2	.001
Negative mystical experiences	16.61	4.96	12.46	12.62	2	.002
Imagination	14.97	12.11	12.58	11.37	2	.003
Dreams	17.40	11.07	12.91	10.00	2	.007
Dissociation	12.44	10.22	10.46	3.83	2	.15
Hallucinations	16.57	6.85	10.81	14.00	2	.001
Hypersensitivity	7.91	3.89	5.20	11.68	2	.003
Changed feelings of time and space	13.63	6.44	9.00	12.57	2	.002
Total score on the ASASC	153.62	84.52	111.95	18.42	2	.0001
Ego strength	25.59	30.65	27.36	10.53	2	.005

Scientists had significantly higher ego-strength scores than artists (z = -3.12, p = .002) and other professions (z = -2.61, p = .009). There was no significant difference between artists and other professions on ego-strength.

A.6.4.9 Summary of group differences

Females scored significantly higher than males on emotional creativity, domestic crafts and visual arts, and on total ASC-proclivity; while males scored higher on scientific creative personality and ego-strength.

Older participants scored higher on ego-strength and lower on negative mystical experiences and involvement in music and performance arts.

Those who practiced a mental discipline scored higher on emotional creativity and ASC-proclivity, but there was no group difference for ego-strength or other dimensions of creativity.

Artists had higher ASC-proclivity than both scientists and other professions, and other professions had higher ASC-proclivity than scientists. This outcome concurs with Ayers, Beaton and Hunt (1999) who found that 'creative artists' in comparison to 'non creative' controls experienced significantly more positive ASCs. Artists also scored higher than other groups on emotional creativity, music and performance arts and artistic creative personality. Scientists scored higher on scientific creative personality and ego-strength than other groups. There was no significant difference between artists and other professions on ego-strength. There was no significant difference between professional groups on domestic crafts and arts, remoteness-of-

verbal-associations or figural divergent-thinking. These outcomes support the contention that ASC-proclivity varies with domain involvement, and Albert and Runco's (1987) hypothesis that that the 'scientist' versus the 'artist' is less frequently and intensely concerned with internal, affective and intrapersonal/interpersonal content (as discussed in Appendix 4.5). Further, that scores of 'cognitive measures' of creativity do not differ significantly between artists and scientists supports the view that the making remote associations is domain generic, which might interact with domain and cognitive-style to lead to 'varieties of creativity' (refer to *Appendix 2*).

APPENDIX 6.5

'Raw' creativity – ASC correlations

In this appendix the non-transformed, non-componential, non-parametric correlation coefficients and probabilities for the relationship between creativity measures and altered states of consciousness are displayed. The shared variance with any other variables (e.g. gender, ego-strength or age) is not partialled out. They are displayed here to illustrate that the correlations displayed in Table 6.7 are not artefacts of the statistical treatments the data was submitted to.

Table A.6.5.1

Correlations between total scores on the creativity measures and ASASC sub-scales

	Emotional creativity	Creative personality	Self-perceived creativity	Figural divergent thinking	Boundary crossing	Remoteness of verbal associations
Extraordinary mental processes	.466** (.000001)	-.013 (.857)	.176* (.012)	.012 (.873)	.200* (.018)	.103 (.148)
Parapsychological experiences	.361** (.000001)	.074 (.287)	.194** (.005)	.080 (.304)	.149 (.081)	.015 (.830)
Esoterics	.375** (.000001)	.091 (.188)	.162* (.019)	.024 (.762)	.194* (.023)	.014 (.842)
Positive mystical experiences	.514** (.000001)	.198** (.004)	.354** (.000001)	.103 (.185)	.177* (.038)	.239** (.0007)
Negative mystical experiences	.381** (.000001)	-.091 (.190)	.017 (.812)	.036 (.642)	.097 (.258)	.101 (.156)
Imagination	.423** (.000001)	.200** (.004)	.459** (.000001)	.206** (.007)	.342** (.00004)	.146* (.039)
Dreams	.510** (.000001)	.147* (.034)	.276** (.00006)	.216** (.005)	.184* (.031)	.126 (.090)
Dissociation	.457** (.000001)	.176* (.011)	.226** (.001)	.111 (.153)	.291** (.0005)	.051 (.474)
Hallucinations	.519** (.000001)	.022 (.751)	.287** (.00003)	.075 (.335)	.145 (.090)	.166* (.019)
Hypersensitivity	.459** (.000001)	.039 (.572)	.163* (.019)	.001 (.992)	.126 (.140)	.121 (.088)
Changed feelings of time and space	.410** (.000001)	.140* (.044)	.242** (.0004)	.023 (.765)	.278** (.001)	.178* (.012)
Total score on the ASASC	.611** (.000001)	.122 (.080)	.308** (.000006)	.101 (.191)	.255** (.003)	.187** (.008)

Note: ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed). Spearman *rho* correlations.

Table A.6.5.1

Contd. [Correlations between total scores on the creativity measures and ASASC sub-scales]

	The importance of creative practice	Involvement in visual art	Involvement in performance arts	Involvement in music	Involvement in writing	Involvement in science	Involvement in domestic crafts
Extraordinary mental processes	.159* (.021)	.315** (.000003)	.153* (.027)	.126 (.071)	.141* (.042)	-.189** (.006)	.046 (.510)
Parapsychological experiences	.165* (.017)	.173* (.012)	.192** (.005)	.107 (.124)	.152* (.029)	-.071 (.304)	.111 (.111)
Esoterics	.140* (.045)	.198** (.004)	.154* (.026)	.095 (.173)	.105 (.132)	-.148* (.033)	.056 (.423)
Positive mystical experiences	.299** (.00001)	.291** (.00002)	.182** (.008)	.108 (.123)	.255** (.0002)	-.063 (.364)	.066 (.348)
Negative mystical experiences	.019 (.785)	.095 (.172)	.105 (.133)	.140* (.044)	.110 (.117)	-.064 (.364)	-.012 (.863)
Imagination	.381** (.000001)	.325** (.000002)	.198** (.004)	.057 (.411)	.227** (.001)	-.102 (.144)	.091 (.189)
Dreams	.294** (.00002)	.286** (.00003)	.185** (.007)	.111 (.110)	.307** (.000006)	-.084 (.225)	.120 (.084)
Dissociation	.236** (.0006)	.270** (.00008)	.072 (.302)	.057 (.414)	.128 (.065)	.008 (.913)	.086 (.225)
Hallucinations	.223** (.001)	.321** (.000002)	.206** (.003)	.116 (.096)	.217** (.002)	-.103 (.139)	.028 (.693)
Hypersensitivity	.148* (.033)	.191** (.006)	.256** (.0002)	.125 (.073)	.124 (.075)	-.057 (.416)	.017 (.811)
Changed feelings of time and space	.180** (.010)	.271** (.0001)	.122 (.078)	.156* (.024)	.223** (.001)	-.067 (.335)	.050 (.472)
Total score on the ASASC	.286** (.00003)	.340** (.000001)	.206** (.003)	.139* (.046)	.260** (.0002)	-.114 (.103)	.072 (.305)

Note: ** Correlation is significant at the 0.01 level (2-tailed); * Correlation is significant at the 0.05 level (2-tailed). Spearman *rho* correlations.

APPENDIX 8.1

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CREATIVITY AND ESP – AN EXPERIENCE SAMPLING STUDY

Nicola J. Holt

PARTICIPANT INFORMATION

Thanks for taking interest in this research, the aim of which is to investigate the relationship between creativity and ESP (extra-sensory perception*) in a novel research design, where you can take part at the time and place of your choice. This basically involves recording any impressions you have over 24 hours about a 'telepathy target' as you go about your daily life. In the following I will describe previous research that led to this study design and give you practical details about what being a participant in this study involves.

** The term extra-sensory perception (ESP) includes telepathy (mind-to-mind communication), precognition (information from the future) and clairvoyance (picking up information from an external object) – all of which occur without the use of known senses or communication channels as understood by contemporary science or the use of logical inference.*

Record impressions on the PDA

Study background and rationale

EXPERIENCE SAMPLING – This study is using a method that has previously been used in other areas of psychology to assess peoples' behaviour and experience in 'every day life' (e.g. looking at what triggers feelings of stress or happiness) – experience sampling methodology. This involves you with a 'mini-computer' that you can carry around with you, and use to record

thoughts and experiences as they occur, thus reducing memory distortions associated with trying to recall events at a later date. This type of study has the advantage of enabling people to record behaviour directly rather than considering how they might behave in abstract examples (e.g., in questionnaires) or taking part in laboratory experiments (which might make people behave artificially, e.g. they may find it hard to relax in an ESP experiment in a strange environment). In this study, the experience that is of interest are thoughts about what an ESP target might be. The experience sampling is 'event triggered' – that is, you determine when to record information. You may do this more than once and in different ways, for example you might set time aside to take part, focusing on the ESP task and recording what happens, or an idea or experience might pop into your mind spontaneously. The precise details of how to do this will be described in the following sections. It is hoped that this method will sample examples of 'ESP experiences' as they arise in daily life for the first time. *Importantly, this design will give you more control,* enabling you to take part in an ESP trial in your own preferred environment *and style, rather than* in that imposed by a laboratory study.

CREATIVITY AND ESP – In addition to exploring ESP 'naturalistically', in this study the potential links between being creative and having ESP experiences are being explored. For this reason there are a number of creativity measures to complete, for example asking about artistic and scientific activities you might be involved in, assessing aspects of personality that have been linked to being creative, and taking part in a creativity 'drawing game'. This will enable me to assess if any of several types of creativity are linked to ESP.

There is a body of work in parapsychology known as 'ganzfeld research'. This is so called because this ESP testing protocol uses an altered state induction technique (to encourage a dreamy, half-awake state) called the 'ganzfeld' (which means 'even or whole field') because perceptual input is kept at a low level with little variation. One person, called a 'receiver', lies in this relaxed state for half an hour and observes their imagery, while simultaneously, a friend, called 'the sender' tried to send them a piece of randomly selected information by telepathy (usually a video clip). These studies have been carefully designed and automated by computers to rule out any means of communicating through 'normal channels' or the guessing of information by logical inference. After this 'sending-receiving period', the receiver (who has been alone in a sound-proof room some distance away from the sender) watches four video clips on a computer screen. They compare these clips to the impressions they received in the ganzfeld and based on this choose which one they think their friend was 'sending' to them. Sometimes an independent person does this judging stage, based on recordings of the free associations the receiver makes whilst speaking out loud in the ganzfeld. These studies have been ongoing since the 1970s and when the results of them are combined it appears that people choose the correct clip (the one their friend was sending) more often than that predicted by chance alone (which is 25% of the time) to a highly statistically significant degree.

Interestingly, studies that have worked exclusively with artists (e.g. painters, actors, writers, musicians) have obtained even higher ESP scores in the ganzfeld. However, it is not clear why this is – it might be due to certain personality characteristics that are more common to artists (e.g. higher belief in the paranormal), it might be something to do with creativity (e.g. loose, unconstrained thinking), or it might be something about involvement in the arts per se (e.g. high levels of imaginative involvement) or there might be something about artists that makes them feel more comfortable in the ganzfeld laboratory environment (e.g. with its emphasis on 'performing', it's unusualness, or its focus on visual imagery). This study aims to explore which of such factors

might contribute to ESP success – with a similar study design, except that 'receivers' will not be ganzfeld, as described in the previous section.

What the study involves

There are three key stages to this study: 1) completing the personality and creativity questionnaire; 2) for a day (24 hours) recording any impressions you may have had about a 'target', and filling in a brief questionnaire about your state of mind when you received the impression – this is the main part of the study; 3) finding out what the target information was (watching the clip that I was sending to you telepathically) and comparing it to the impressions you gained.

THE ESP TRIAL DAY – I will meet with you before the ESP trial begins and describe to you how to record your experiences with the 'mini-computer' and answer any questions you may have about the study. I will then not communicate with you again until the trial has been completed. If you have any problems e.g. can no longer participate in the study or have questions about participation, you can email me or telephone a colleague who will pass on a message to me and try to assist you.

The design of the study follows on from that of the ganzfeld studies, except as the 'receiver', rather than being in the 'ganzfeld room' for half an hour, you will be able to record any impressions at any point during the day (or night). I will be a 'sender'. I will run a computer program that will randomly select a video clip from a selection. This could be any sort of clip, from a documentary, advert, film, TV programme or cartoon. There will only be one clip for the entire day. I will focus on this clip at several points throughout the day and will attempt to send the information to you telepathically. But, this study is looking for a general ESP effect – you could always pick up information by clairvoyance (from the clip itself) or precognition (from the moment when you find out what the target is and watch it). Ganzfeld studies have been shown to work well with a sender who is not well known to a receiver, so there is no need to worry about this.

Your part in the study will be to play the role of the 'receiver'. To some extent how you go about this is quite flexible, you have been given the control over how often, where and when you take part, although at least once each day is required to participate. You will be given a 'mini-computer' or personal digital assistant (PDA) to carry around with you. It is best to keep this with you at all times in case you want to jot down an idea or thought. It is unobtrusive and could fit easily into a pocket or bag, being not much bigger than a mobile phone (measuring 10x7x1.5 cm). You can take part in various ways, such as: you could relax in a quiet space and 'free-associate' like people do in the ganzfeld, simply following thoughts, images, as they pop into your mind, even if they seem irrelevant and recording them simultaneously or immediately afterwards; you could record thoughts that flit through your mind as you are falling asleep or waking up; or you could record thoughts that pop into your mind as you go about your day. It is best to generate a focus and positive intention to pick up ESP impressions about the target at the start of the day – to keep you alert to any 'impressions' you may receive. These recordings can be as brief or as detailed as you like, and they can be recorded as words/speech or as drawings.

You can save your thoughts by recording your spoken voice or by writing/sketching with a stylus on the PDA's screen. After you have done this, there is a questionnaire to fill in, which also runs on the PDA. This will ask you questions about your experience, focusing on your state of consciousness. This is so I can see if ESP works better in some waking states than others. It

will also ask a few questions about what kind of target you think I might be 'sending' to you. In the following section I will go into more detail about how to use the PDA.

After this 'sending/receiving day' I will meet up with you to show you what the target was and we can chat about your experience. If you like you can compare the target to your recordings.

It is important to record your impressions clearly and with required detail convey the main aspects of your experiences, because in this study we will be using independent judges (2 members of our research unit) to read transcripts of the recordings (anonymously) and guess (from the target clip and 3 decoy clips) which clip I was sending you.

The ESP program and the Personal Digital Assistant (PDA)

I will give you a PDA and a charger for it. It is best to put the PDA in the charger overnight, in case the battery is getting low after a days usage. Please keep the PDA charged up, because they lose the data if the battery goes flat!

When you switch on the PDA, with a button on the top left (which has a green line on it) a main screen should appear. This should have only three icons on it. Along the top of the screen there is the time at the left hand corner, there is a 'battery' icon which lets you know how much power there is left and to the right there should be the letters 'ESP'[1]. The three icons below this are: 'ESP' (the questionnaire), 'Notepad' (to write or draw on) and 'voice memo' (to record thoughts). These are all that you need to record your experiences and impressions. I will describe each of these in turn. But first, I will describe features of the PDA that will help you to use these tools.

The stylus – you need this to 'tap' on the screen to select items (the equivalent to moving the pointer about with a 'mouse'). The stylus also lets you write in 'notepad' as if it were a pen. The stylus is stored in the PDA. It is pushed into the top of it, on the right-hand side. To get it out you press the top of it and it springs up so that you can pull it out. So, for example, if you want to go into 'notepad' you just tap on the icon for it on the PDA's screen, with the stylus, and 'notepad' will open. Remember always to replace the stylus in the PDA when you have finished with it.

The slider – The bottom half of the PDA slides open, so that it expands. When you do this you see the icon of a house – 'home'. Tapping on this will take you back to the ESP home page and out of any of the three programs you will be using. There is also a 'sketch pad' that has the letters 'ABC' on the bottom left hand corner. Tapping on 'ABC' makes a keyboard come up so that you can type in text with your stylus (you might need this in the questionnaire).

The joystick – there is a silver dial on the bottom of the PDA, in the centre, which allows you to scroll up and down pages, simply press either the top or bottom of it.

VOICEMEMO – this is the easiest way to record impressions, by speaking into the PDA, which will electronically record your spoken thoughts. There is 58 minutes worth of recording time for you to use over the two days. To initiate this just tap on the 'voicememo icon', which looks like a microphone. There should be no stored files when you first start, so press 'new', which will open up a new session. You will see a red button. You press this to start recording. There is also a black button. You press this to stop recording. The bar above these shows you how much time

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[1] If the screen has more than three icons and words other than 'ESP' appear in the top right hand corner, then you need to re-select the right 'menu'. You do this by tapping on the words in the right hand corner with the stylus, which can be pulled out of the PDA (it is pushed into the right hand side in the top, press on the top of it, and it should pop out). A selection of menus should appear, simply select the one called 'ESP', the other menus have irrelevant background programs in them that you will not need to use.

you have available for recording, this ranges from 00:00 to the maximum time available 58:00. The number above the bar shows you how many seconds you have been recording for. When you are recording, the word '*Recording*' *appears at the top* of the screen. The microphone of the PDA is on the left hand side at the top. When you press stop you can either press '*Done*' *to exit*, or 'New' to record something else. If you press the loudspeaker icon you can adjust the volume of the voice recorder. When you press 'Done' the recording will be saved according to date and time. Please do not alter these! If you want to listen to the recording tap on the save record and it will play automatically. This is perhaps not advisable as it may make you self-conscious. Please do not delete any impressions. To return to the main page tap on the 'home' icon.

NOTEPAD – An additional way to record impressions is by tapping on the 'notepad' icon. This opens up a blank page, which you can simply write or draw on like a piece of paper with the stylus. You can scroll up or down the page with the joystick. You can alter the thickness of the link by tapping on the icon at the bottom right of the screen that looks a bit like a pencil. You can also select an eraser here to rub out errors. When you have finished press 'Done'. If you want to write more press 'New'. To scroll between different notes, you can press to go right or left on the joystick. Again, the PDA will save your note according to date and time. Please do not alter these. To return to the main page tap on the 'home' icon.

ESP – The final of the three icons is the experience-sampling questionnaire. *Please complete one of these every time you record a potential ESP impression.* This asks you a series of questions about your experience and your state of consciousness while you received potential ESP impressions. After you have recorded your voice memo or made notes/sketches, tap on the circular 'ESP' icon. To start answering questions, tap the following screen. This will start the ESP questionnaire, which will begin by describing some of the question formats to you. It will let you know that most of the questions are answered by moving a bar on a slider (with the stylus) to a point that reflects your opinion/experience. This slider measures your degree of agreement on a continuum, from 0% to 100%, with a statement, and may ask you to position yourself between two extremes somewhere along this, e.g. between being 'very focused' and 'very distracted' in your thoughts. It also lets you know that some ends of the slider will be denoted by 'SA' (strongly agree' and SD 'strongly disagree' (in response to a statement). Press continue, and a series of questions will ensue. Move the bar on the slider to a point you are happy with for each question and then tap on 'Done' and the next question will appear. If options appear in 'button', just click on the button that best describes your opinion. In two questions you may enter some text if you wish. To do this, click on 'ABC' which is on the bottom left of the 'sketchpad' beneath the PDA's screen, and a keyboard should appear. You can tap appropriate letters to spell out your response. Click on 'Done' when you have finished. Please continue until you see the message 'Questionnaire completed. Thank you' or else your responses will not be saved. To return to the main page tap on the 'home' icon.

Please remember to charge the PDA up overnight.

SO, THE BASIC PROTOCOL FOR TAKING PART IS TO:

- record impressions that constitute an 'ESP trial' at your own discretion;
- then fill in an ESP questionnaire about it (one for each separate 'ESP trial').
- You can do this as often or little as you like, bearing in mind that there is only about 55 minutes worth of voice recording time.

Other considerations

All responses to questionnaires and ESP trials will be stored anonymously and any recordings will be used with confidentiality and for the purposes of this research study only - they will only be listened to by myself who will transcribe them. The transcriptions will then be read, along with any other notes or sketches, by the independent judges (members of the parapsychology research group) who will be blind to the identity of the recorder. The recordings will be destroyed after this.

This study is not testing for psi on an individual basis, so the outcome of any particular trial is not indicative of psi ability per se. Different people may perform optimally on ESP tasks in different conditions and circumstances, we are still seeking to understand such processes. All analyses will be group-based, for example, to see if more participants than we would expect by chance provide information that enables the independent judges to select the target clip from the decoy clips.

You are free to withdraw from taking part in the study, or from answering individual questions within the study, at any point, with no obligation to continue if you no longer wish to do so. If you are in the middle of a trial when you make this decision, you imply need to discontinue and inform myself of this via email (Nicola.holt@northampton.ac.uk) or telephone my colleague to leave a message (01604 892485) and arrange to return the equipment.

If you have any difficulties with the equipment or any questions during the trial, please email me, text me on 07811341419, or phone my colleague as above.

There is no deception involved in this study, but if you wish to learn more about the hypotheses of the study after participating you are free to ask, and if you wish to learn about the final outcome of the study, please leave contact details on the consent form. I will ask you to sign a consent form, simply stating that you agree to take part in the ESP study and to return the PDA after the trial.

A few of the video clips are emotionally negative, but these are not considered to be especially disturbing or violent and are taken from films in the popular domain. Other clips are positive or emotionally neutral. No psychological harm is envisaged by this study. Indeed, it is hoped that participating in this project will be an enjoyable, interesting and unique experience that will give you the opportunity to explore your own thought processes. The value of taking part in such research is such that it may help us to understand the processes of ostensible ESP, and the conditions in which it does and does not appear to be successful.

Please email me (nicola.holt@northampton.ac.uk) or phone me (01604 892485) if you are interested in arranging an ESP trial, would like a questionnaire to fill in, or want to ask me any questions about the study.

APPENDIX 8.2

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CREATIVITY AND ESP QUESTIONNAIRE

Thank you for expressing interest in this study, the aim of which is to explore the relationship between ESP (extra-sensory perception), artistic involvement and creativity. Following are a number of measures concerned with creativity, personality, experience and beliefs. The results from these will enable me to rule out the impact of possible 'interfering' factors when looking at the relationship between artistic involvement and ESP, such as belief in the paranormal and extraversion. Please complete each section as quickly, accurately and honestly as possible. There are no right or wrong answers and you are requested to answer on the basis of your own experiences and beliefs, not on the basis of logic. Your first intuitive response is usually the best. Don't worry about any apparent contradictions in your responses. If you change your mind, please erase your first answer completely.

Responses to these questions will not be analysed at an individual level, but across individuals. All responses will be anonymous and treated with utmost confidentiality and will be used for research purposes only. Please try to answer all of the questions in each scale, but note that you are of course free to skip a question or to discontinue with the study if you wish.

If you would like to receive feedback on the overall results of this study, please indicate this on the consent form for this study, so that any personal details (e.g. email address are not attached to this questionnaire).

Thanks, Nicola

Participant Number

1. Gender Male Female
2. Age _____
3. Occupation (If a student/academic, please state your subject areas)

_____

4. How creative would you describe yourself to be?

Not at all creative						Highly creative
1	2	3	4	5	6	7

5. Is involvement in a creative practice an important purpose in your life?

Not at all important						Highly important
1	2	3	4	5	6	7

6. How confident are you that you will receive ESP impressions in this study?

Not at all						Very
1	2	3	4	5	6	7

7. Do you practice any kind of mental discipline (e.g. meditation). If yes, please describe.

The Creative Cognition Inventory

(Holt, 2002)

To what extent are the following experiences or processes important to your creativity? Please respond from '0' indicating 'not at all important' to '4' indicating 'extremely important'. (If the word 'idea' used in some of the questions below seems inappropriate, please replace with a word more fitting for the context of your creative endeavours, e.g. image, form, music, solution, poem, formula, problem. . . .)

	Not important				Important
1. Making discoveries through trial and error	0	1	2	3	4
2. Trusting hunches or instincts	0	1	2	3	4
3. Ideas arising whilst dreaming	0	1	2	3	4
4. Methodical and systematic problem solving	0	1	2	3	4
5. Sudden moments of inspiration in waking life	0	1	2	3	4
6. Rational, logical thought	0	1	2	3	4
7. A sense of communicating with a deeper sense of self	0	1	2	3	4
8. The careful selection of ideas	0	1	2	3	4
9. Loose, playful, unconstrained thinking	0	1	2	3	4

Please continue overleaf . . .

	Not important				Important
10. Following your intuition	0	1	2	3	4
11. Ideas arising as falling asleep or waking up	0	1	2	3	4
12. Meditation	0	1	2	3	4
13. Paying attention to visual imagery	0	1	2	3	4
14. Experiences of losing track of time when involved in creative work	0	1	2	3	4
15. Playing with ideas	0	1	2	3	4
16. Luck, chance, 'fortunate accidents'	0	1	2	3	4
17. The use of analogy	0	1	2	3	4
18. A sense of purpose that seems to come from beyond the self	0	1	2	3	4
19. Recombining existing elements in new ways	0	1	2	3	4
20. Working with a set goal or outcome in mind	0	1	2	3	4
21. A sense of channelling information	0	1	2	3	4
22. Paying attention to auditory impressions	0	1	2	3	4
23. Day dreaming	0	1	2	3	4
24. The release of negative emotions	0	1	2	3	4
25. Non-verbal modes of thinking	0	1	2	3	4
26. Positive emotions, e.g. joy, excitement, euphoria	0	1	2	3	4
27. Paying attention to bodily feelings	0	1	2	3	4
28. A sense of communicating with something other	0	1	2	3	4
29. A sense of being in tune with nature or the universe	0	1	2	3	4
30. Emotional experience	0	1	2	3	4
31. Testing how well ideas work in practice	0	1	2	3	4

Personality Questionnaire – Extraversion and 'bioeccentricity' (Eysenck, 1989; Mason, 2005)

1.	Are you a person whose mood goes up and down easily?	Yes	No
2.	Are you a talkative person?	Yes	No
3.	Are you easily confused if too much happens at the same time?	Yes	No
4.	Are you easily distracted from work by daydreams?	Yes	No

Please continue overleaf . . .

5.	Are you easily distracted when you read or talk to someone?	Yes	No
6.	Are you mostly quiet when you are with other people?	Yes	No
7.	Are you rather lively?	Yes	No
8.	Are your thoughts sometimes so strong that you can almost hear them?	Yes	No
9.	Can some people make you aware of them just by thinking about you?	Yes	No
10.	Can you easily get some life into a rather dull party?	Yes	No
11.	Can you usually let yourself go and enjoy yourself at a lively party?	Yes	No
12.	Do ideas and insights sometimes come to you so fast that you cannot express them all?	Yes	No
13.	Do you dread going into a room by yourself where other people have already gathered and are talking?	Yes	No
14.	Do you enjoy meeting new people?	Yes	No
15.	Do you ever feel that your speech is difficult to understand because the words are all mixed up and don't make sense?	Yes	No
16.	Do you ever have a sense of vague danger or sudden dread for reasons that you do not understand?	Yes	No
17.	Do you feel that your accidents are caused by mysterious forces?	Yes	No
18.	Do you find it difficult to keep interested in the same thing for a long time?	Yes	No
19.	Do you frequently have difficulty in starting to do things?	Yes	No
20.	Do you like mixing with people?	Yes	No
21.	Do you like plenty of bustle and excitement around you?	Yes	No
22.	Do you often have difficulties in controlling your thoughts?	Yes	No
23.	Do you tend to keep in the background on social occasions?	Yes	No
24.	Do you think that you could learn to read others' minds if you wanted to?	Yes	No
25.	Do you usually take the initiative in making new friends?	Yes	No
26.	Does a passing thought ever seem so real it frightens you?	Yes	No
27.	Does your sense of smell sometimes become unusually strong?	Yes	No
28.	Have you ever thought that you had special, almost magical powers?	Yes	No
29.	Have you sometimes sensed an evil presence around you, even though you could not see it?	Yes	No
30.	Is it hard for you to make decisions?	Yes	No
31.	When in the dark do you often see shapes and forms even though there is nothing there?	Yes	No
32.	When you look in the mirror does your face sometimes seem quite different from usual?	Yes	No
33.	When in a crowded room, do you often have difficulty in following a conversation?	Yes	No

Please continue overleaf. . .

The Adjective Checklist – 'Creative personality'

(Gough, 1979; Domino, 1970)

This answer sheet contains a list of adjectives. Please read them quickly and mark those that describe you as you really are. Do not worry about duplications or contradictions. Skip any adjectives that you may not know the definition of.

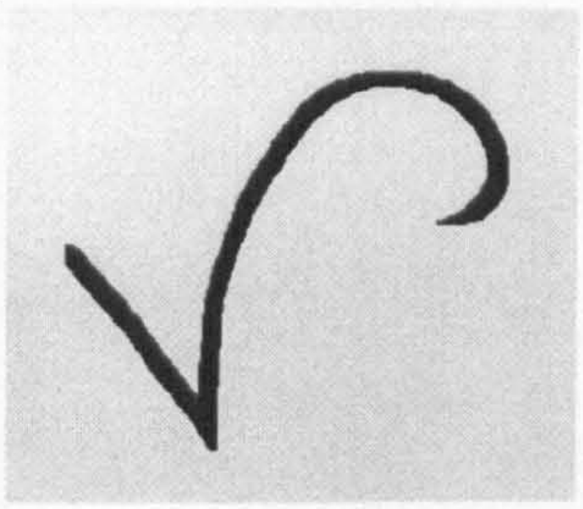
Absentminded	☐	Industrious	☐
Active	☐	Informal	☐
Adaptable	☐	Ingenious	☐
Adventurous	☐	Insightful	☐
Affected	☐	Intelligent	☐
Alert	☐	Interests narrow	☐
Aloof	☐	Interests wide	☐
Ambitious	☐	Intolerant	☐
Argumentative	☐	Inventive	☐
Artistic	☐	Lazy	☐
Assertive	☐	Logical	☐
Autocratic	☐	Mannerly	☐
Capable	☐	Meek	☐
Careless	☐	Moody	☐
Cautious	☐	Nagging	☐
Clear-thinking	☐	Original	☐
Clever	☐	Outspoken	☐
Commonplace	☐	Quick	☐
Complicated	☐	Quiet	☐
Confident	☐	Rational	☐
Conservative	☐	Rebellious	☐
Conventional	☐	Reflective	☐
Courageous	☐	Resourceful	☐
Curious	☐	Reserved	☐
Cynical	☐	Restless	☐
Demanding	☐	Sarcastic	☐
Determined	☐	Self-centred	☐
Disorderly	☐	Selfish	☐
Dissatisfied	☐	Self-confident	☐
Distractible	☐	Sensitive	☐
Dull	☐	Serious	☐
Egotistical	☐	Sexy	☐
Energetic	☐	Silent	☐
Enterprising	☐	Sharp-witted	☐
Enthusiastic	☐	Sincere	☐
Good-looking	☐	Snobbish	☐
Healthy	☐	Sociable	☐
Honest	☐	Spontaneous	☐
Hostile	☐	Strong	☐
Humorous	☐	Submissive	☐
Hurried	☐	Suspicious	☐
Idealistic	☐	Tactless	☐
Imaginative	☐	Weak	☐
Impulsive	☐	Withdrawn	☐
Independent	☐	Unconventional	☐
Individualistic	☐		

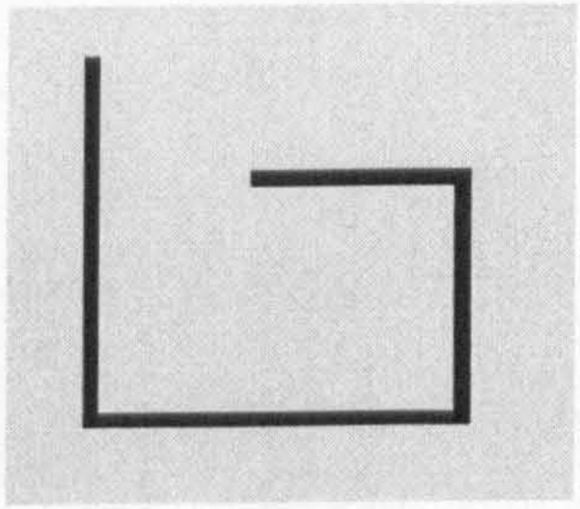
Please continue overleaf . . .

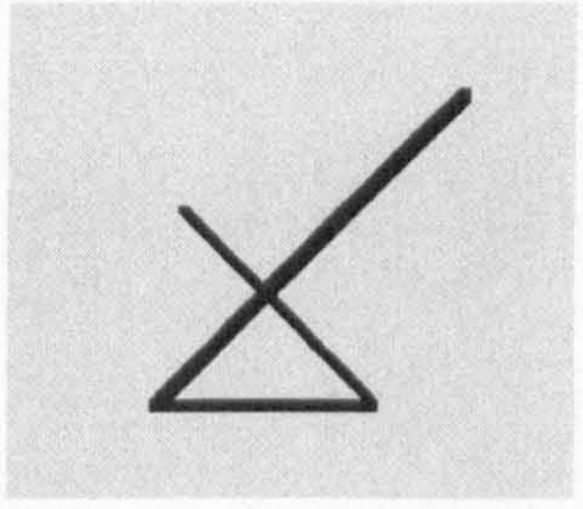
Activity: Shapes
(Holt, 2002)

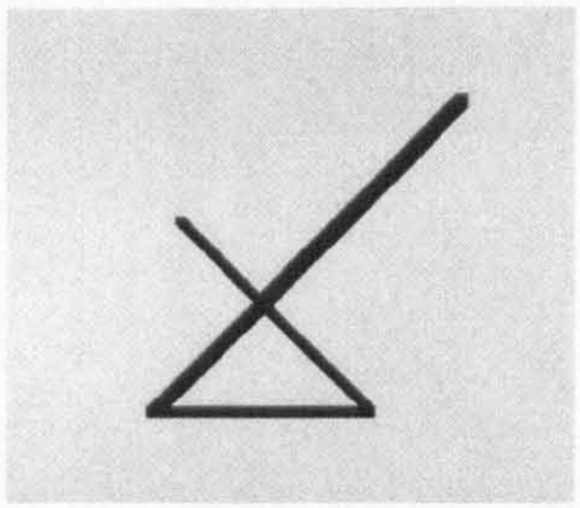
(Please allow 5 minutes)

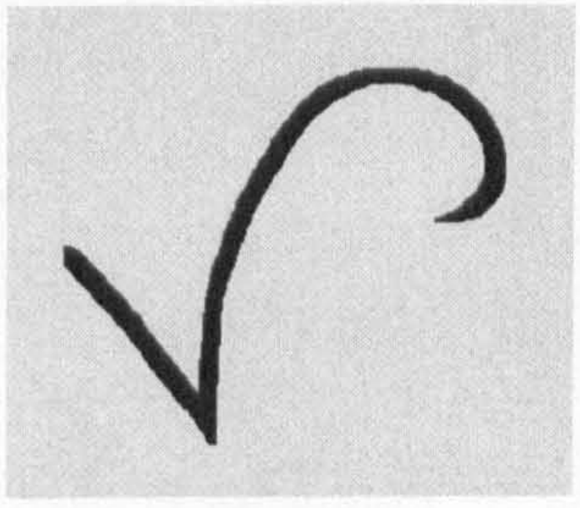
Please see how many objects or pictures you can make by drawing on the shapes below. Try to think of as many things as you can that no one else will think of and give names or titles to the objects you create.

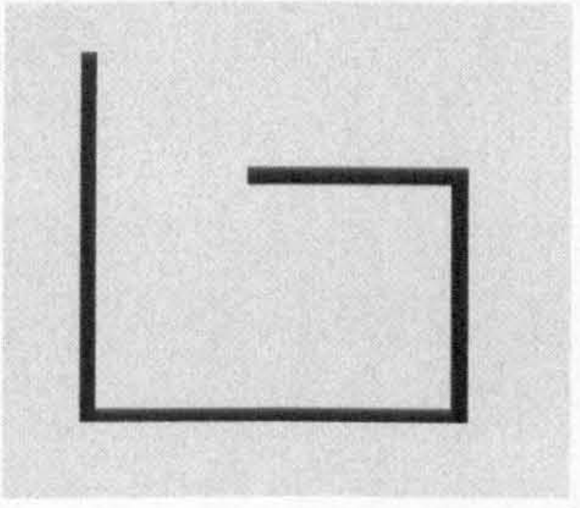


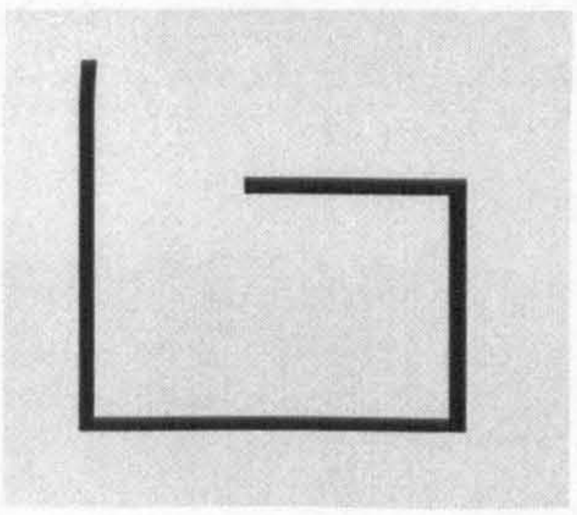


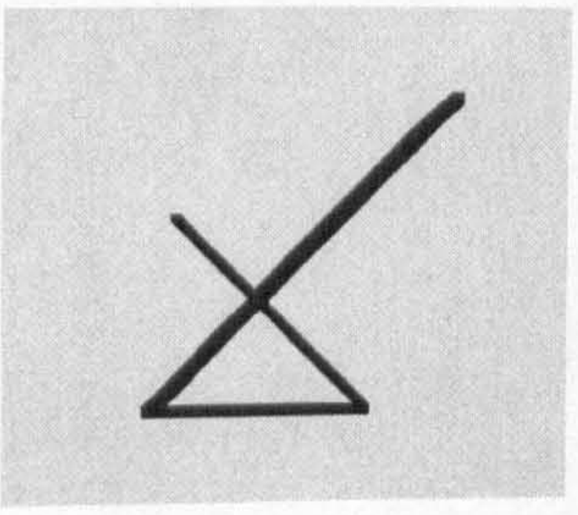


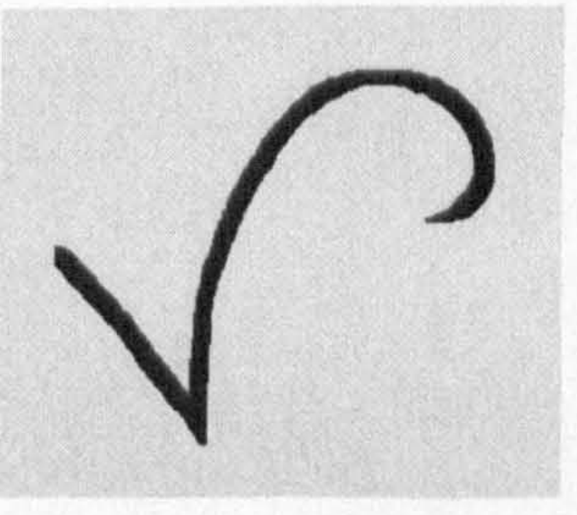












Please continue overleaf . . .

Creative Activities and Interests Checklist
(Griffin & McDermott, 1998; Holt, 2002)

Please tick those of the following in which you have:

	*An **active** **personal interest***	*Done in the last 12 months*
The painting of pictures	☐	☐
The drawing of pictures	☐	☐
The making of sculpture	☐	☐
The taking of artistic photographs	☐	☐
The making of useful or decorative objects	☐	☐
The renovation of old or antique objects	☐	☐
Participating in drama production	☐	☐
Performing in a play	☐	☐
Performing in a band	☐	☐
Performing in an orchestra	☐	☐
Performing in dance	☐	☐
Performing in comedy	☐	☐
Going busking	☐	☐
Participating in video production	☐	☐
Recording music	☐	☐
Writing music	☐	☐
Writing poetry	☐	☐
Writing plays	☐	☐
Writing short stories	☐	☐
Writing magazine articles	☐	☐
Writing journal articles	☐	☐
Interior decorating	☐	☐
Exterior decorating	☐	☐
Inventing new recipes	☐	☐
Making clothes	☐	☐
Growing or gardening	☐	☐
The construction of scientific or technical objects	☐	☐
The invention of scientific or technical objects	☐	☐
The development of scientific experimental designs	☐	☐
Presenting scientific or mathematical papers	☐	☐
Entering projects or papers into a science contest	☐	☐
Applying maths in an original way to solve a practical problem	☐	☐
Writing an original computer program	☐	☐

Please list any other creative things that you have done in the last 12 months

Please continue overleaf

Thalbourne's paranormal belief scale

This section presents a set of statements, each expressing an attitude about some aspect of ESP. For each of these, you should indicate how much you agree or disagree with the statement by circling one of the options, where 'SA' means you strongly agree, 'A' means you agree, 'D' that you disagree, and 'SD' that you strongly disagree. You may find the following definitions helpful when completing this section:

ESP: psychic reception of information without the use of the senses or reasoned guesses

PK: psychic influence on physical objects by the force of mental will power alone

1.	I am convinced that ESP exists.	SA	A	N	D	SD
2.	I am convinced that I have had personal experience of ESP.	SA	A	N	D	SD
3.	I am convinced that I am psychic.	SA	A	N	D	SD
4.	I am convinced that it is possible to gain information about the future before it happens in ways that do not depend on common sense or the "normal" senses (sight, hearing, etc).	SA	A	N	D	SD
5.	I am convinced that I have had at least one hunch that turned out to be correct and which (I believe) was not just a coincidence.	SA	A	N	D	SD
6.	I am convinced that I have had at least one premonition about the future that came true and which (I believe) was not just a coincidence.	SA	A	N	D	SD
7.	I am convinced that I have had at least one dream that came true and which (I believe) was not just a coincidence.	SA	A	N	D	SD
8.	I am convinced that I have had at least one waking vision that was not an hallucination and from which I received information that I could not have otherwise gained at that time and place.	SA	A	N	D	SD
9.	I am convinced that there is a life after death.	SA	A	N	D	SD
10.	I am convinced that it is possible to contact spirits of the dead.	SA	A	N	D	SD
11.	I am convinced that it is possible to gain information about the thoughts, feelings or circumstances of another person, in a way that does not depend on common sense or the "normal" senses (sight, hearing, etc).	SA	A	N	D	SD
12.	I am convinced that it is possible to send a "mental message" to another person, or in some way influence them at a distance, by means other than the normal channels of communication.	SA	A	N	D	SD
13.	I am convinced that I have had at least one experience of telepathy (where I became aware of another person's thoughts or sensations in a way that was not due to common sense or the "normal" senses of vision, hearing etc.) between myself and another person.	SA	A	N	D	SD
14.	I am convinced that psychokinesis (PK) exists; that is, the direct influence of mind on a physical system, without the use of any known physical energy (as in, for example, psychic healing, affecting the roll of dice, bending spoons or moving objects).	SA	A	N	D	SD

Please continue overleaf . . .

15.	I am convinced that on at least one occasion I have personally exerted PK, where my mind apparently directly influenced the physical world in some way, without the use of any known physical means.	SA	A	N	D	SD
16.	I am convinced that I have strong or reliable PK ability.	SA	A	N	D	SD
17.	I am convinced that, on at least one occasion, I have witnessed an apparently psychokinetic effect on physical objects which I cannot explain in terms of a normal physical effect.	SA	A	N	D	SD
18.	I am convinced that I have witnessed - in the past or at present - persistent physical disturbances, that seemed to be caused by PK (as for example a "poltergeist").	SA	A	N	D	SD

Emotional Creativity Inventory
(Averill, 1999)

This questionnaire contains 30 items concerning the way you think, feel, and react in a variety of situations, and your opinions on a variety of issues. Please read each statement carefully. Be particularly careful when responding to negatively worded statements (e.g., "I do not like working alone"), for they can be especially confusing. Please indicate your degree of agreement or disagreement with each statement, from strongly disagree (SD), to disagree (D), to neutral or 'average' (N), to agree (A), to strongly agree (A). If a statement seems confusing to you, it may be helpful to prefix it with the phrase, "Compared to the 'average person' ".

1.	My emotional reactions are different and unique.	SD	D	N	A	SA
2.	When I have strong emotional reactions, I search for reasons for my feelings.	SD	D	N	A	SA
3.	I try to be honest about my emotional reactions, even when it causes me problems.	SD	D	N	A	SA
4.	I respond well in situations that call for new and unusual emotional responses.	SD	D	N	A	SA
5.	I believe that people should work on their emotional development as hard as they work on their intellectual development.	SD	D	N	A	SA
6.	I can imagine myself being lonely, angry, and joyful, all at the same time.	SD	D	N	A	SA
7.	I think about and try to understand my emotional reactions.	SD	D	N	A	SA
8.	I sometimes experience feelings and emotions that cannot be easily described in ordinary language.	SD	D	N	A	SA
9.	I am good at expressing my emotions.	SD	D	N	A	SA
10.	I have felt combinations of emotions that other people probably have never experienced.	SD	D	N	A	SA

Please continue overleaf . . .

11.	I am not particularly interested in the emotional aspects of my life.	SD	D	N	A	SA
12.	The way I experience and express my emotions helps me in my relationships with others.	SD	D	N	A	SA
13.	My emotions are almost always an authentic expression of my true thoughts and feelings.	SD	D	N	A	SA
14.	I like music, dance, and paintings that arouse new and unusual emotional reactions.	SD	D	N	A	SA
15.	I think about past emotional experiences to help me cope with current emotional problems.	SD	D	N	A	SA
16.	I have emotional experiences that would be considered unusual or out of the ordinary.	SD	D	N	A	SA
17.	My emotions help me achieve my goals in life.	SD	D	N	A	SA
18.	When in emotional situations, I tend to respond in a unique manner.	SD	D	N	A	SA
19.	I like to imagine situations that call for unusual, uncommon, or unconventional emotional reactions.	SD	D	N	A	SA
20.	After an intensely emotional experience, I try to step back and examine my reactions objectively.	SD	D	N	A	SA
21.	When responding emotionally, I can be quite inventive and innovative.	SD	D	N	A	SA
22.	My outward emotional reactions accurately reflect my inner feelings.	SD	D	N	A	SA
23.	I would have to be a poet or novelist to describe the kinds of emotions I sometimes feel, they are so unique.	SD	D	N	A	SA
24.	I can experience a variety of different emotions at the same time.	SD	D	N	A	SA
25.	My emotions are a major source of meaning in my life; without them, my life would lack significance.	SD	D	N	A	SA
26.	I prefer movies and books that depict complex and improbable emotional situations.	SD	D	N	A	SA
27.	I pay attention to other people's emotions so that I can better understand my own feelings.	SD	D	N	A	SA
28.	The range and diversity of my emotional reactions sometimes exceed my ability to describe how I feel.	SD	D	N	A	SA
29.	I try to disguise and hide my emotions.	SD	D	N	A	SA
30.	I am able to experience a large number of different emotions.	SD	D	N	A	SA

Thank you for completing these measures.

Please continue overleaf . . .

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APPENDIX 8.3

PhD Student Research Project – Researcher: Nicola Holt

CREATIVITY AND ESP PERFORMANCE: DEVELOPING EXPERIENCE SAMPLING METHODOLOGY TO EXPLORE PSI IN A QUASI- EXPERIMENTAL, QUASI-NATURALISTIC CONTEXT

The proposed study follows upon previous doctoral work by the researcher that has explored the relationship between creativity, anomalous experiences and altered states of consciousness. This research proposes to extend this by asking how multiple dimensions of creativity are related to objective psi-performance, rather than subjective psi experiences in daily life. Further, the methodology proposed seeks to examine this through naturally occurring states of consciousness, avoiding the constraints of previous laboratory studies in this research area. This protocol is an adaptation of experience sampling methodology (ESM), and will be described in detail below. However, first a brief rationale of the primary research aims will be provided. (This has been deleted from this report because it is reproduced in Chapter 7).

Ethical considerations

In accordance with the ethical guidelines of the British Psychological Association (1992) adherence will be made to the classifications thereof: consent, deception; debriefing; withdrawal from the investigation; confidentiality; and protection of participants.

Principle 1 CONSENT (refer to full guidelines)
How will you obtain consent from your participants? Make specific reference to those who may be under the responsibility of others (e.g. teachers, carers, medical staff), or who may be vulnerable (e.g. learning disabled, recently bereaved, traumatised).

All participants will be as fully informed about the experiment as possible. No vulnerable groups will be targeted for recruitment and all participants will be asked to sign a consent form, which will outline to various degrees the procedure and any issues regarding confidentiality etc. Participants will be able to decide whether to participate in the study with informed consent. All participants will be over 18 and without impairments that negate the ability to give informed consent legally – 'real consent'. This age limit is required due to the adult nature of some of the target clips (which may contain mild peril, some swearing but no nudity or sexual activity). After the study, participants will be asked to sign a further consent form asking for permission for specific content (e.g. notes, drawings or quotes from recorded transcripts) to be reported or published as part of formal research papers. No participants will be coerced to take part in this study, interested participants from the general population will be advertised for.

Principle 2: DECEPTION (refer to full guidelines)
Does your study involve deception? If so, justify this and explain how you will handle this ethically.

Participants will be fully briefed about the nature and aims of the experiment, hence no deception will be involved. Participants will not be given deliberately misleading information, and no information will be withheld that may lead to discomfort or distress. Participants will be given correct and accurate information if they ask any further questions about the nature of the study.

Principle 3: WITHDRAWAL (refer to full guidelines)
How will you ensure that participants know they can withdraw at any time without good reason, regardless of initial consent, and demand that any data already collected be destroyed?

Issues regarding withdrawal will be made explicit at the time of recruitment and when participants sign their consent forms. There is also a note in information sheet clarifying this point. Participants will also have contact information for the researchers so they can withdraw their data at any time during or after the study, including transcripts of their voicememos and notes.

Principle 4: DEBRIEFING (refer to full guidelines)
How do you propose to provide feedback to your participants, allow for questions, and justify any deception mentioned under Principle 2?

At the end of the experiment, participants will have an opportunity to discuss their experiences with NH and to compare any 'psi impressions' with the target clip, which will be revealed at this point. Positive links between the two will be made by NH in an effort to leave the participant with a positive feeling about the study. Should the participant appear disappointed in any way by their performance, NH will make it clear (as is described in the information sheet) that the study is not a test of individual psi ability, and that psi may occur in a complex system where a mix of factors may be required, which may not arise in artificial psi studies. The participant will also be informed that independent judges will rate their mentations against the target video clip and three decoys. They will be informed that if they wish they can be sent (if requested) a summary of the overall results of the research.

Principle 5: CONFIDENTIALITY (refer to full guidelines)
How, and to what degree, will you ensure confidentiality, store non-anonymous data securely, and guarantee that any results subsequently published will not be traceable to any specific individual?

All completed questionnaires and transcribed mentations will be identified through a code which will be assigned by NH and so will prevent data being identified through the use of names All study related material will be kept confidential by the research team unless express permission has been granted by participants for specific material to be reported or published. All data will be stored securely in a locked filing cabinet.

Principal 6: PROTECTION (refer to full guidelines)
How you will ensure protection of your participants and yourself from physical and mental harm during your investigation (e.g. substance administration, sleep deprivation, physical discomfort, embarrassment, damage to self-esteem, personal revelations, etc.). Could your data be used to the disadvantage of any group or individual and, if so, explain why you think this risk is acceptable.

It is expected that participants will find this study interesting and enjoyable. It is not expected that participating in the study will present any cause of mental or physical harm beyond what might be normally experienced by people in their everyday lives. NH has removed the most negative clips from the UofN target pool for this study as she does not ethically feel comfortable with sending very negative clips to participants for a prolonged period of 24 hours. If any issues are raised by participants seeing a particular video clip (e.g. they find the content personally distressing) they will be able to switch it off and will be able to discuss such reactions with the experimenter in the debriefing session. However, due to the mild nature of the clips such reactions are not envisaged to occur. Participants will have been informed at the start of the study that the clips used for the ESP trial may contain positive or negative scenes taken from films or television programmes. Participants will be fully aware of what the experiment will require; any participants who voices concerns over their potential participation, despite reassurances, will be advised not to participate. I am not aware of any evidence to suggest that experiences related to watching the types of clips in our target pools can have any lasting detrimental effects.

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It is less likely than in other psi studies that a mismatch should occur between outcome and expectations in this study as any judgements of success are subjective. However, should such a concern arise (e.g. that a believer considers that they have performed below their expectations, or a sceptic considers that they have exceed their expectations), the researcher will be able to debrief participants in a manner that diffuses responsibility for the outcome and focuses on the elusive and statistical nature of previously reported effects. It will be made clear that success in this study need not always be reflected in direct hits. Participants will also be invited to be added to a central database of participants and to take part in future research. It is hoped that these strategies will reduce any discomfort caused by incongruent results.

It is unlikely that any of the questions in the questionnaire package will cause offence to participants. The schizotypy items are labelled as measuring 'bioeccentricity' in order to avoid terminology associated with mental illness. If participants have any questions about the items the scale will be described in terms of 'healthy schizotypy' and its links with creativity. If participants have any questions or would like further information about the drawing task (a common question) they will be told which are the most common responses to the shapes, e.g. that the curved line is commonly interpreted as a swan. This will be done in a way not to denigrate their performance in any way, highlighting the importance also of flexibility of ideas and the amount of detail in drawings (elaboration). The other scales are labelled clearly (e.g. 'extraversion') and responses and interpretations should be fairly transparent to participants.

The data resulting from this experiment could not be used to disadvantage any group or individual.

I have answered all the questions honestly and to the best of our ability. Additionally, I endorse the following statement: "I confirm that I have a copy of, have read and understand, the Ethical Principles for Conducting Research with Human Participants as published by the British Psychological Society".

Signature: NICOLA HOLT

Date: 24 May 2006

Additional (group) signatures if applicable:

.....

.....

Decision by Ethics Committee (tick one box):

☐ We see no reason to reject this research proposal on ethical grounds

☐ The proposal is ethically unsound, and should not proceed

☐ We have concerns about the ethics of this proposal, and recommend the following modifications, and re-submission:

.....

.....

.....

.....

Signature: ..... Date: .....

Note: No legal liability or responsibility can be attached to the ethics Committee for advice given

APPENDIX 8.4

Curve estimates for relationships between person variables and psi-performance (Study 3)

A.8.4.1. Figural divergent thinking

Figures A.8.1 and A.8.2 suggest that the relationship between psi-performance and figural divergent-thinking is curvilinear. However, the psi-performance of individuals with low, moderate and high levels of figural divergent-thinking did not differ from each other at a significant level ($F_{(2,26)} = .792, p = .419$).

Figure A.8.1
Scatter plot showing relationship between psi-performance and figural divergent thinking

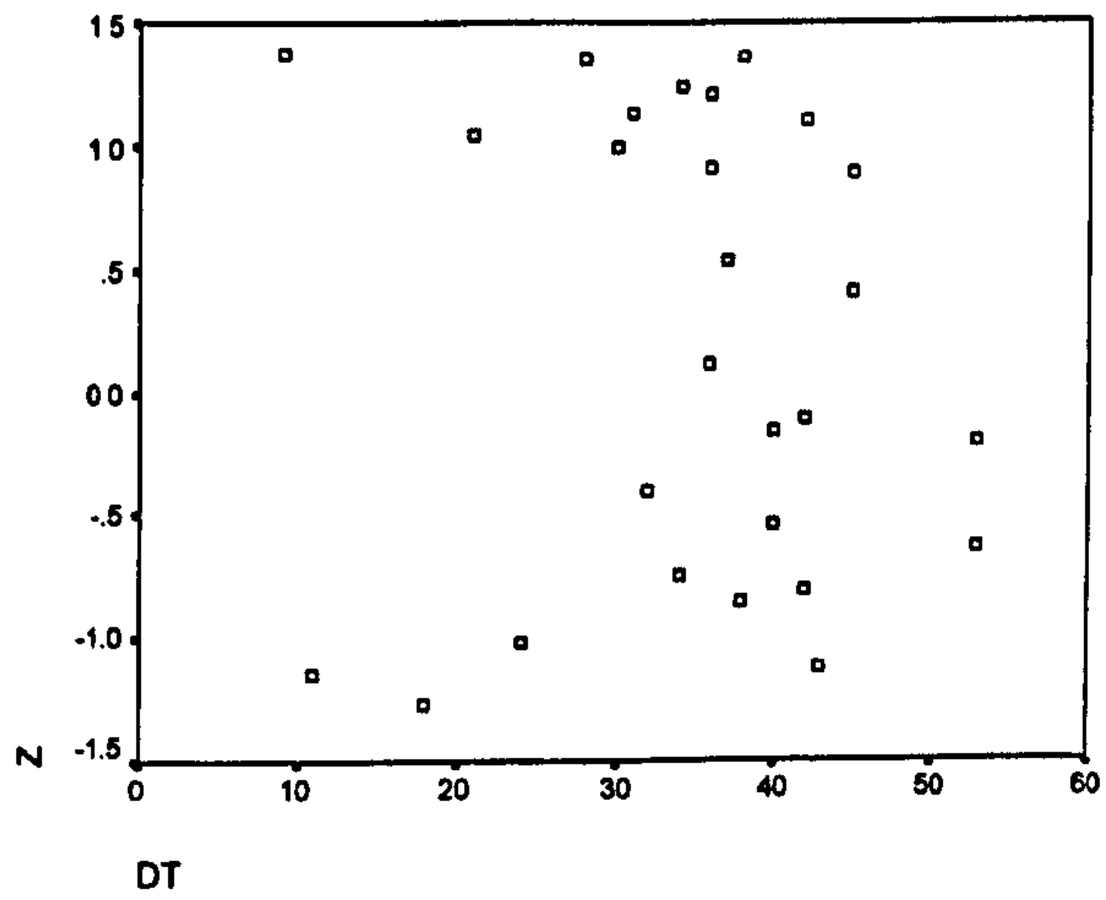
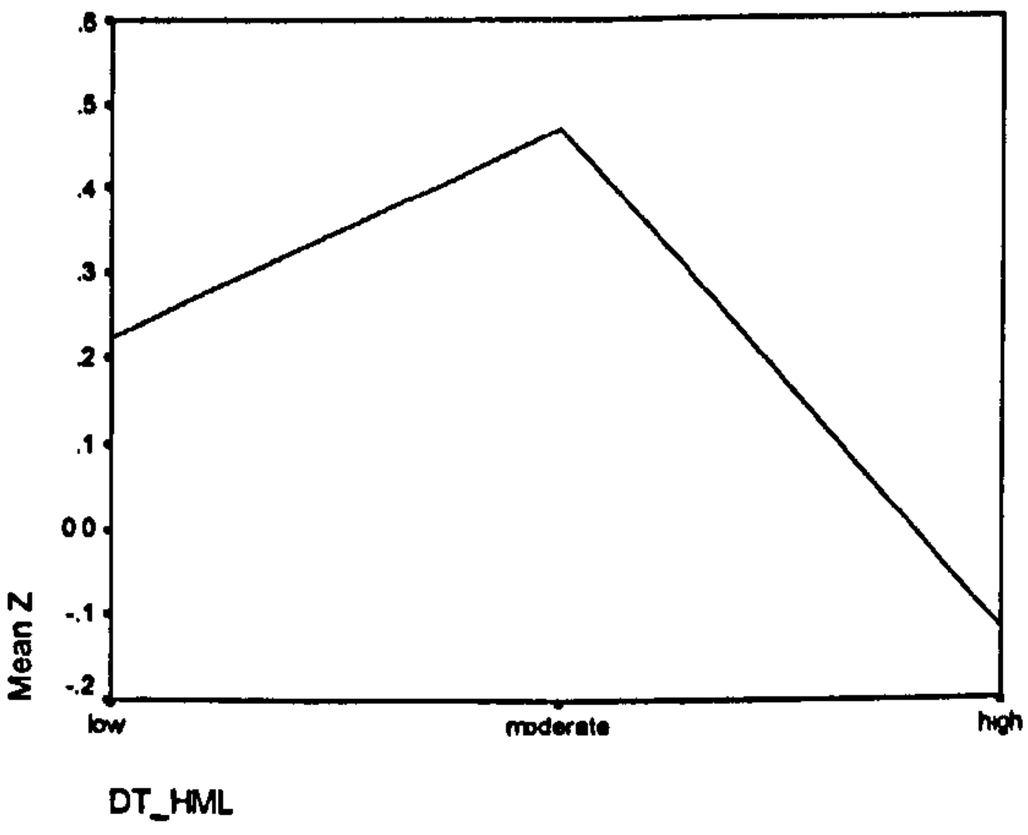


Figure A.8.2

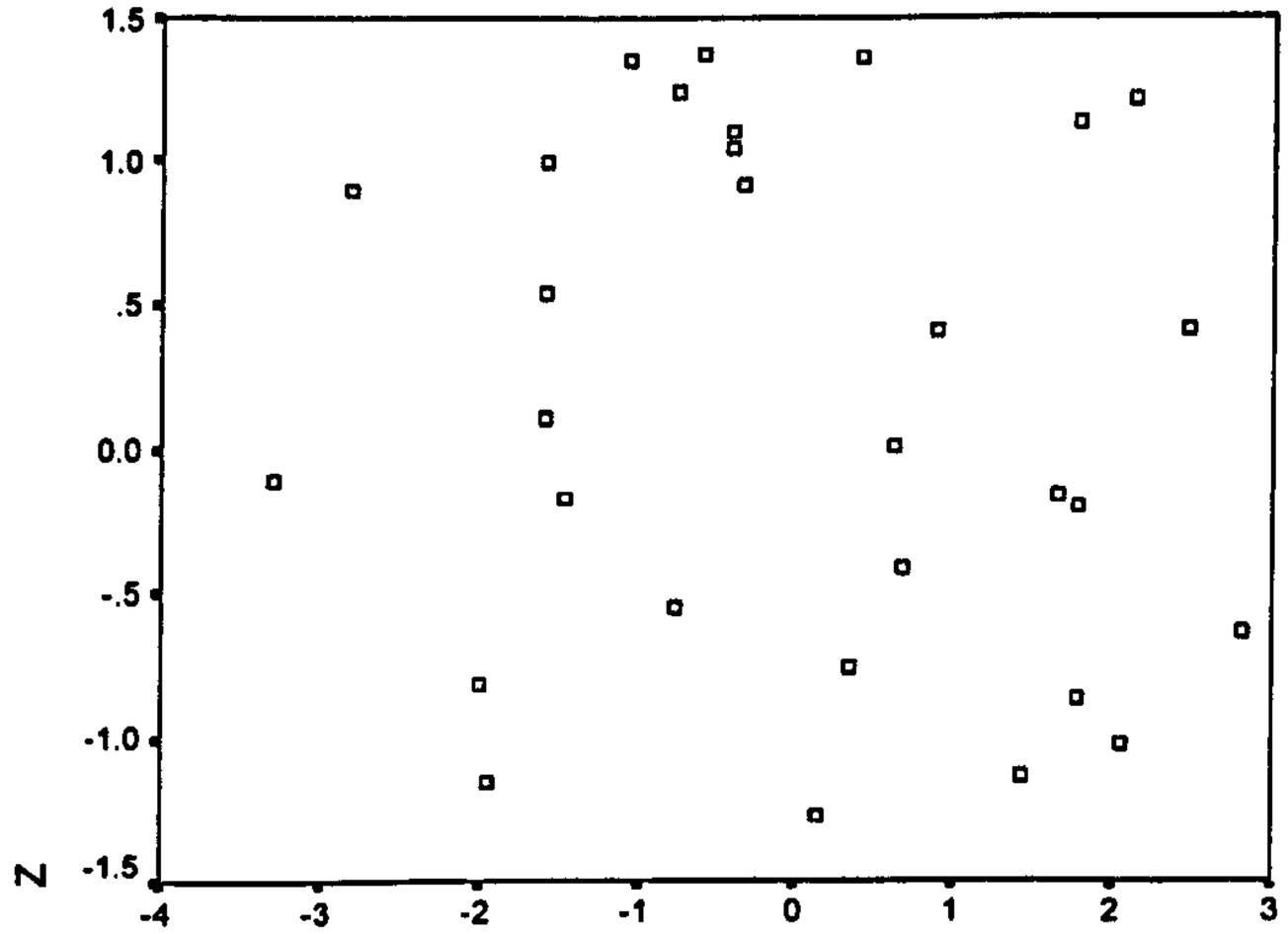
Line graph to show mean psi-performance scores for low, high and moderate levels of figural divergent-thinking



A.8.4.2. Artistic creative-personality

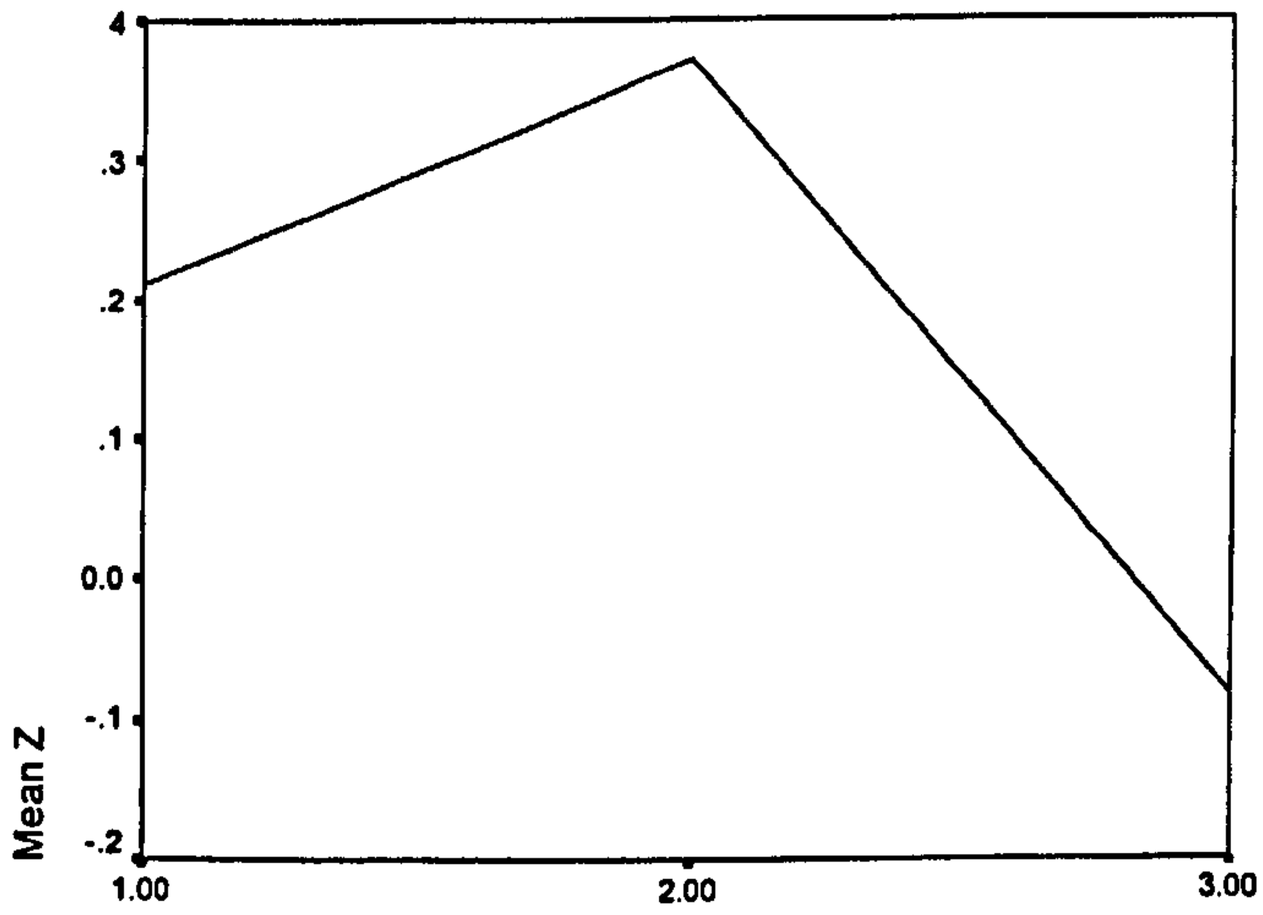
Figures A.8.3 suggests that there is little relationship between psi-performance and artistic creative-personality. However, Figure A.8.4 suggests that high scorers performed at lower levels on the ESP task than low and moderate scorers on artistic creative personality, but non-significantly so ($F_{(2,27)} = .640, p = .535$).

Figure A.8.3
Scatter plot showing relationship between psi-performance and artistic creative-personality



art, sp, imp, summed z-scores

Figure A.8.4
Line graph to show mean psi-performance scores for low, high and moderate levels of artistic creative-personality



A.8.4.3. Emotional creativity

Figure A.8.5 suggests that there is little relationship between psi-performance and emotional creativity. Figure A.8.6 shows that low and high levels of emotional creativity were associated with higher psi-performance scores. This showed a suggestive trend towards significance ($F_{(2,27)} = 2.519, p = .099$).

Figure A.8.5
Scatter plot showing relationship between psi-performance and emotional creativity

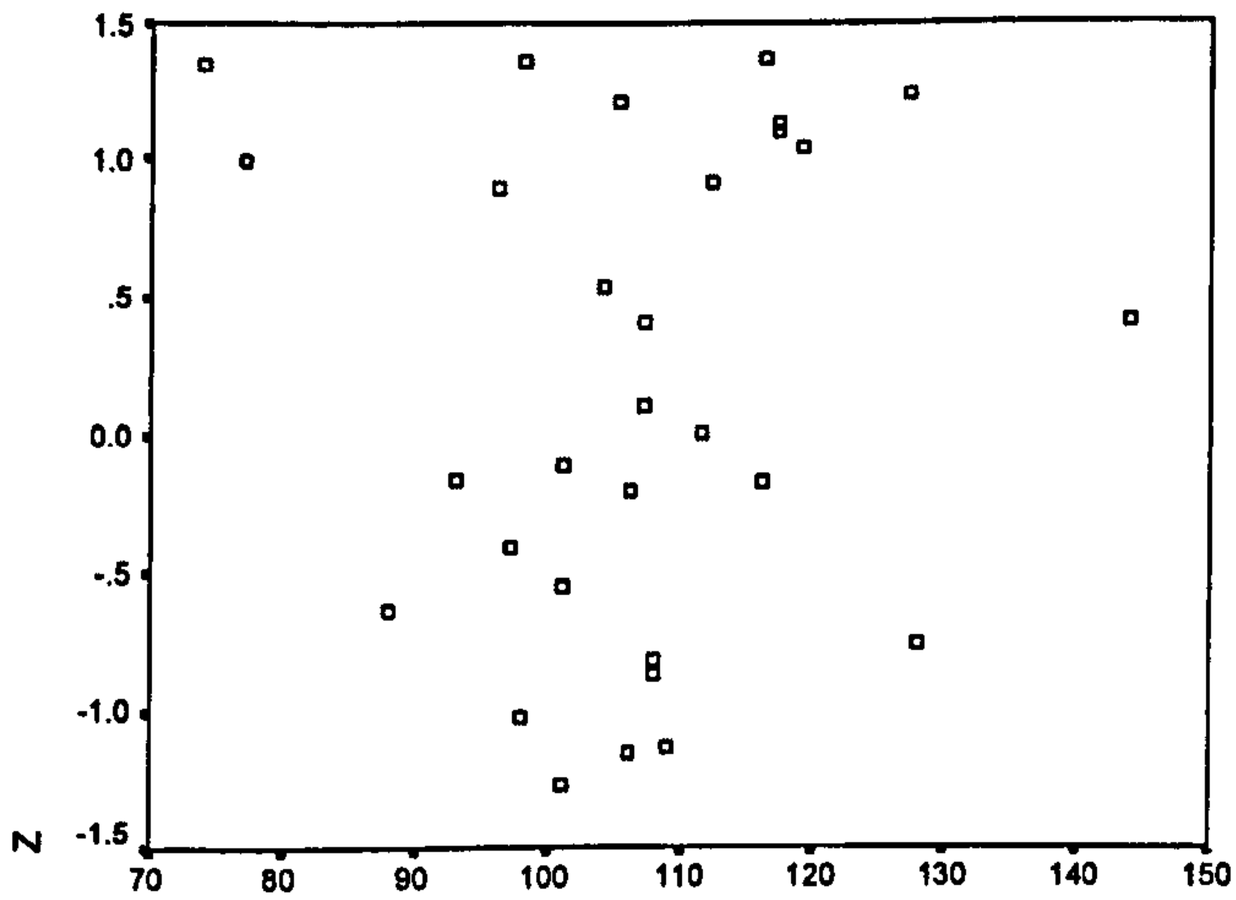
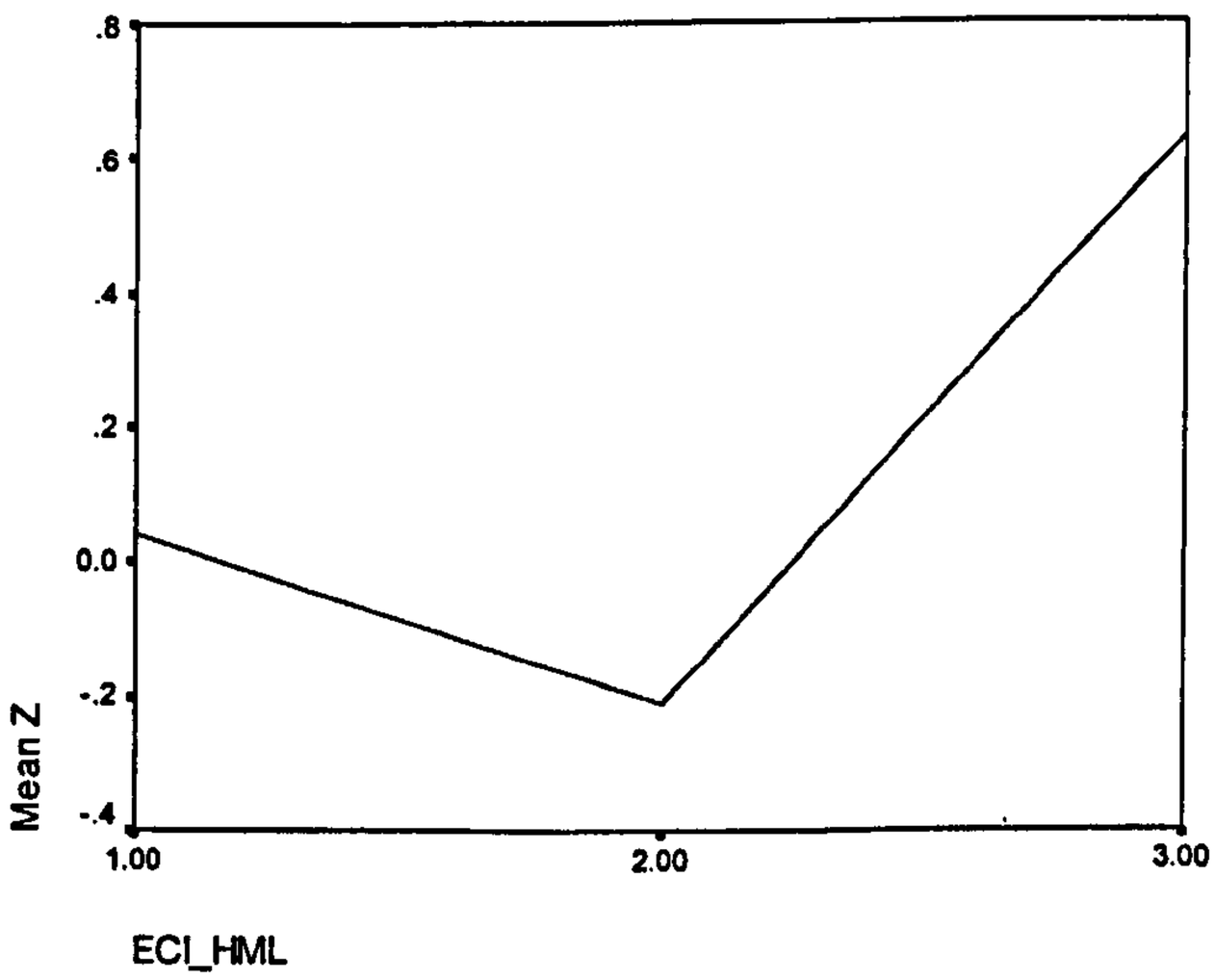


Figure A.8.6
Line graph to show mean psi-performance scores for low, high and moderate levels of emotional creativity



A.8.4.4. Scientific creative personality

Figure A.8.7 is suggestive of a curvilinear relationship along the z-score axis. However, Figure A.8.8 suggests that there is a linear relationship between scientific creative personality and psi-performance.

Figure A.8.7
Scatter plot showing relationship between psi-performance and sclentific creative-personality

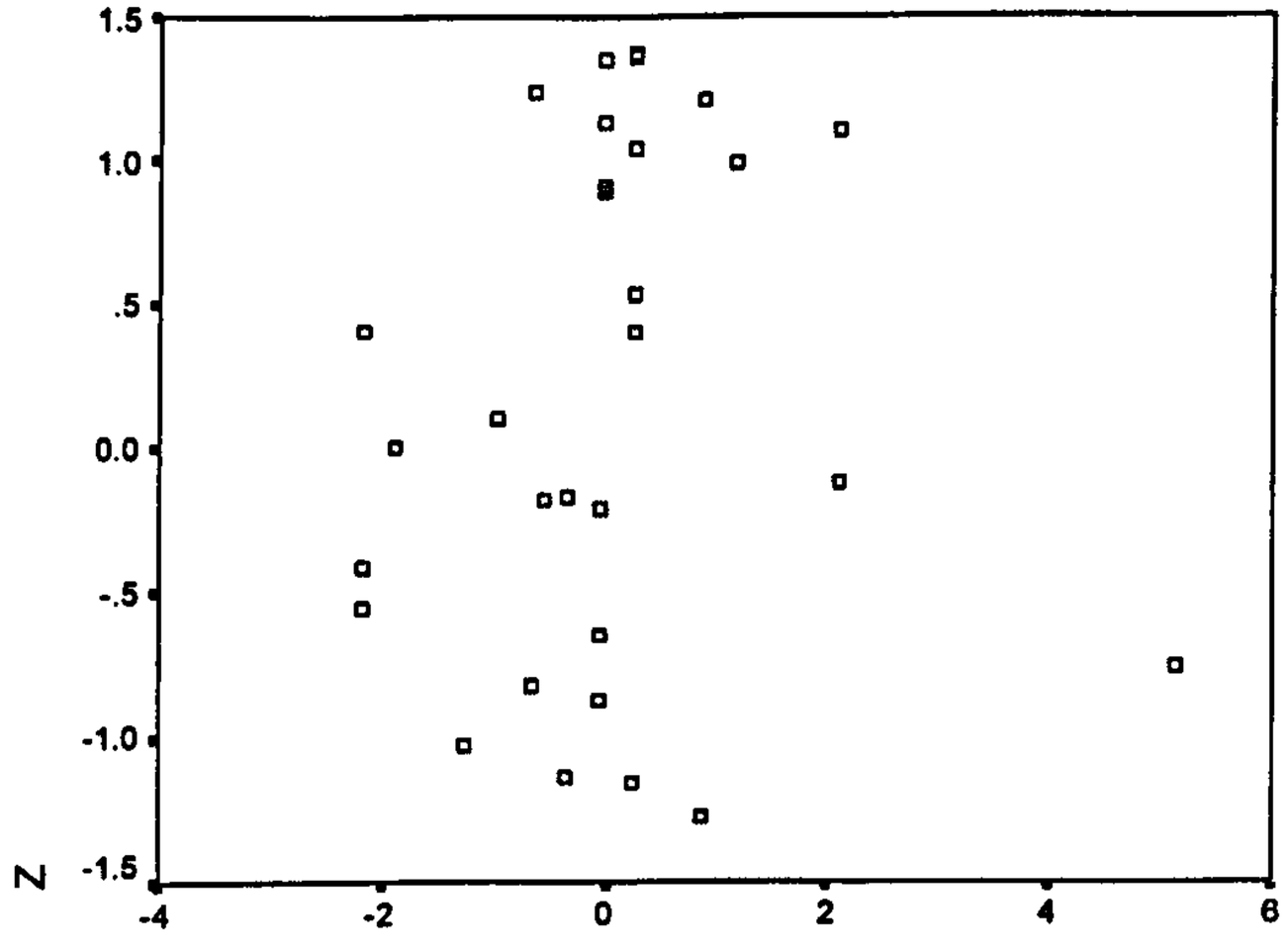
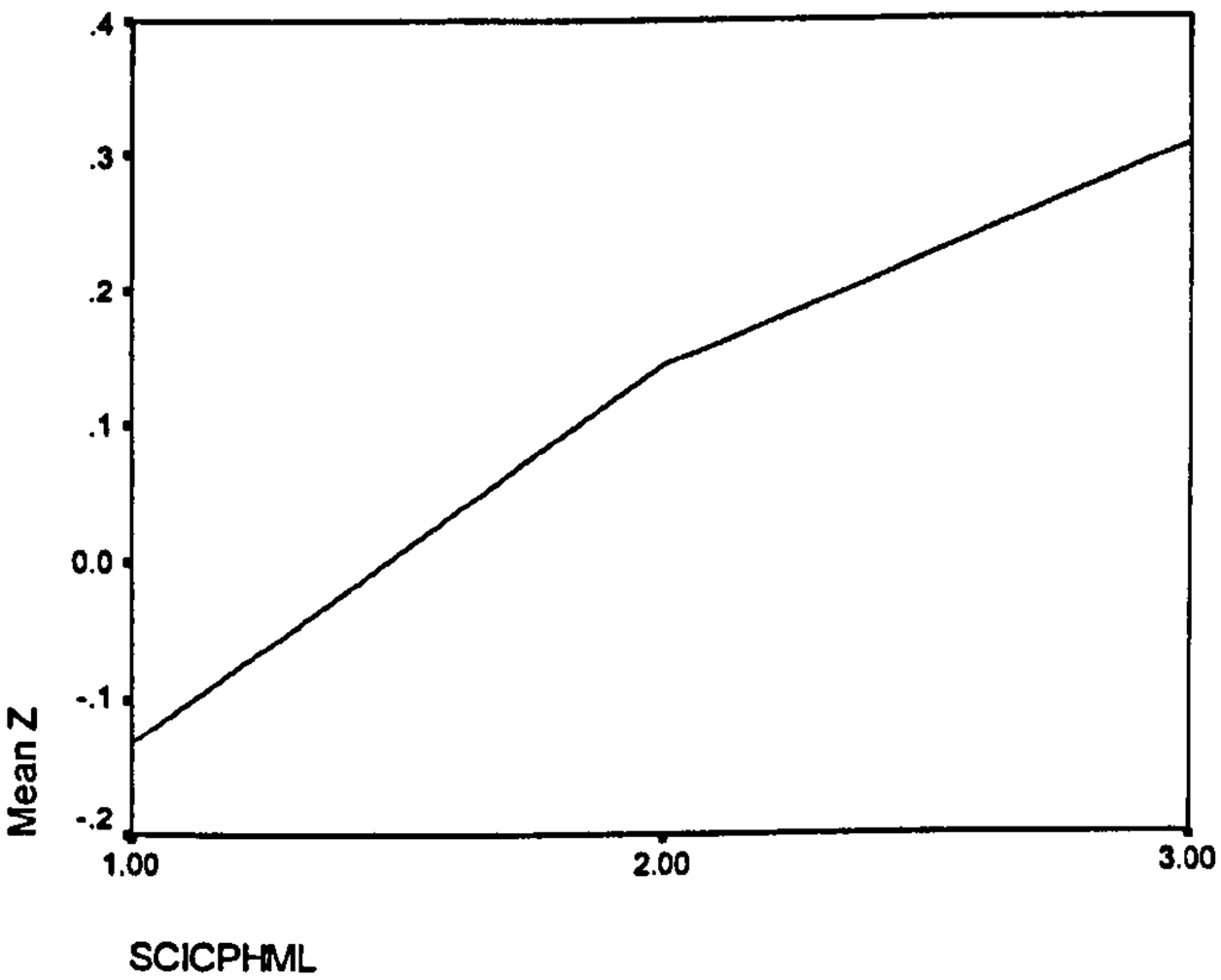


Figure A.8.8
Line graph to show mean psi-performance scores for low, high and moderate scientific creative-personality



A.8.4.5 Music and performance arts

Figures A.8.9 and A.8.10 suggest curvilinear relationships between psi-performance and involvement with music and performance arts. In Figure A.8.10 low and high levels of music and performance arts are associated with better psi-performance ($F_{(2,27)} = 2.571, p = .095$).

Figure A.8.9
Scatter plot showing relationship between psi-performance and involvement with music and performance arts

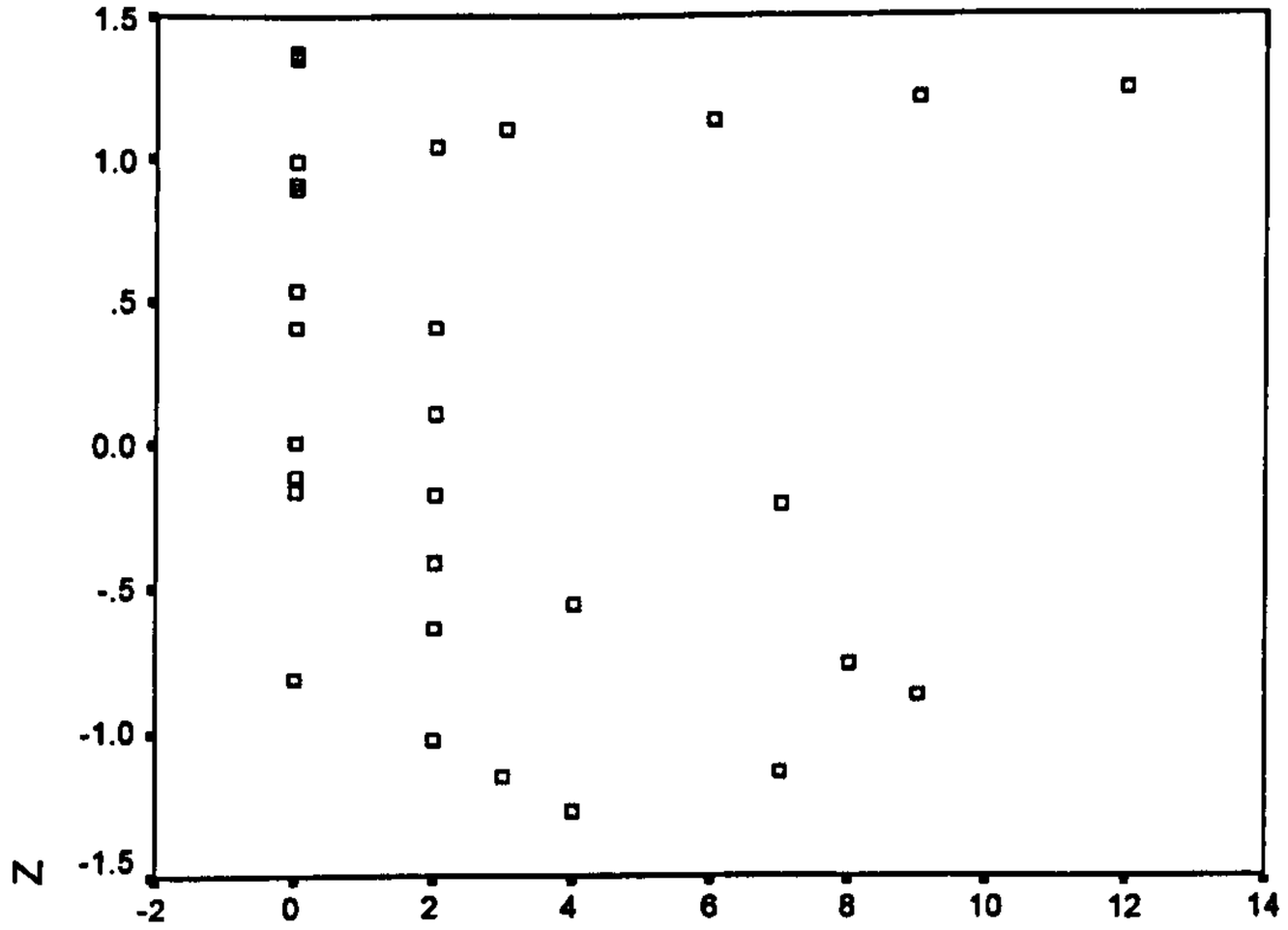
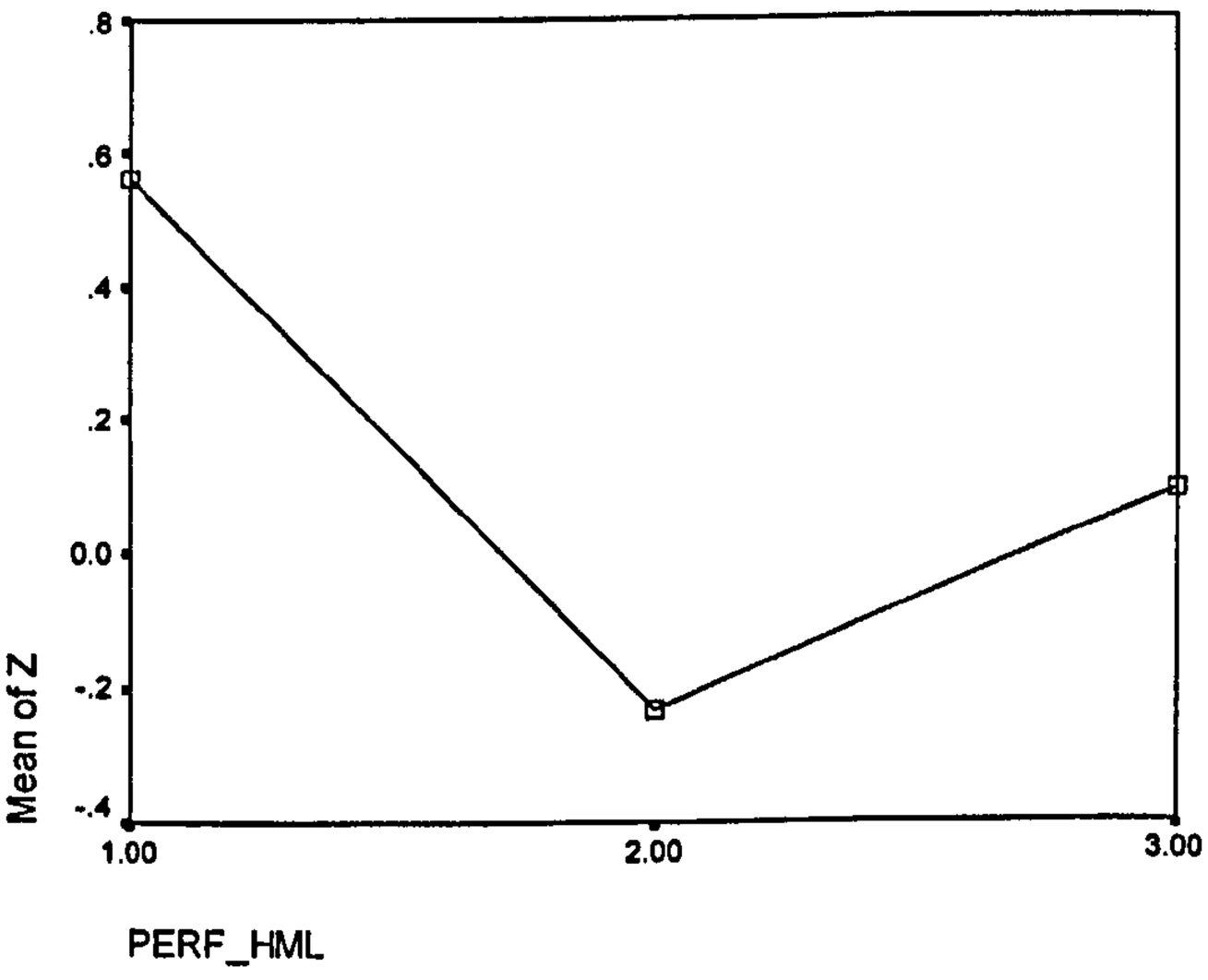


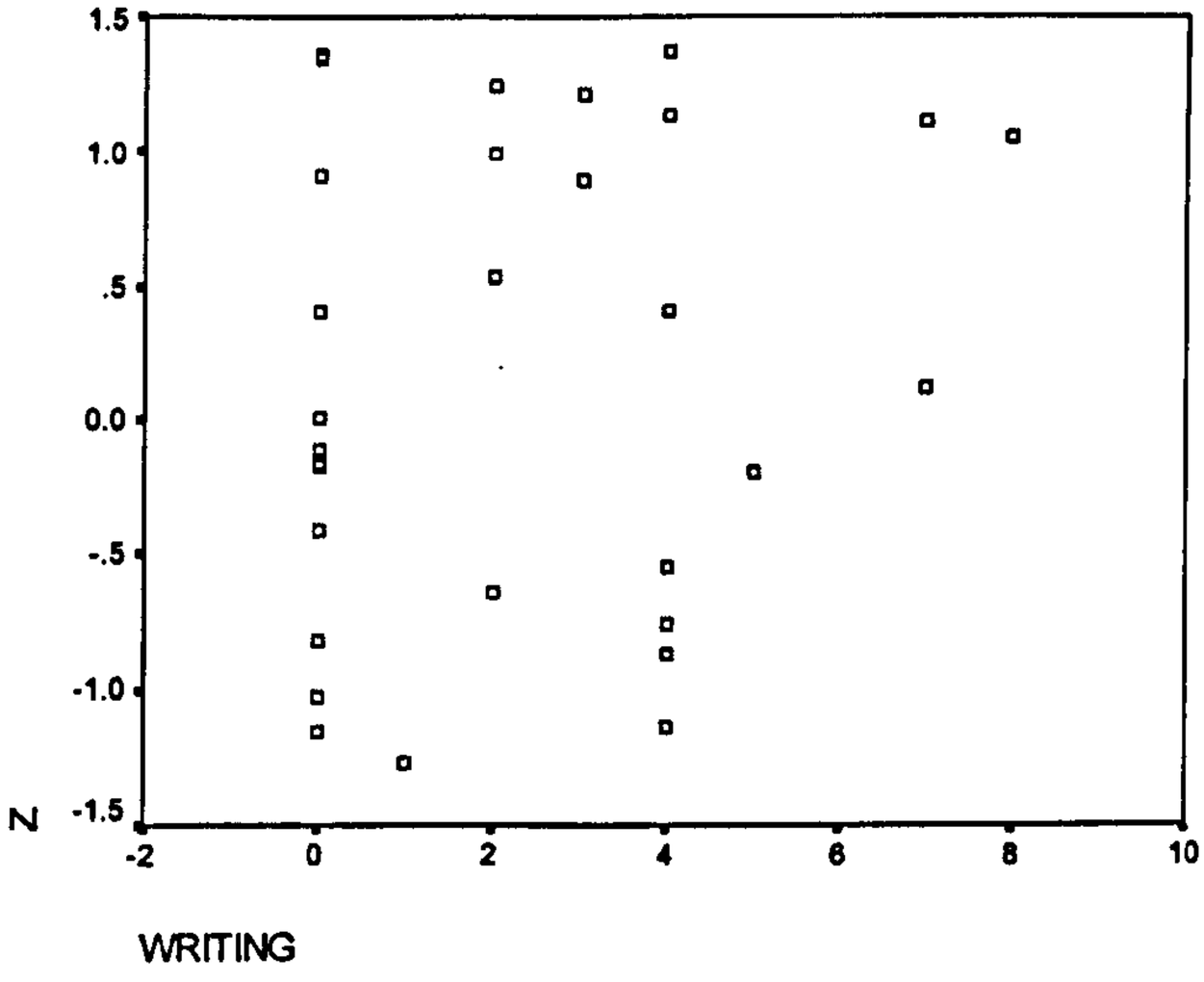
Figure A.8.10
Line graph to show mean psi-performance scores for low, high and moderate involvement with music and performance arts



A.8.4.6 Writing

Figure A.8.11 shows little relationship between involvement in writing and psi-performance.

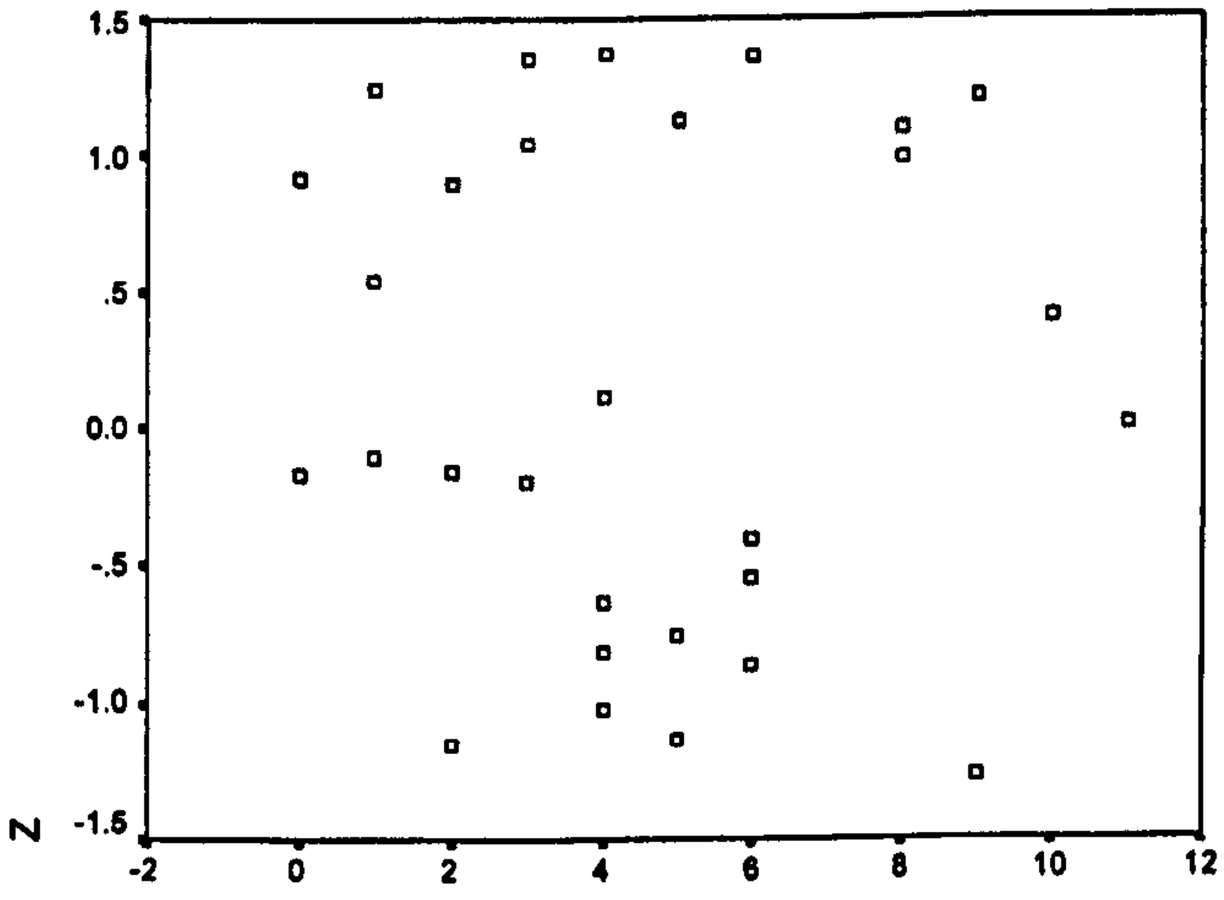
Figure A.8.11
Scatter plot showing relationship between psi-performance and involvement with writing



A.8.4.7 Domestic crafts

Figure A.8.12 shows little relationship between involvement with domestic crafts and psi-performance.

Figure A.8.12
Scatter plot showing relationship between psi-performance and involvement with domestic crafts



CREATIVITY, SUBJECTIVE PARANORMAL EXPERIENCES AND ALTERED STATES OF CONSCIOUSNESS

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INTRODUCTION

Between 1962 and 2003, 27 experimental studies have explored the relationship between creativity and psi. These suggest there is something about artistic populations that is psi-conducive. Of ten free-response studies working with artistic populations, four found that compared to non-artists, artists obtained a significantly higher hit rate (e.g., Moss, 1969). The remaining six studies used the ganzfeld paradigm, each obtaining above chance psi-scoring, with hit rates between 30% and 50% (MCE=25%), and an overall hit rate of 40% (e.g., Morris, Summers & Yin, 2003). These artistic populations obtained higher hit rates than the general populations of ganzfeld studies – for which a recent meta-analysis estimates a hit rate of 30% (Bem, Palmer & Broughton, 2001). However, the interpretation that this psi-success is due to the creativeness of the participants is questionable – it is confounded by other potential characteristics of these populations, such as extraversion, self-confidence, open-belief systems or a willingness to introspect, and the 'experimenter effect'.

Artistic involvement alone is not a measure of creativity. Creativity is commonly defined as a process whereby a novel product emerges, something that is original and also valuable or adaptive (e.g., Boden, 1996). Research using psychometric measures of creativity as correlates of psi-success (e.g. divergent thinking) have had mixed success (there are more significant outcomes with non-artistic populations) and contradictory outcomes (suggesting that 'creativity' may be associated with magnitude of psi) (e.g. Roe, Anowarun & Mckenzie, 2001). Creativity is a poly-faceted, heterogenous construct, with low convergent validity between its various measures (Hocevar, 1981). Interpretation of its relationship to psi has been further hindered by this complexity, particularly when different measures of 'creativity' have been used in isolation, as Palmer (1978) noted.

This study sought to clarify the relationship between creativity and psi by asking if different dimensions of creativity relate differentially to the likelihood of having subjective paranormal experiences (SPEs) and to a proclivity to experience altered states of consciousness (ASCs). This expanded upon the work of Kennedy, Kanthamani and Palmer (1994) who found incidence of SPEs to be significantly correlated with rating artistic creativity as an important purpose in life (r=.20, p=.04).

METHOD

Design

A correlational design was adopted, and a principal components analysis (PCA) conducted to identify underlying dimensions of creativity and determine their relationship to ASCs and SPEs. The order of measures presented to participants was counterbalanced. There were two versions, in reversed orders, with the 'drawing task' in the middle to act as a break from questionnaires.

Apparatus and Materials

The Emotional Creativity Inventory, Averill (1999). A 30-item inventory examining three facets of emotional experience: preparedness; novelty; authenticity and effectiveness.

Creativity Checklist, (Griffin & McDermott, 1998). A 54-item checklist, assessing involvement in: visual arts, performance arts, writing, music and domestic crafts. A scientific activities subscale was added, based on the Creative Behavior Inventory (Hocevar, 1979).

Self-perceived creativity and the importance of creativity. A 2-item measure on a 7 point Likert scale, asking: "How creative would you describe yourself to be?"; and "Is involvement in a creative practice an importance purpose in your life?".

Gough's Creative Personality Scale, CPS (1979). A sub-scale of the Adjective Checklist (Gough & Heilbrun, 1983) composed of 12 adjectives antithetical to, and 18 associated positively with, 'creative personality'.

Remoteness of Associations. Based on the model that making remote word associations is related to creativity (e.g. Martindale, 1989; Mednick, 1969), quick responses are made to ten stimulus words by writing an associated, but unusual, response.

Shapes, a drawing task, where nine simple abstract lines are turned into 'objects', based on the divergent thinking model of creativity developed by Guildford (e.g., 1967) and Torrance (e.g., 2000). Responses are scored by: *flexibility*, the total number of different ideas produced: and *originality*, the unusualness of ideas.

The Creative Cognition Inventory, CCI (Holt, 2002). A 29-item scale developed to assess the use of different cognitive styles in the creative process, with seven sub-scales: heightened internal awareness; intuition; linear, goal-directed cognition; playful, absorbed cognition; the use of analogy; and oneiric cognition.

The Assessment Schedule for Altered States of Consciousness, ASASC (van Quekelberghe, Altstotter-Gleich, & Hertwick, 1991), consisting of 97 items and eleven sub-scales (delineated in the first column of *Table 1*), including SPEs (extrasensory perception and direct mental influence on living systems).

Barron's Ego-strength Scale, (1968), updated MMPI-2 version (Schuldberg, 1992). A 45-item scale measuring personality integration, self-adequacy and personal adaptiveness and effectiveness.

Participants

211 participants (108 females and 101 males), aged between 18 and 70+ were recruited through opportunity sampling (the UCN psychology participant pool, UCN staff, SPR members and posters/flyers at conferences, art galleries and libraries) and word of mouth (through contacts with creative groups and academics at other universities). Participants included 36 professional artists (e.g. fine artists, poets, composers, film makers) and 28 professional scientists (physicists, chemists and engineers).

Procedure

When an enquiry was made, potential participants were given by hand, emailed or posted a questionnaire with an introductory letter and instructions about the study. Hence participants could select their preferred environment to complete the questionnaire. This could be returned either via a freepost address or by email, for which participants were given an eight-week time scale. Participants were asked to spend only five minutes on 'Shapes' and to complete the word association task as quickly as possible.

RESULTS AND DISCUSSION

From the PCA seven oblique components of creativity emerged, as delineated in the top row of *Table 1*. SPEs correlated most highly with the component labelled 'intrapersonal awareness'(r=.45, p=.000001). This component loaded predominantly on emotional creativity and the sub-scales of the CCI that focused on heightened internal awareness (e.g. paying attention to visual imagery and emotions) and non-linear cognition, and was positively correlated with artistic writing and the visual arts. Involvement in 'music and performance arts' and 'crafts and visual art' correlated at low levels with SPEs, but were not significant when corrected for multiple analysis (r=.19, p=.007 and r=.15, p=.03 respectively).

Table 1: Partial correlations between creativity components and ASCs controlling for ego-strength, gender and age*

	Intrapersonal awareness	Artistic creative persona	Figural divergent thinking	Scientific creative personality	Music and performance arts	Crafts and visual art	Writing
Extraordinary mental processes	***.51*** ***.000001***	*.18* *.01*	.08 .28	.02 .80	*.14* *.05*	.09 .24	-.05 .53
Parapsychological experiences	***.45*** ***.000001***	.10 .18	.08 .26	.05 .45	*.19* *.007*	*.15* *.03*	-.02 .80
Esoterics	***.42*** ***.000001***	.10 .15	.09 .23	.03 .63	.13 .07	.04 .55	-.02 .81
Positive mystical experiences	***.54*** ***.000001***	***.37*** ***.000001***	*.20* *.005*	*.20* *.005*	.10 .15	.11 .13	.08 .26
Negative mystical experiences	***.30*** ***.00001***	.11 .13	.11 .13	.02 .79	.02 .75	-.08 .28	.08 .28
Imagination	***.55*** ***.000001***	***.42*** ***.000001***	*.20* *.005*	.13 .06	*.17* *.02*	*.22* *.002*	-.03 .66
Dreams	***.55*** ***.000001***	***.28*** ***.0001***	***.25*** ***.0001***	.12 .09	*.19* *.009*	*.21* *.003*	.08 .25
Dissociation	***.54*** ***.000001***	*.22* *.002*	*.17* *.02*	*.21* *.003*	.10 .16	*.18* *.01*	-.11 .12
Hallucinations	***.52*** ***.000001***	***.27*** ***.0001***	.11 .12	.08 .28	.12 .09	.09 .20	.10 .18
Hypersensitivity	***.43*** ***.000001***	*.19* *.01*	.08 .24	.03 .63	*.23* *.002*	.04 .56	.07 .31
Changed feelings of time and space	***.45*** ***.000001***	***.25*** ***.0001***	*.14* *.04*	*.20* *.005*	*.20* *.005*	.08 .27	.05 .46
Total score on the ASASC	***.67*** ***.000001***	***.33*** ***.00001***	*.21* *.003*	*.15* *.04*	*.19* *.008*	.13 .07	.05 .47

* Correlations in italics are significant at the p<.05 level; those in bold remain significant when corrected for multiple analysis with the Bonferroni method (p<.0006).

Participants who practiced a 'mental discipline' (e.g., meditation, prayer, yoga, martial arts) scored significantly higher than those who did not on the intrapersonal awareness dimension of creativity only (z=-5.23, p=.0000002). Professional artists scored significantly higher on intrapersonal awareness than both scientists (z=-4.03, p=.00006) and other professions (z=-4.35, p=.00001).

This analysis suggests that of these dimensions of creativity, it is not cognitive flexibility (divergent thinking), creative personality or involvement in particular domains that relate to the reporting of SPEs in this sample, but an openness to and exploration of 'psychological space'. This concurs with the idea that people who have 'internal sensitivity' are more likely to have psi experiences (Honorton, 1972). Although artistic populations may be more likely to possess such a 'cognitive style', mere involvement in artistic domains alone does not appear to be related to SPEs to a significant degree. However, other dimensions of

creativity correlate at higher levels with ASC proclivity, hence these may mediate psi-outcome in studies that seek to manipulate states of consciousness as part of a 'psi-conducive' protocol. The next stage of this research will be to explore how well these components of creativity predict psi-success in an experimental paradigm.

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DEVELOPING EXPERIENCE-SAMPLING METHODOLOGY TO EXPLORE PSI IN 'EVERYDAY LIFE'

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INTRODUCTION

This paper describes the development of experience-sampling methodology (ESM) to test for psi outside of the laboratory, and briefly outlines an ESP study, using ESM, for which data are currently being collected. ESM is "a research procedure for studying what people do, feel, and think during their daily lives" (Larson & Csikszentmihalyi, 1983, p. 41). It is a quasi-naturalistic method that involves participants providing self-reports about the nature and quality of their experience as they go about their everyday activities. Reporting is either triggered by random signals over a set period of time (signal-contingent sampling) or by a particular environmental or psychological stimulus (event-contingent sampling). The methodology has three broad characteristics: participants record information in a 'natural setting', in 'real time' (i.e. as close as possible to a signal or event) and do so on repeated trials (Conner, 2005). As such, ESM is concerned with ecological validity, recognising the importance of the contexts in which psychological processes unfold. Through the immediate reporting of cognition, affect and behaviour, it is thought to minimise problems associated with the fallibility of memory in the reconstruction of events (Bolger, Davis & Rafaeli, 2003). Finally, through repeated measurements, the goal is to expose "regularities in the stream of consciousness" (Csikszentmihalyi & Larson, 1987, p. 527).

ESM can explore such experiential (or temporal) regularities on three levels: 1) fluctuations within a single individual's experience (the 'stimulus' level); 2) average experiences of different groups of person, e.g. personality types (the 'person level'); and 3) the interaction between the person and stimulus level, e.g. how different personality types show different patterns of experiential variability. For instance, ESM has been used in case studies (e.g., exploring individual experiences of psychopathology, de Vries, 1992) and with larger samples (e.g., to assess experiences of stress at work and how these interact with situational and personality variables, Miner, Blomb & Hullin, 2001). The methodology has also been used to examine the experiences of different individuals within an interpersonal setting (e.g., family dynamics, Almeida, Wethington & MacDonald, 1999). Further, ESM has been applied in behavioural medicine and health research, with increased focus on measuring physiological variables in addition to self-reports. Ambulatory monitors have been used to measure heart-rate and blood pressure (e.g., Jamner, Shapiro & Alberts, 1998) and physical movement tracked with wrist actigraphs (e.g., Shapiro & Goldstein, 1998). Multichannel recorders can jointly track indices of heart-rate, blood pressure, respiration, and physical activity (see Fahrenberg & Myrtek, 1996 for a review).

With the development of technology, over the last ten years there has been a movement towards using personal digital assistants (PDAs) and mobile phones to record experience rather than earlier paper and pencil methods with accompanying 'beepers' (see Feldman-Barrett & Barrett, 2001, for a review). The benefits of such technology include the recording and accurate storage of the exact time that a report was made (it is 'time-stamped'), the recording of reaction times to questions, and the randomization of the presentation order of questions to help prevent boredom and stereotyped responses over time. In addition,

[1] The author would like to gratefully acknowledge a Perrott-Warrick grant, which enabled the purchase of equipment for this study.

(and especially pertinent to psi research where security is a sensitive issue) data can be stored so that the participant cannot amend any information at a later date.

ESM and burgeoning developments in its technology may inspire novel and exciting research designs in parapsychology. ESM is very flexible and it is possible to envisage both the assessment of SPEs as they arise (in longitudinal designs) and ambient ESP quasi-experiments (e.g., with new software a controlled psi task could be initiated at random intervals). The author is currently experimenting with such protocols. Data are being collected with an ESP-ESM design. This may be seen as an adaptation of the 'ganzfeld' protocol, except that instead of being in a perceptual-isolation for 35 minutes, the 'receiver' mentates when, where and as frequently as, they like over a 24-hour period. It is hoped in this way to capture natural variations in states and to explore how these relate to psi-success. Further, such a methodology might avoid demand characteristics of lab based psi tasks (such as extraverts performing well in the ganzfeld, Honorton, Bem & Ferarri, 1991). While ESM has not previously been applied to the study of psi, it has precedents in psi research that has allowed participants to take part in their own space and time (e.g., Carrington, 1944; Delanoy, Watt and Morris, 1993; Ertel, 2004). It has been suggested that such 'take-home' protocols may be 'psi-conducive'. Participants might be better able to relax in their chosen environment (Ertel, 2004); and/or the freedom and choice of when to take part may promote feelings of competence and motivation (Delanoy et al., 1993). Further, it might be argued that a scenario that enables participant spontaneity may also facilitate psi (Stanford, 1991).

METHOD

Design

The present study is intended to explore the utility of using event-contingent experience-sampling methodology within an ESP protocol, where 'receivers' record impressions about an ESP target at their own impetus. This further includes a 'sender' (the experimenter, NH) watching a randomly selected video-clip, and a judging stage using two blind independent judges, where the target clip and three decoy clips are rated for their similarity to a 'receiver's' mentation. The dependent variable for the evaluation of psi-performance is based on the sum of target ranks awarded; the dependent variable for personality and exploratory analyses is the *Z*-score of target ratings (averaged across judges). Analyses will be made at three levels: the group level – looking at overall psi-success and psychometric correlates of this; the individual level – correlations between psi-success and the state of consciousness in which individual impressions arose; and interactions between the group level (personality) and the individual level (states of consciousness) and how these relate to psi-success.

Apparatus and Materials

Experience Sampling Program (ESP), version 4 (Barrett & Feldman-Barrett, 2005). This is free software for Palm PDAs that has been designed specifically for ESM research. It displays questions, records responses (as hidden files) and measures reaction times (in respond to each question). ESP includes two software packages: 'ESP', a palm application that interacts with participants; and 'ESP desktop', a PC application for designing experiments and configuring the ESP settings, which runs on Windows.

Tungsten T personal digital assistant (PDA) by Palm Inc (2002). The dimensions of this are 7.4 x 9.6x 1.3 cm, with a high resolution colour display screen measuring 5.3 x 5.3 cm. It runs on Palm OS v5 and has a Texas instruments OMAP1510 processor, with 16 MB of internal memory. The PDA has a microphone and its installed software includes 'Voicememo', which enables up to 55 minutes worth of audio mentation to be recorded (without a memory expansion card). The software also includes 'Notepad', which enables recordings to be made with a stylus (a metal 'pen' which is stored inside the PDA) on the screen, thus capturing words or images. The PDA has rechargeable batteries and a portable charger in which to store it when not being used.

Experience sampling questionnaire. ESP was configured to display and store responses to 32 questions that related primarily to the state of consciousness in which a potential ESP impression was recorded. These were based on: the phenomenology of consciousness inventory, PCI (Pekala, 1991), 21 items assessed 12 dimensions (duplicate items from the PCI were not included as the ESP needed to be as brief as possible) (positive affect, negative affect, altered experience, imagery, inward absorbed attention, self-awareness, internal dialogue, altered state, rationality, volitional control, memory and arousal); 2 items concerned environmental context (described with free response text) and degree of solitude; 9 items were taken from post-trial ganzfeld questionnaires (Sargent, 1980; Simmonds & Holt, in press) and primarily focused on qualities of mental imagery (e.g. its familiarity, spontaneity and its seeming source). Most responses involved moving a point on a slider from 0 to 100% to indicate degree of agreement or disagreement with a statement.

The UofN target pool, consisting of 116 minute-long digital video clips that were drawn from commercial films to reflect a range of emotions and themes. Clips were arranged in 29 sets of 4 so that members of a set were as distinct as possible and were stored digitally as MPEG files, labelled 1a, 1b, 1c etc. Randomisation for choice of the clip was achieved using the Visual Basic pseudo-random algorithm (rnd), seeded using the timer at the start of the automated ganzfeld computer system developed by Dr Paul Stevens (RANDOMIZE TIMER). Once the 'Start' button has been pressed, the computer first selects a target set, then selects one of the four clips within that set. The clips were presented via Media Player v7.

A battery of creativity measures (as described by Holt, Delanoy & Roe, 2004).

Procedure

At an initial meeting with a participant the aims of the study will be described to them by the experimenter (NH), who will attempt to create a good rapport. Subsequently, the participant will be shown how to use the PDA and will be guided through this with a practice session. They will then be given the PDA and a booklet describing the study aims and practical details, in case they forget anything, and the contact details for a research associate (E2) should they experience any difficulties.

In the ESP-ESM study participants will carry a PDA with them for 24-hours. When they feel like taking part in a trial (e.g. recording a daydream, thought, dream or experience) the participant will switch on the PDA and record this impression or experience either through Voicememo or Notepad. They will then initiate the 'ESP' questionnaire which will record their state of consciousness, time and situation. The participant will be asked to do at least one trial, which they may initiate at any time. As a security measure the participant will not be able to access any of their experience-sampling forms and mentations will be 'time-stamped'.

On the trial day a target video clip will be randomly selected by the autoganzfeld programme on a laptop computer. NH will watch this and attempt to send information about it to the participant at spontaneous times throughout the day, recoding times, lengths of sending sessions and details of the information focused upon. There will be no contact between the experimenter and the participant until the debriefing session.

The participants will be informed of the above, and that they will see the target clip in the debriefing session. They will also be told that no attempt is being made to distinguish between whether any psi is due to telepathy, clairvoyance or precognition, hence they may frame the task cognitively as they prefer.

The final stage of each trial will involve the participant meeting with the experimenter for a debriefing session. The experimenter will download all of their mentations and questionnaire responses and will discuss these with the participant and both will make comparisons with the target clip, which they will be shown. Participants will have a chance to discuss their experience of taking part in the study.

The mentations that have been generated will be used by two blind independent judges to guess the identity of the target from three decoy clips by giving a confidence rating (0 to 100%) for each clip representing certainty that it was the target. This will be done for both each separate mentation and holistically for all the mentations, considered as a collective, across the 24-hour period.

RESULTS AND DISCUSSION

Data are currently being collected for the study briefly outlined above, and it hoped that at the PA this will be briefly presented and the efficacy of the ESP-ESM evaluated.

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