Influences of Affect and Naming on Children's Drawings

Thesis

Influences of affect and naming on children's drawings

James Galpin M.Sc., M.Res

A thesis submitted in fulfillment of the requirements for the degree of Doctor of Philosophy, Developmental Psychology

The Open University

2013

DATE OF SUBMISSION: 30 JANUARY 2013
DATE OF AWARD: 5 JUNE 2013

Declaration

I hereby declare that this thesis is of my own composition, and that it contains no material previously submitted for the award of any other degree. The work reported in this thesis has been executed by myself, except where due acknowledgement is made in the text.

Acknowledgements

I would like to thank my supervisors Dr Esther Burkitt, Professor David Messer and Professor Vicky Lewis for their constant support and advice.

I would also like to thank all the schools and children that took part in my research. To my friends and family and everyone else who has contributed either directly or indirectly to this PhD I would also like to say thank you.

Abstract

Influences of Affect and Naming on Children's Drawings

Positive and negative affective characterisations have been shown to influence children's use of size in human figure drawings. Inconsistency in the literature regarding this influence and methodological issues makes the robustness of the findings uncertain. Furthermore theoretical debate continues over the underlying mechanisms, acquired pictorial convention (APC) or an appetitive defensive mechanism (ADM), causing a differential expression of size. The first two studies were designed to improve upon past methodology in examining the relationship between size and affect in children's drawings: a novel model figure was developed, independent measures of affect taken and children took part in drawing production and perception tasks.

The first two studies examined the influence of affect on children's drawings of nice and nasty human figures and the role of APC and ADM. The results indicated that affectively labelling a model figure to be drawn did not reliably influence the size of children's drawings. However, consistency in the effects of labelling on drawing perception tasks was found. This led to an examination of the features, other than size, that different children displayed in their free drawings. There was consistency shown in terms of the core features children drew for concrete objects and children appeared to be using a set of shared conventions for representing objects. This consistency of use of features was not as robust for less concrete more descriptive topics (such as nice and nasty figures). The use of a word label was also shown to influence children's drawings when copying from a model. Children were significantly more likely to include core features from the labelled object despite these being absent in the model. Furthermore children would draw core features prior to more periphery features, supporting the core-to-periphery progression principle.

Contents

Chapter 1

Introduction

The overarching theme in this thesis is an examination of the influences of affect and the use of word labels upon what children draw and what they perceive in the drawings of others. The first two studies are primarily concerned with size in relation to children's production and perception of drawings. The remaining chapters examine children's internal representations and the relationship between these and their drawings.

The current chapter reviews the relevant literature and is split into two parts. The first section examines the literature that is particularly relevant to the examination of affect in children's drawings. The literature is discussed regarding the clinical application of children's drawings, the use of size in children's drawings, and the use of size as an indicator of emotional affect in children's drawings of affectively characterised topics. Previous research is presented to highlight the varied results in this area.

The second section of this review discusses the literature regarding children's free drawings (i.e. drawings without a model or example of the topic). The factors that influence why and when children draw an object using abstract, generic, schematic (typical) representations as opposed to more specific, visually realistic representations and what may cause children to include the same core features (e.g. the roof of a house) in their drawings is discussed.

1.1 Affect and children's drawings

The lack of consistent results reported in the literature regarding the relationship between size and positive and negative affective characterisations of figures and other topics are highlighted and it is argued that one of the main explanations for this lack of consistent results are a lack of a consistent experimental methodology and the presence of certain methodological flaws. Two theories, acquired pictorial convention (APC) and an appetitive defensive mechanism (ADM), that have been put forward to explain the direction of the change in size are also reviewed. The review begins by detailing the clinical use of children's drawings and highlighting the use of size in drawings obtained in a clinical setting.

1.1.1 Clinical use of children's drawings. This sub-section highlights the direct clinical relevance of the studies presented in the first two empirical chapters of this thesis. It summarises the historical development of projective drawing assessments for clinical use and the relevance of interpretations of size to these assessments; the problems surrounding the reliability and validity of projective drawing assessments is discussed, and the ongoing need for researchers to provide formal experimental evidence upon which more valid and reliable conclusions may be made.

Children's drawings have been of considerable interest in the study of child development since the late nineteenth century (Barnes, 1893; Darwin, 1877; Ricci, 1887). Folk psychology can lead to the tempting assumption that what is seen depicted on paper can provide a direct reflection of what is in a person's mind. The clinical appeal of the use of children's drawings as an assessment tool is also understandable. The level of self-awareness and verbal ability required to provide a detailed description of a mental state is often thought to be out of reach for children (Booth & Hall, 1994; Booth, Hall, Robison & Kim 1997). Children's limited vocabulary, as well as an under-developed capacity for self reflection (Damon & Hart, 1982; Zelazo, 2003), can lead to their emotions being less amenable to verbal description. As such, children's drawings could provide a useful addition to the range of tools clinicians have at their disposal.

The emergence of psychoanalytic theory (Freud, 1920) was a catalyst for greater interest in the notion that a motivation for children to draw may have been to express their unconscious feelings (Hammer, 1958). The possible clinical applications of drawings began to be explored, specifically in relation to projective personality interpretations based on drawings collected in clinical settings (Schilder, 1935; Bender, 1938). A projective task or activity is one in which the participant is thought to project his or her feelings or emotional state without directly expressing it through words (Cox, 2005).

A wide variety of projective drawing assessments was developed for assessing types of maladjusted personality as well as children's emotional attitude towards themselves and others. One set of these techniques involved the drawing of various forms of trees (e.g., *Baumtest* developed by Koch, 1949, Van Lennep's, 1958, drawing task and the *Familie in Tieren* technique developed by Brem-Graser, 1957). Another important tradition involved human figure drawings. There was a widely-held assumption that examination of children's human figure drawings could provide valuable insights into a child's mind: The Machover 'Draw-a- Person' test (Machover 1949), the House-Tree-Person (HTP) Test (Buck 1948), the Kinetic Family Drawing (KFD) Test (Burns & Kaufman 1970) and the Goodenough-Harris Draw-A-Person (GHDAP) Test[1] (Goodenough, 1926; Harris, 1963) are all examples of drawing tests based upon a psycho-dynamic psychoanalytical framework that continue to be used by clinicians today (Bekhit, Thomas & Jolley 2005; Camara, Nathan & Puente 2000; Cashel, 2002; Chan & Lee, 1995; Watkins, Campbell, Nieberding & Hallmark 1995).

Various aspects such as quality of line, position on the page, details included and in some cases colour are examined in projective drawing assessments. One element that is examined in all of the tests mentioned above is size. The Draw-a-Person Test (Machover 1949), the HTP Test (Buck 1948), the KFD Test (Burns & Kaufman 1970) and the GHDAP Test (Goodenough, 1926; Harris, 1963) all viewed size (or proportion) as an aspect that was particularly indicative of the children's feelings towards themselves or others. The examination of figure size has been seen as a particularly salient factor in the analysis in children's drawings of human figures as it was argued to represent the child's own self-esteem (Berman & Laffel, 1953; Buck, 1948; Di Leo, 1973; Hammer, 1958; Koppitz, 1968, 1984; Machover, 1949). Larger figures were seen to denote aggression or grandiosity, while smaller ones were thought to reflect inadequacy, inferiority, low self-esteem, depression or anxiety. There have however been many criticisms of the reliability and validity of these tests and these are discussed in detail below (Section 1.1.2) with particular regard

[1]Whilst the GHDAP Test was originally developed to provide an indication of children's level of cognitive development, specifically a measure of intelligence, it is also used as a projective assessment of emotional disturbance in children.

to the implications these have for the use of size as a measure of affect in projective drawing assessments.

1.1.2 Problems with projective drawing tests. Early attempts at analysing emotions in children's drawings fell into circular judgments whereby the behavioural and psychological problems affecting the child (often known prior to the administration of the drawing test) were deduced from the drawing and then used to describe and explain what had been drawn (Smith & Dumont, 1996). The subjective nature of projective drawing tests was documented by Wanderer (1969, reprinted in Hammer, 1997). He found that even when judges of drawings were not aware of the child's particular problems, the level of training and the personality of the judges influenced the interpretations. Even those following the psychoanalytic tradition acknowledged that conflicting interpretations of the same drawing could be reached (Hammer, 1958). A review by Anastasi (1976) reported there to be no clear consensus as to how certain features of the drawings should be interpreted in projective assessments. Neale and Rosal (1993) examined the usefulness of projective drawing assessments in aiding diagnoses for art therapists and found that the drawings made could not provide reliable information in and of themselves of any underlying emotion the children felt towards themselves or others. Motta, Little and Tobin (1993), in their review of the projective approach to analysing children's drawings, found little to support its validity, and recommended that analysis of children's drawing be discarded as a diagnostic tool. Indeed, Anastasi and Urbina (1997) and Thomas and Jolley (1998) have provided more recent reports arguing that validation studies have failed to support the diagnostic interpretations given by the Machover Draw-a-Person Test. More recently, the reliability and validity of the Goodenough-Harris Draw-A-Person Test has also been found to be limited. Ter Laak and colleagues (2005) argued that a more reliable and valid scoring system is required in order to improve its success as an indicator of a child's cognitive level, socio-emotional development and personality (Ter Laak, De Goede, Aleva & Van Rijswijk, 2005).

Despite the evidence questioning the reliability and validity of projective drawing tests, with some researchers even arguing that their use breaks ethical standards (Burgess & Hartman, 1993; Smith

& Dumont, 1995), they are still used by clinicians and psychologists around the world to provide information about the emotional level and personality of the child (Bekhit, Thomas & Jolley, 2005; Camara, Nathan & Puente 2000; Cashel, 2002; Chan & Lee, 1995; Watkins, Campbell, Nieberding & Hallmark 1995). In the survey by Watkins et al. (1995), 80% of the clinical psychologists surveyed in the USA used projective drawing tests of some kind. Whilst the Watkins et al. (1995) study is now well over a decade old, there are few signs of their use decreasing due in part to the structure of the healthcare system in the US. Financial constraints derived from the reimbursement practice of private healthcare companies may lead clinicians to use tests that are quick and short to administer, such as projective drawing assessments (Piotrowski, 1999 – as reported in Jolley, 2010). The highly litigious environment in which these tests are used has led to warnings for clinicians to exercise caution when using projective assessments, notably Rorschach tests, in order to avoid lawsuits (Garb, Wood, Lilienfeld & Nezworski, 2002). The recent American Psychological Association research methods handbook (McGrath & Carroll, 2012) also urges caution in the use of projective assessments in general and it further suggests not referring to them as either *projective* or *tests*, presumably to minimise litigation.

There is therefore an on-going need to provide formal experimentation, such as that presented in this thesis, which will provide a clearer understanding of the various factors that can influence the way in which a child draws an image. This will then provide a more objective basis upon which interpretations of children's drawings can be made. The following sub-section reviews the experimental research literature regarding children's drawings that is relevant to the studies presented in this thesis.

1.1.3 Experimental research into children's drawings. This sub-section begins by reviewing experimental research examining children's drawings that highlights a range of factors, other than emotional states and the sub-conscious, which influence the way in which children draw. In particular how planning and production problems as well as memory capacity can affect the size of figures children draw. This section therefore draws attention to the factors that must be considered when designing an experiment to specifically examine the use of size in relation to affect. It foreshadows some of the rationale behind the design of the first two studies presented in Chapters 2 and 3 of this thesis as well as the research upon which those studies were built.

The need to account for planning and production issues in any examination of the content of children's drawings was highlighted by Freeman (1977) and was presented much earlier by Luquet in *Le Dessin Enfantin* (1927/2001). The important distinction was made between children's drawing competence and actual drawing performance. Luquet acknowledged that children may know what they want to draw, and demonstrate this through an announcement of their intentions prior to the production of a drawing, but are subsequently unable to successfully produce the drawing, due, he argued, to two factors: a lack of necessary graphic control, plus the limited and discontinuoused nature of the child's attention (Luquet 1927/2001; Willats 2005).

In his examination of the role of memory on children's drawings Morra (2008) highlights both the cognitive and motor processes that are involved in drawing, noting that the act of producing a drawing would "activate a task executive carrying the goal and the plan of a drawing....and a graphic figurative scheme that carries information on what the drawing.....should look like" (Morra, 2008, p. 64). Morra (2008) goes on to explain that the task executive for a drawing would involve five constituent parts: (1) a goal (the intended meaning of the drawing), (2) the use of marks standing for that meaning, (3) a drawing instrument, (4) a surface on which the drawing is to be made and (5) a system of hand movements to produce marks with the drawing instrument. Each of the five constituent parts of this task executive potentially involves a range of further factors that could all influence the way in which a child's picture is drawn.

In considering the goal of a drawing (part (1) of the task executive described by Morra, 2008) a child could hold any one of a variety of possible intentions when commencing a drawing and indeed his or her intention could change during the drawing process (Trautner & Milbraith, 2008). The child may have a representational intention, to produce a more or less realistic drawing of the referent; an expressive intention, to induce specific effects in the observer of their drawing; a narrative intention, to tell a story with his or her drawing; or an aesthetic intention, to produce an image that is decorative or pleasing due to its form and colour (Trautner & Milbraith, 2008). Therefore, when designing an experiment to examine children's drawings, the intention of the child when producing his or her drawing must be considered as a potential motivating factor for why the child has drawn an image in a specific way.

Planning problems can also be considered as a reason why an image has been drawn a certain way or a certain size. Drawing is sequential in the way that one can only draw one thing at a time, and there are specific problems inherent in organising this serially ordered behaviour (Freeman, 1980). One problem that frequently manifests itself in children's drawings is a tendency towards end-anchoring. This problem is often shown in depictions of the human figure, where head and legs, being the end-items, are more reliably represented than body or arms. They define the endpoints of what Freeman (1980) describes as the dominant vertical axis. An example of the potential impact of end-anchoring can be seen in the human figure drawings of young children (up to around the age of 5- 6 years in normally developing western children [Cox, 1993]) known as *tadpole* figures. Here the head and legs, the pre-requisite defining features of a tadpole figure, are consistently represented but the body, and to a lesser extent the arms, are omitted (Cox, 1993). Therefore due to concomitant planning difficulties the first items drawn by a child may be drawn larger which in turn could impact upon the size of other details in the drawing.

A related influence on size that planning problems can also have was highlighted by Thomas and Tsalimi (1988) in that children tend to draw important distinguishing elements of a picture first. Children (5- to 8-year-olds) were shown to overestimate the head size of human figure drawings when the head was drawn first. As a result these first drawn elements will often be larger than elements of the drawing that are executed later as there is less space available on the surface upon which children are drawing. Furthermore, Lange-Küttner (1997) found that size modification of the human figure in a spatial context could occur as *object-driven,* size being mediated by the presence of, and thus need to share space with, other objects, or *axes-driven,* because the figure must fit into a spatial axes system, i.e. the surface onto which the picture is to be drawn. This again highlights the variety of factors other than affect than can influence the size of children's drawings.

The inclusion of detail can also influence the use of size. Freeman (1980) pointed out that the desire to include detail may increase the size of a drawing. Henderson and Thomas (1990) found that children's (4- to 7-year-olds) anticipation of detail to be included in a drawing could result in a significant adaptation of the size of the drawing. In their study children were split into four groups dependent upon the detail requested in the drawing. They found that the head of a human figure was drawn larger than the trunk in anticipation of having to include the detail of teeth, whereas when the detail to be included was a jacket the trunk (body) was drawn larger. All of the factors discussed above could account for size changes in children's drawings. As such, research designed to examine the influence of affect upon the size of children's drawings must seek to control for these factors. The next section reviews the literature that has sought to specifically examine the influence of affect on children's use of size in their drawings.

1.1.4 Experimental evidence specifically regarding use of size in children's drawings.

This sub-section introduces and reviews experimental research that was specifically concerned with examining children's use of size in their drawings in relation to social significance and affect. Next, the development of theories regarding the use of size is summarised. The studies that directly influenced the research presented in this thesis are then reviewed. The lack of consistency in the results found in the literature is discussed and the methodological flaws and inconsistencies between studies are highlighted. These flaws and inconsistencies were directly addressed in the study reported in Chapter 2 of this thesis.

Art historians have noted, in paintings and drawings made by adults, items that are seen to be important and salient have been drawn larger since prehistoric times (Costa & Corazza, 2006). Similarly, and outside the psycho-dynamic tradition, early research into size differences in children's drawings pointed towards size as a reliable indicator of topic significance. This position was based to a large extent on Löwenfeld's (1939) claim that children exaggerate features of a topic that are significant to them. Löwenfeld and Brittain (1970), when examining children's drawings of a person searching for a pencil, interpreted exaggerated size of hands as signifying the importance of the topic of *searching*. An exaggeration of the size of the pencil indicated the importance of the idea that the pencil had been found. Size scaling in drawings has also been seen to be a robust reflection of social significance (Aronsson & Andersson, 1996; DiLeo, 1973). DiLeo (1973) demonstrated that a child's most significant family member tends to be portrayed larger than less significant ones. Craddick's (1963) research into the relationship between figure size and significance examined the size of drawings of a witch in the lead-up to, during and after Halloween. It was found that children's drawings of witches were smaller during Halloween than those drawn before or after. This led Craddick to argue that figure size indicates the importance or significance of a figure as it becomes more salient in naturally occurring events. It is noteworthy that through Craddick's study the relationship between size and topic significance was shown to be more dynamic than a unidirectional increase in size of important topics. Furthermore it introduced the idea that emotionally driven significance may cause size change in drawings. Craddick (1963) argued that children may reduce the size of witches in their drawings as the topic was more threatening - or anxiety-eliciting – at that time of year.

The possibility that children increased the size of positively significant figures was investigated by Sechrest and Wallace (1964). They examined changes in size of children's drawings of Santa Claus before, during and after Christmas. The results obtained by Sechrest and Wallace showed that there was a significant increase in the size of the Santa Claus pictures as Christmas approached. This early experimental research then prompted researchers to focus on the possibility that the specific contents of children's graphic depictions can reveal the child's particular emotions concerning the subjects which are depicted (Burkitt, Barrett, & Davis, 2003a, 2003b, 2004; Burkitt & Barnett, 2006; Forrest & Thomas, 1991; Fox & Thomas, 1990; Hammer, 1997; Joiner, Schmidt & Barnett, 1996; Thomas, Chaigne & Fox, 1989; Thomas & Jolley, 1998).

The studies by Craddick (1963) and Sechrest and Wallace (1964) however contained some methodological flaws. They did not utilise any control drawings with which to compare the drawings of witches or Santa Claus, nor was there any independent measure of the child's actual feeling towards the figures drawn. Thus there was no measure of the extent to which the child felt threatened by the witches, or felt positive towards Santa Claus. The repeated measures design also failed to take into account any practice effects that may have occurred as a result of the repeated depiction of the same figure. Thomas, Chaigne and Fox (1989) pointed out that the size increase in the Santa Claus drawings could be accounted for by the children's greater familiarity with the figure of Santa Claus due to an increase in the number of depictions of the figure they would have seen in their environment in the run up to Christmas. As children's familiarity with the figure increased it could be argued that they would have been able to include greater detail in their pictures. As Thomas and Tsalimi (1988) and Henderson and Thomas (1990) noted, detail inclusion or anticipation of detail inclusion can lead to a tendency to increase the size of a drawing.

Taken together however, Craddick's (1963) and Sechrest and Wallace's (1964) studies provided the basis for further investigation into the role that affect and affective characterisation of figures may play in children's use of size. This early research also provided important guidance about experimental research regarding the relationship between size and affect in children's drawings. Key issues to be considered before any relationship between size and affect can be argued to reliably exist are: the use of baseline measures; independent assessments of affect and the potential for practice effects to influence the use of size when using repeated measure designs.

Many of these issues were addressed in subsequent research (Burkitt et al. 2003a, 2004; Fox & Thomas, 1990; Thomas, Chaigne & Fox, 1989); however, as shall be discussed, concerns regarding the methods used continue to be raised regarding almost all subsequent research that examined the relationship between size and affect in children's drawings. These methodological concerns are argued here to be a possible cause for the mixed results concerning the relationship between size and affect in children's drawings reported in the literature. Addressing these concerns was one of the aims of the study presented in Chapter 2.

Some of the methodological issues raised regarding the early research reported above (Craddick, 1963; Sechrest & Wallace, 1964) were addressed in a series of studies by Fox and Thomas (1990). They included a baseline measure and an independent measure of affect towards the figures to be drawn. Like Craddick (1963), they also examined children's drawings of witches. Importantly they also asked children to draw an ordinary woman as a baseline. Drawings were completed before, during and after Halloween. Importantly they used a questionnaire to independently measure children's fear of witches, rather than assuming all children were threatened by them. In their first study they did not report any significant decrease in size of the witch drawings. Thus the early results of Craddick (1963) were not reliably replicated. However, the second study carried out by Fox and Thomas (1990) compared the results of those children who, according to the questionnaire, were afraid of witches with those that were not. Regardless of the timing of the drawing (before, during or after Halloween) those who were scared of witches drew their witches smaller and ordinary women larger compared with those who were not (Fox & Thomas, 1990). There seemed therefore to be some support for the notion that children reduce the size of threatening topics in their drawings.

In a series of studies conducted by Thomas, Chaigne and Fox (1989) the type of figures to be drawn was extended to include more general topics of positively and negatively characterised figures. Thomas et al. examined the size change in children's pictures of a human figure and a 'magic' apple characterised as *nice* or *nasty* with a drawing of a *neutrally* characterised man and apple also taken to provide a baseline measure of the child's human figure and apple drawing size. The apple was characterized as magic so that the characterisations of nice and nasty would be more easily attributed to the otherwise inanimate object of an apple. To avoid the influence upon size that detail inclusion may have, children were asked to copy a simple outline of a figure for the human figure drawings and an actual apple for the magic apple drawings. This was done to avoid any attempt to make room for detail that may occur should the children draw in the absence of a model. Thomas et al. also sought to control for any possible effects of practice (as a result of a repeated measures design) that could be responsible for an alteration in the size of the drawings. They therefore included a control group, asked to draw the neutrally characterised figure twice, rather than a neutral figure followed by either a nice or nasty version. Separate pieces of paper were provided for the neutral, nice and nasty drawings to control for possible size changes due to planning difficulties as a result of having to draw two figures on the same page. This study therefore addressed many of the methodological concerns raised above. Nevertheless the results only partially supported an influence of affect on the size of the drawings.

The results reported by Thomas et al. (1989) confirmed that children drew the nasty human figure significantly smaller than the neutral figure. The nice figure was also drawn larger than the neutral figure; however this was not done to a significant degree. The nice magic apple was drawn significantly larger than the neutral one. The nasty magic apple was drawn smaller than the neutral one, although this was not done to a significant degree. More significant in terms of the current research is the point that these results illustrate a lack of consistency in the significant differences between the size of positively and negatively characterised topics. The decrease in the size of the nasty topics was significant for the human figure but not the apple, whilst the increase in the size of the positive topic was significant for the apple but not the human figure. Thomas et al. (1989), in seeking to account for this lack of consistency, proposed that reduction in size of the nasty magic apple did not occur because it was a fictitious, usually inanimate, object and therefore not a real threat. Indeed, Hugdahl and Ohman (1977) have demonstrated that instructions can engender fear towards some classes of stimuli (e.g. snakes) but not others (e.g. geometric shapes) due to participants' biological or cultural predispositions with regard to fear acquisition.

However, there were methodological caveats in the study conducted by Thomas et al. (1989). There was no independent measure of affect felt towards the apples and people; therefore the explanation put forward by Thomas et al. has shortcomings. Furthermore the experimental design itself may have accounted for the inconsistencies found between the size changes observed in the nice and nasty human figures and magic apples. This highlights a second key point with regards the research undertaken in the first two studies reported in the current thesis. The experimental conditions were not held constant by Thomas et al.. Whilst the human figure drawings were obtained through the copying of a two-dimensional schematic model, the magic apple drawings were obtained by copying a real (three-dimensional) apple (Burkitt et al., 2003b). Burkitt et al. (2003b) further pointed out that the use of a between-subjects design may have introduced large error variance into the data as there is large variability in the size of different children's drawings.

Hammer and Kaplin (1964) assessed the size difference between children's two human figure drawings, the first figure being of the same sex as the child and the second as the opposite. Whilst extreme variations in size were not found, namely that children who drew a very small figure first rarely drew a very large figure second, consistency of figure size was not found in any of the ages examined. Swensen (1968) examined the consistency of size of human figure drawings taken from the same individual and found that consistency was only observed 51% of the time. Thus any examination of size change between two figures would need to counterbalance the order of presentation of figures to be drawn. These methodological issues may therefore have accounted for the lack of consistency found in the results reported by Thomas et al. (1989) and also raise questions about the validity of the results.

Building on the Thomas et al. (1989) study, Burkitt et al. (2003b) increased the already tight experimental controls on possible confounding factors. Many of the design features of the Burkitt et al. (2003b) study were included in the studies reported in Chapters 2 and 3 in this thesis, the study is therefore reviewed in detail below.

1.1.4.1 More recent research examining the relationship between size and affect in children's drawings. In the Burkitt et al. (2003b) study, shaded outlines of a human figure, a dog and a tree were used for children to copy, thus controlling for possible planning and production problems, as well as for the possibility of a size increase due to anticipation of detail inclusion. Children were all asked to draw a control drawing of the outline figure which was neutrally characterised. This provided a baseline to which the positively and negatively characterised drawings could be compared. A repeated measures, within-subjects design was used to control for the large variability in the size of different children's drawings (Hammer & Kaplin, 1964; Swensen, 1968). Each child produced three drawings (baseline, nice and nasty) on separate pieces of paper to control for the fact that should the most significant figure be drawn first there may be less space for the second figure. Thomas and Gray (1992) noted that if a figure that was deemed more important was drawn first it may be drawn larger than the less important one due to poor planning skills.

To control for potential effects of the repeated measures design (size of children's drawings changing simply as a result of practice effects) the drawing tasks were administered in counter-balanced order (one group drawing the nice figure then the nasty figure, the other producing the nasty drawing first and the nice drawing second). Importantly, a five point smiley face Likert scale was employed to independently measure the affect felt towards the topic at the time of drawing, a similar measure was used in the studies reported in Chapters 2, 3 and 7.

The results supported those originally obtained by Thomas et al. (1989). When surface area was analysed the nasty drawings were significantly smaller, and the nice significantly larger than the baseline drawings. The analysis of the height of the drawings lent further support to this. The nice drawings were taller than the baseline and the nasty were shorter than the baseline; the difference was significant in both cases. The width measurements were not as conclusive: although nice drawings were found to be significantly wider than nasty drawings, the width of the baseline drawing was not significantly larger than that of the nasty drawings.

The independent measure of affect felt towards the drawings lent further support to the data, with the nice topics being rated on the Likert scale significantly more positively than the nasty topics. The results showed that size changes were consistent across the age range (4- to 11-years-old). The size change was also noted across the three topics (human figure, dog and tree), thus highlighting the fact that the asymmetrical results (between the human figure and magic apple drawings) found in Thomas et al. (1989) were most likely a result of methodological differences between the two models used.

Overall the results of Burkitt et al. (2003b) indicated that the increase in size of a positively characterised (nice) topic and less reliably the decrease in size of a negatively characterised (nasty) topic can be expected when the drawings are made by copying an outline shaded figure. Whilst accounting for and controlling for previous methodological inadequacies, the tightly controlled nature of the Burkitt et al (2003b) study can be criticised due to the model used (a shaded outline figure) not being entirely neutral, since Black and Niven (1993) found that the majority of children who saw a shaded outline figure presupposed it to be nasty. Further to this, Burkitt et al. (2003a, 2004) found that in children's drawings black was the colour that was most closely associated with nasty figures. Therefore relative size changes may not have been a reliable indicator of affect felt by the children. The studies reported in Chapters 2 and 3 addressed the issue of the colour of the outline figure to be copied.

In order to examine the reliability of the size change reported by Burkitt et al. (2003b) in the absence of a model, Burkitt et al. (2004) repeated their original experiment without the use of a model, examining children's free drawings of a man, a tree and a dog. The 2004 study utilised many of the design features of the 2003b study – control drawings were taken, a repeated measures design was used, all three drawings (baseline, nice and nasty) were made on separate pieces of paper, and an independent measure of affect was taken at the time of drawing. However, once again the results pointed towards a lack of consistency in the effect of affect upon children's use of size in their drawings.

The analysis of the surface area and height of drawings supported the earlier findings in that nice drawings were drawn significantly larger and taller than the baseline and nasty drawings. However, a significant reduction in the size of the nasty drawings compared to the baseline was not found. In fact in the older group of children (with a mean age of 10 years, 1 month) the nasty drawings were taller relative to the baseline drawings. The notable exception to this was the reduction in the size of nasty trees relative to baseline. The study did demonstrate a reliable effect in terms of the increase in size of positive topics relative to baseline drawings with 71% (n = 179) of children drawing larger positive figures when measured by surface area and 66% (n = 166) increasing the height of the positive figures. However, only 45% (n = 112) of the children decreased their nasty drawings relative to baseline when measured by surface area, with only 42% (n = 107) doing so when measured by height (Burkitt et al. 2004). The results across the two studies therefore point towards a lack of consistency in the relationship observed between size and affect in children's drawings. It is again argued here that methodological differences may be responsible for this lack of consistency as opposed to the effect of size change being unreliable. The lack of consistency could be a result of the exact cues children were given, a model to copy from or free drawings, the type of size measurement used, individual differences between the two groups of children that took part in each study or experimenter differences.

The research presented in Chapter 2 of this thesis sought to address these methodological issues in order to gain a more reliable set of results. These results could more definitively support or refute the hypothesis that the use of positive or negative characterisations will result in children altering the size of topics drawn. Some researchers have, in light of the lack of consistency shown between size and affect, concluded that the area does not merit further study (Jolley, 2010). Absence of reliability and persistent confusion in the current evidence regarding size and positive and negative emotion in children's drawings is highlighted by the fact that analyses of children's line drawings made in projective drawing tests (e.g., size reflecting emotional significance) fall short of meeting evidentiary standards required for admissibility in court (Lally, 2001). This fact emphasises the scepticism found, not only within the scientific community (Thomas & Jolley, 1998), but also elsewhere (Lally, 2001). Indeed recent research has renewed calls for examination of size and emotion in children's drawings in both forensic and clinical practice to be dismissed (Strange, Van Papendrecht, Crawford, Handel & Hayne, 2010). In order to justify why this area does merit further examination studies that have provided negative evidence regarding the relationship between size and affect are summarised briefly below. It is once again argued that owing to methodological caveats in these studies the conclusions drawn from their results cannot be seen to be definitive (Joiner, Schmidt & Barnett, 1996; Jolley & Vulic-Prtoric 2001; Strange et al. 2010).

1.1.5 Negative evidence specifically regarding use of size in children's drawings.

Examining the drawings of children between the ages of 6 and 16 years who had been diagnosed with depression Joiner, Schmidt and Barnett (1996) found no evidence of a reliable size change between drawings of positive and negative figures. It must be pointed out however that this study was not designed to specifically examine the sole measure of size as an emotional indicator, size was one of three indices looked at (the other two being detail and line heaviness). The study was mainly concerned with examining the validity of projective drawing tests as accurate substitutes for self-report or thematic projective measures of depression and anxiety, for which they found little evidence (Joiner et al. 1996; Joiner & Schmidt, 1997). However, Joiner et al. (1996) also did not measure affect towards the drawn topics independently at the time of drawing (Burkitt et al. 2003b). Therefore Joiner et al. (1996) cannot be certain that the hypothesised affect was felt towards the topic drawn and that the results obtained reliably reflected affect in children's drawings.

Children's drawings of happy and sad events, as opposed to specifically a human figure, were examined by Strange et al. (2010). They reported no significant difference between the size of objects in the drawings of the two scenes; furthermore they reported that adults both with and without clinical training failed to identify which drawing represented the happy scene and which the sad scene when they removed specific emotional indicators from the drawings (such as tears, for example). However, Strange et al. (2010) seemingly overlooked the literature regarding detail inclusion, planning difficulties, independent measures of affect, effectiveness of instructions used or the role of real world scaling in drawings in their study. Accordingly Strange et al. (2010) did not control for any of these factors and as such their research does not provide any conclusive evidence that size is not reliably used in children's drawings of affectively characterised scenes.

Croatian children's drawings of enemy and friendly soldiers were examined by Jolley and Vulic-Prtoric (2001) for differences in size and placement on the page. There was found to be no main effects of size of drawing for any of the children studied, including a trauma group of children who had lost parents as a result of the Balkan conflict. The data from the extant literature would have predicted that the drawings of the enemy soldier would have been drawn smaller than the friendly soldier. The conclusion put forward was that the size of the subject drawn is unlikely to be a reliable feature portraying the child's emotional attitude towards it (Jolley & Vulic-Prtoric 2001). However, Jolley and Vulic-Prtoric (2001) did not provide objective confirmation of this with an independent measure of affect felt towards the drawings at the time of drawing (Burkitt et al. 2003b). Furthermore there were some data to suggest that those children in the trauma group drew smaller soldiers than those not in the trauma group. The authors speculated that this may have been due to a negative affect felt towards soldiers in general. This speculation, and the fact that no independent measure was taken, again suggested that the relationship between size and affect merited further investigation. Once again, due to methodological inconsistencies and flaws, no definitive conclusion can be drawn. The studies reported in Chapters 2 and 3 directly addressed these issues.

In summary therefore, Sections 1.1.4 and 1.1.5 have presented the evidence found in the literature to both support (Burkitt et al. 2003b, 2004; Thomas et al., 1989) and refute (Joiner, Schmidt & Barnett, 1996; Jolley & Vulic-Prtoric 2001; Strange et al. 2010; Thomas & Jolley 1998) the hypothesis that there is a relationship between size and affect in children's drawings. It would still appear there are methodological inconsistencies and flaws that need to be addressed before a definitive conclusion can be made. The studies reported in Chapters 2 and 3 utilised a method that was specifically designed to address these inconsistencies and flaws. Independent measures of affect felt towards the positively and negatively characterised figures drawn in a production task were taken. Brief mood induction instructions similar to those reported in Burkitt et al. (2003b, 2004) were used in order to characterise a nice and a nasty person in the drawing tasks. To control for the possible role that detail inclusion (Henderson & Thomas, 1990) and planning difficulties (Thomas & Tsalimi, 1988) can have upon size in children's drawings, the children were asked to copy from a model when they were executing their drawings. The model used had been developed during a pilot study so as to be more neutrally viewed than the models used previously. A baseline drawing of a neutrally characterised human figure was also taken which provided a measure of the child's drawing of an uncharacterised figure to which the characterised figures could be compared.

Furthermore children in the studies reported in Chapters 2 and 3 were asked to draw their nice and nasty human figures drawings on both the same and separate sheets of paper. The rationale behind the inclusion of same and separate sheet drawing conditions as well as a drawing perception task is discussed in Section 1.1.6 below. Children also took part in a drawing perception task, where they had to identify which of two figures shown to them was nice and which was nasty. Again brief mood induction instructions similar to those used by Burkitt et al. (2003b, 2004) were used to characterise the figures in the perception task and independent measures of affect felt towards the figures were taken.

1.1.6 The appetitive defensive mechanism (ADM) and acquired pictorial convention (APC). This sub-section discusses two theories that have been proposed to explain why children may be showing a size change between different affectively characterised topics in their drawings. A drawing perception task was used in the studies reported in Chapters 2 and 3 in order to examine these theories further.

Following their analysis of children's drawings of nice and nasty people and magic apples, Thomas et al. (1989) speculated about the cause of size changes in children's drawings of these topics. Two theories were proposed: the first was that they were influenced by an appetitive/defensive mechanism (ADM). The second theory was that children were drawing according to a learnt, acquired pictorial convention (APC). According to Thomas et al. (1989), ADM explains the reduction in the size of the drawings of nasty topics because of the desire to gain psychological distance from the topic and thus reduce the threat that it may pose (the defensive mechanism). Nice topics on the other hand would be drawn larger in response to an appetitive mechanism that seeks to gain psychological affinity with the topic (Burkitt, Barrett & Davis, 2003b; Thomas et al., 1989). According to the APC theory children draw according to the conventions they have observed or learnt in relation to how topics are drawn (Jolley, 2010; Thomas et al., 1989), so that if nasty people are drawn as smaller than nice people then this is the result of children seeing that other people use this convention.

Relatively little research into which of these mechanisms may motivate size effects in children's drawings has been carried out, perhaps as a result of the lack of consistency found to support a size change. However, the results obtained by Burkitt et al. (2003b) led them to state that a case for APC or an ADM being responsible for their results were equally possible. They suggested that future research could look to clarify which mechanism may be motivating any size change. They pointed out that any study investigating these mechanisms would need to look at both drawing production and perception; to date only two such studies have been carried out, both of which are unpublished (Galpin, 2006; Jolley, 1995).

Over a series of six studies into the possible use of an ADM or APC in the production of children's drawings, Jolley (1995) compared children's drawings of nice and nasty figures with a drawing perception task that required children to identify, based upon size alone, which of two figures was nice and which was nasty. This drawing perception task was included in order to establish the pictorial convention that a child may hold, so their drawings could be examined to see if they followed those conventions (and thus an APC) or alternatively an ADM could have been seen to be more influential. Jolley (1995) did raise the point that children may hold different conventions for perception and production, however the comparison between perception and production results nonetheless provided a neat method through which to examine APC. The studies reported in Chapters 2 and 3 also used similar perception tasks in order to examine the potential role that APC may play in motivating any size change observed in children's drawings.

The studies conducted by Jolley (1995) as part of his doctoral thesis did not provide any clear indication as to which mechanism, APC or ADM, was motivating the size change in children's drawings. None of the studies he conducted found any significant size changes in children's drawings of affectively characterised figures despite attempts to provide optimum conditions under which a size change might occur, specifically if it was motivated by an ADM. This was done through manipulations of the instructions given to the children (in which the 'threat' of the negatively characterised figure was exaggerated in order to attempt to increase an ADM response), through the stimulus used and by the collection of drawings made either on the same or on separate sheets of paper. These results led Jolley (1995) to conclude that the lack of significant size changes in relation to both positive and negative affective characterisations were a result of the weakness of any ADM that could have been operating. He further suggested that size is not a reliable indicator of affect felt towards a drawn topic, which in turn weakens the argument for an APC to be motivating any size change either. However, methodological limitations, as Burkitt et al. (2003b) pointed out, limit the generalisability of the results. Jolley (1995) employed a relatively small sample size (16 participants per experimental group) and the statistical power was not reported. The between-participants design could also have allowed error variance to obscure any experimental effects. Furthermore, no independent measure of children's affect felt towards the affectively characterised topics was taken. As stated above, these methodological concerns were taken into account in the design of the studies reported in Chapters 2 and 3.

With regards the APC theory, Burkitt et al. (2004) highlighted a problem raised by the drawing perception task results reported by Jolley (1995). During the perception tasks children would identify small figures as nice and large figures as nasty. This is the opposite pattern found in the significant difference in the results of drawing production tasks by Burkitt et al. (2003b; 2004). If APC were the mechanism motivating the change in size of children's affectively characterised drawings, then drawing perception and production tasks would be expected to produce similar results. Whilst it is logically possible for children to hold differing conventions for perception and production this seems unlikely, and evidence for the similarity between the two exists. The findings of an unpublished study by Cotterill and Thomas (1990) revealed that when children's drawings of nice and nasty figures were drawn on the same piece of paper, nasty figures were drawn larger and nice figures drawn smaller. Thus the drawing perception task results obtained by Jolley (1998) and the drawing production results from Cotterill and Thomas (1990) indicated that the APC could explain the use of size in children's drawings. Further support for the possible use of an APC is provided by the finding that children have also been shown to appreciate the value of pictures in portraying information and are aware of what types of representation would be most useful to aid an observer in identifying an object from a picture of it. Allen, Bloom and Hodgson (2010) found that 3- to 4-year-olds, when tasked with choosing a picture that best represented an object (a house or a cat for example), would select the picture that contained the most relevant information despite this picture being less detailed and more prototypical - what they term "vague". This representation might be similar to the prototypical generic image that a child would likely draw (see Section 1.2.4). This suggests that there is a similarity between children's drawing production and perception.

The results reported by Cotterill and Thomas (1990), in which nasty figures were drawn larger than nice figures when drawn on the same piece of paper, also highlighted the effect that drawing on the same as opposed to separate sheets of paper can have. It could be argued that the presence of the other figure on the same sheet of paper may have provided a cue (Freeman, 1980) that would trigger the use of APC. Freeman's (1980) cue dependency model of drawing is discussed further in Section 1.2.2. The key point to note here is that drawings made on a single sheet of paper may involve a different mechanism from those drawn on separate pieces of paper. The study presented in Chapter 2 addressed this possibility by examining children's drawings made on both the same and separate pieces of paper.

1.1.7 Summary of Section 1. The literature reviewed in Section 1of this chapter has highlighted the clinical relevance of examining the relationship between size and affect as well as the need for experimental evidence to support clinical interpretations based upon size made in projective drawing assessments. The literature concerning the various influences other than affect and the sub-conscious (from a psychodynamic perspective) can have upon drawing and drawing size were briefly reviewed to identify the factors that drawing research must take into account (planning difficulties for example).

It was shown that recent research examining the relationship between size and affect that has utilised well-controlled experimental methods has not provided consistent evidence regarding the nature of the influence of affect upon size, although it has been argued that methodological differences could explain this lack of consistency. Methodological issues within the experimental tradition have been highlighted and will be addressed by the research presented in Chapters 2 and 3. The two mechanisms that have been proposed to be motivating size change in children's drawings of affectively characterised figures will also be examined in the empirical studies reported. Specifically the APC theory will be tested through the comparison of the results of drawing perception and drawing production tasks. Two carefully controlled studies with relatively large numbers of children were carried out to investigate the relation between size and affect.

As already indicated this chapter is split into two sections. Given that the initial two studies involved asking children to draw men who were nice or nasty, in subsequent studies it was decided to explore further the influence of naming more generally on the way in which children represent objects and emotions and the similarities between children's drawings in terms of the specific features they included in their drawings. The next section will therefore examine the literature that relates more specifically to the studies reported in Chapters 4 to 8 which explored the influence of naming further.

1.2 The development of children's drawings: relations between their thinking/representations, naming and their drawings

Chapters 2 and 3 are concerned with investigations of predictions derived from APC. Although support was not obtained for this theory, the APC theory and the experience of seeing the children produce drawings of affectively characterised human figures raised questions about whether children adopt conventions in terms of different individuals using the same features in their drawings of other topics and if so whether there are influences on their use of these conventions. In particular, whether the labelling or naming (the terms naming and labelling are used interchangeably in this thesis) of the topic to be drawn influences the features that are included in the drawings children produce. This section of the chapter therefore reviews the literature regarding common features in children's drawings and what factors influence the inclusion of what are termed *core features*[2] (i.e., the same feature, such as a roof of a house) in different children's drawings.

This review starts with an outline of early stage-like accounts of children's drawings with a focus on the stage of intellectual realism. This involves children basing their drawings on what they know rather than what they see. Research is then discussed that shows children's drawing development is less rigid than stage-like theories would suggest and children draw in a manner that would not be expected by stage-like accounts. Evidence is next presented that despite this flexibility in children's

[2] Core features are defined by Picard and Vinter (2005) as those "parts of an object that are necessary to define its identity" (p.419).

drawing style there is still a tendency for children to ensure the core features of a topic are included in their drawings (intellectual realism) despite task demands that would require otherwise. Thus it will be argued that children tend towards the use of an intellectually realistic drawing style in their free drawings. As children's free drawings must be based upon internal representations, the way in which these internal representations are formed is briefly examined in Section 1.2.4. This leads onto Section 1.2.6 which examines evidence to suggest that naming may make it more likely that children draw according to intellectual realism (IR). Finally Section 1.2.7 examines the literature regarding the sequence with which children draw the individual features of their drawings and the extent to which this may indicate those features that may be considered core for a specific topic.

The review then leads to a statement about the specific aims of the research presented in Chapters 4 to 8. These studies were concerned with the influence of word labels (naming) on how children draw, specifically how the use of word labels could result in a higher proportion of similarities in children's drawings both in terms of the core features included and the sequence with which those features were drawn.

1.2.1 Stage-like accounts of drawing development. This sub-section first presents a brief review of early stage-like accounts of children's drawing development, and discusses some of the challenges to this account. Research is then examined that suggests that, despite a flexibility in drawing styles, children tend towards the stage of intellectual realism put forward in Luquet's (1927/2001) account of drawing development. This discussion of stage-like accounts of drawing development provides a basis for the hypothesis in this thesis that naming influences the way in which children draw, specifically that they will tend to draw in a more IR than visual realism (VR) style when the topic is named.

One of the earliest stage-like accounts of drawing development was put forward by Kerschensteiner (1905). He proposed a developmental progression whereby drawings moved from schematic representations, to drawings aimed at reflecting simple visual appearance, and finally to drawings seeking to represent three-dimensional space. Rouma (1913) furthered the idea of a stage-like development of children's drawings: he proposed ten distinct stages based on his observations. These early stage theories formed the foundations for the prevalence of stage-like theories of drawing development. The main influence was however Luquet (1927/2001) who posited that children's drawings progress through four ontogenetic stages: fortuitous realism, evident at 2 years of age (where a child will notice a scribble fortuitously coming to bear a similarity to a real world object); failed realism, evident from 3 years of age (children will more consistently try to represent real world objects, but are hampered by motor and cognitive constraints such as lack of fine motor control and poor attention); intellectual realism (IR), evident from 5 years of age; and finally visual realism (VR), emerging at around the age of 8 years. Examination of these final two stages in particular motivated studies conducted by a wide range of researchers (e.g. Costall 1995, 1997; Freeman 1972, 1980; Gardner, 1980; Golomb, 1990, 2002, 2004; Milbrath, 1998; Piaget & Inhelder, 1969; Willats, 1997, 2005; Winner, 1982) and now forms the focus of the subsequent examination of stage theories.

IR was proposed to account for the form of children's drawings whereby they are seeking to provide the "most faithful and complete representation of the object" (Luquet, 1927/2001, p.122 as cited in Cox, 2005, p.75). This leads to children seeking to display as many of the core features of a topic from their concept of that class of objects (a point also noted by Kerschensteiner, 1905). IR is characterised by the child drawing an object and its details in their usual generic shape reflecting the viewpoint from which it is most typically seen, the canonical position. Gibson (1979) and Freeman (1980) qualify the canonical position as that which is the object's typically encountered view and that which best displays its core structural or invariant features. IR is often demonstrated through the use of a range of techniques such as transparency, folding out and aerial views (Jolley, 2010).

VR was proposed by Luquet (1927/2001) as the ultimate stage in children's drawing development, where children seek to draw an image that is as close as possible to the actual specific object, or their view of it. This would then require the child to inhibit some of their conceptual knowledge regarding the object, to suppress core features that were not visible, and to develop the ability to convey occlusion of features and perspective. For example, in order to draw a VR representation of a watch that may have no numbers on the face, one would have to inhibit the displaying of numbers on the face, despite this potentially forming key conceptual knowledge regarding a watch. Whilst not all children (or adults) achieve mastery of VR, Luquet (1927/2001) argued that this is ultimately the stage that children's aspire to produce. Research will now be discussed that shows that children are not constrained by a developmental stage in their drawing ability. This evidence will then set up the position taken in this thesis that children's drawings reflect the attributes of IR in which core features are most often displayed.

That the stages proposed by Luquet (1927/2001) were qualitatively distinct, and showed an abrupt transition from one to the next, was a widely-held view among those researching children's drawings, though not Luquet himself. Luquet's original conception of the four stages allowed for a greater flexibility in the drawing styles that children used than a traditional stage theory would imply (Costall, 1989). Indeed Freeman and Janikoun (1972) speculated that whilst their study could show that younger children were constrained to produce intellectually realistic drawings, equally they could be drawing in that manner because they were employing a deliberate strategy. In Freeman and Janikoun's seminal study that examined the shift between VR and IR children were asked to draw a mug copied from one placed in front of them. Younger children (5-, 6- and 7-year-olds), who were thought to be in the stage of IR, drew the mug with a handle included even when no handle was visible. None of the 9-year-olds drew the handle and very few of the 8-year-olds, who would be hypothesised to be in the stage of VR, included a handle when it was not visible in the model. Whilst the results of Freeman and Janikoun's study would support a stage-like theory of drawing development, their acknowledgement that it simply reflected a deliberate strategy being used was echoed by Kindler and Darras (1998) who proposed that children's drawing development involved the exploration and use of different drawing repertoires that children were able to use.

A large body of experimental research has provided clear support for greater flexibility in children's drawing development. One strand of this work examined context- or task-dependency in children's drawing skills (as put forward by Freeman's cue dependency model, 1977, 1980) as opposed to them simply being defined by a stage-like development. A diverse range of factors causing the child to display VR drawings whilst still in the stage of IR has since been examined, including: verbal instructions used in tasks (Barrett, Beaumont & Jennett, 1985; Beal & Arnold, 1990); the socio-communicative context of the drawing (Light & McEwen, 1987); the familiarity and dimensionality of the model to be drawn in experimental tasks (Barrett & Light, 1976; Cox, 1981; Nicholls & Kennedy, 1992); and episodic information given to the child prior to drawing (Moore, 1987). The literature is briefly summarised in the next section in order to highlight the fact that children are not constrained by the stage of drawing development they may have reached. Evidence about why children still produce drawings that reflect a stage similar to IR in which core features are included in the drawings is then discussed. The studies presented in Chapters 4 to 8 of this thesis explicitly examined the core features in children's drawings and, in Chapters 4 to 6, how naming, in particular, may be influencing children to draw in an IR way.

1.2.2 Evidence for flexibility in children's use of different drawing styles. This sub-section presents research that indicates that children are not constrained by stage-like theories of development and therefore the way in which they draw can be influenced by factors other than their age, such as naming (see Sections 1.2.5 and 1.2.6).

Freeman's (1977, 1980) cue-dependency model of drawing provided the catalyst for much experimental research examining how children display flexibility in their drawings that would not be expected from a strict stage theory. For example, children younger than the age at which they would be expected to display VR can nevertheless draw in this way (Barrett, Beaumont & Jennett, 1985; Beal & Arnold, 1990; Barrett & Light, 1976; Cox, 1981; 1985; Nicholls & Kennedy, 1992).

Freeman (1977, 1980) proposed that rather than drawing being dictated by strict stage-like progressions, children's drawing style is in fact dictated by the nature of task demands in the form of cues and by the child's ability to respond to those demands. Freeman pointed out that a blank sheet of paper presents children with a great deal of freedom in terms of what they can draw. However, once an initial mark has been made on the paper the subsequent graphic choices available to the child are reduced. The degrees of freedom in terms of what the child can draw are reduced further with each subsequent mark. During this process children are continuously monitoring the sequence of marks they are making. Thus children's drawings are produced as a result of the culmination of the roles that a multiplicity of cues has played over the course of the drawing. These cues can be given by previously-drawn elements (such as the position and size of previously-drawn features) or can be external (for example the physical limits of the surface upon which they are drawing, the edge of a piece of paper; or the instructions given during the task).

The cumulative effect of cues could cause a drawing to diverge from the more VR image of the children's intention and capability as they respond to the cues. As discussed in Section 1.1.2 of this chapter, certain cues, drawn early in a sequence can be a result of motor and cognitive difficulties. For example lack of planning may lead to too large a head being drawn; that cue, plus an external cue such as paper size, might then dictate and constrain the next feature drawn. The implication of this model is that a child's spontaneous drawing may not reveal the full extent of the level of graphic ability (i.e. ability to draw according to VR) but rather has come about as a result of the cues the child has responded to. Therefore, if you were to provide children with the appropriate cue, they may indeed be able to draw at a level that may not be expected by a strict stage-like theory.

Evidence of this ability was provided by Barrett and Bridson (1983). They found that children younger than 8-years-old could draw more VR images if they were explicitly instructed or cued to do so. Similarly Beale and Arnold (1990) revisiting the mug drawing paradigm used by Freeman and Janikoun (1972) found that children as young as 5-years-old could draw a view specific image of a mug (with no handle) when explicitly instructed or cued to do so.

The influence of the instructional cue to draw for an audience was explicitly investigated by Light and McEwan (1987). They divided children (5- to 6-years-old) into two groups and asked them to draw an array of bricks. One group was instructed to draw the array of bricks explicitly so that a friend using their drawing could understand the exact positions of the bricks. The control group was simply instructed draw the bricks as best they could. The children who had received the explicit communicative instructions would, 75% of the time, disregard their canonical way of representing the bricks (reflecting IR) and instead produce more VR representations of the array. Only 30% of children in the control group did so. Sitton and Light (1992) also demonstrated that children alter the way in which they draw as a result of the specific need to convey information to an audience. Children (aged 4- to 6-years) were split into two groups: control and communication. Those in the control group were tested individually; those in the communication group were tested in pairs. They were all asked to draw a person and then, in counterbalanced order, a man, a woman, a boy and a girl. The children were then given explicit feedback regarding the drawings and prior to repeating the task was asked if they could improve upon their previous efforts. Further to this, children in the communication group were told their partner would have to try to guess which figure was which. Children (older than 5-years) in the control and those in the communication groups, showed a clear differentiation in their drawings, with those in the latter providing clearer differentiations between their figures. They provided fewer canonical simple *human figure* representations and more VR representations of specific genders using a range of additional details. The study reported in Chapter 3 uses the cue of an audience in order to examine the possibility that children (older than 5-years) will provide a clearer differentiation, through the use of size, of nice and nasty human figure drawings.

Light and McEwan (1987) suggested that their results (to which those obtained by Sitton and Light, 1992 could be added) provided strong evidence for the possibility, raised by Freeman and Janikoun (1972) and indeed Luquet (1927/2001) before them, that children have a range of drawing styles available to them and will adopt a particular strategy in response to the specific task demands: in the study by Light and McEwan (1987) this would be in response to the specific communicative purpose of the drawing.

In summary therefore the studies discussed above form part of a large body of work that has shown that children do have flexibility in terms of the ability to draw according to VR at a younger age than proposed by early stage-like theories of children's drawing development (see also

Arrowsmith, Cox & Eames, 1994; Berti & Freeman, 1997; Bremner & Moore, 1984; Cox, 1981; Davis, 1983; Lewis, Russell & Berridge, 1993; Sutton & Rose, 1998). This body of research serves to highlight the fact that children as young as 5-years-old, or potentially younger (Callaghan, 1999), display high levels of graphic flexibility whereby they can modify their drawing strategies, moving away from their normal style, or a tendency to draw according to IR, as a result of a manipulation of task demands. Evidence is now presented to suggest that children, despite the flexibility they have in terms of the drawing styles they can use, will draw according to a more IR style in their free drawings. It is then argued in Section 1.2.6 that the use of a word label will prompt children to draw in an IR style whereby they will display the core features for the named topic (for example a mug will be drawn with a handle). This hypothesis is then directly tested in the studies reported in Chapters 5 and 6.

1.2.3 Children drawing according to an intellectually realistic as opposed to a visually realistic style. It is argued in this sub-section that children in some circumstances display a preference towards drawing according to a more IR style. Thus they are likely to include the core features of a topic even when task demands may require otherwise, such as the display of a handle in a drawing of a mug, even when no handle is visible (Freeman & Janikoun, 1972). The use of a more IR style is then shown to increase the likelihood that children will show similarities in the core features displayed in their drawings due to the internal representations held by the child (see Sections 1.2.5 and 1.2.6). Examination of core features in children's drawings and the role naming may play in causing a child to display core features is the focus of the studies presented in Chapters 4 to 8 in this thesis. Whilst the influence of using affective word labels on children's drawings is the focus of the studies reported in Chapters 2 and 3.

Early research examining the nature of why and what children draw involved the collection of naturally occurring spontaneous drawings, rather than the copying of a model. Based on young children's free-hand drawings, Ricci (1887) maintained that their form was motivated by attempts to display knowledge about objects, rather than to represent what they saw in front of them. Kerschensteiner (1905) echoed this idea and maintained that children's drawings were primarily composed of core features that were central to their concept of that class of objects. As evidence, Kerschensteiner (1905) cited the fact that children's drawings of objects will often include features that may not be visible. More recent research that has examined children's use of IR sought to do so through the experimental paradigm of examining children's drawings made from a model. Using this method children are presented with a model and asked to draw it, either directly or from memory. Crucially the model had certain features not present or not visible to the child. The majority of researchers using this paradigm agree that what can be seen as errors in drawing production, whereby copies of a model are inaccurate (relative to the view it was presented in), are the result of children's depiction of more IR drawings (Davis, 1983; Freeman, 1980; Picard & Durand, 2005).

Children's greater use of IR representations is seen when they are required to draw an object from memory that was presented to them in a viewpoint that they were unfamiliar with. Recent studies (Toomela, 2003; Walker, Bremner, Smart, Pitt & Apsey, 2008) that have taken into account the role that task demands (as discussed in Section 1.2.2) may have in mediating the way in which children draw, have still found results echoing those of Freeman and Janikoun (1972). Children have been found to show a tendency to draw an object in a more IR style despite this not corresponding to the model they had been shown (Toomela, 2003; Walker, Bremner, Smart, Pitt & Apsey, 2008). Toomela (2003) presented children with a model of a doll that was distinctive in that it did not contain all of the details one would expect in a prototypical doll and asked them to draw it. The majority of drawings produced by children (up to the age of 8-years-old) were of prototypical dolls and included features that were not present in the model.

Walker et al. (2008), using the IR/VR staple of a mug as well as an additional experiment using a novel object, examined the role that longer term or shorter term remembering would have on whether children used IR or VR. They found that children's drawings of a mug, that had been shown in atypical view (no handle), would be drawn from memory as an IR drawing (with a handle). The use of a more IR drawing was potent for longer term remembering. Thus, children would draw the core features (handle) despite the task demands. The potential for factors other than deference towards an IR drawing style in causing children to draw in a less VR manner are examined briefly below, before further evidence suggesting that children may indeed be opting for an IR drawing style is presented.

The Walker et al. (2008) study has identified the role that various information-processing factors play in the development of a more VR drawing ability with the lack of the development of these factors perhaps accounting for the IR drawing style seen in their results. Indeed, Jolley, Fenn and Jones (2004) noted that a transition to VR may coincide with improved drawing ability. Jolley et al. (2004) went on to state that an ability to draw more VR pictures requires the more sophisticated use of formal properties such as line and colour. As older children achieve this increased sophistication through the development and improvement of various information-processing skills such as working memory, planning, monitoring and awareness (Berti & Freeman 1997; Picard & Vinter, 1999; Spensley & Taylor, 1999) they are also better able to represent drawings in a more realistic way. Therefore drawings representative of IR may be due to children not possessing the necessary skills to be able to draw more VR images. The role that these mental processes play is acknowledged here but as Cox (2005) also pointed out these factors alone cannot account for why children may not use VR in their drawings as adults, in whom these processes are fully developed, but still utilise what can be seen as IR in their drawings. As will be discussed in Section 1.2.5 and 1.2.6, naming may be causing children to draw in this way.

In a seminal study by Thouless (1931) it was shown that prior knowledge regarding an object would impact on the ability to draw an unfamiliar version of that object. In this case adult participants were asked to draw a circular disk (a plate) from an oblique perspective, thus requiring them to effectively draw a circle as an ellipse. The results indicated that there was an exaggeration of circularity in the drawings. The overly circular representation of the plate was not consistent with the viewpoint from which the adult participants were asked to draw. Such a representation suggested that the drawing was being influenced by what would be assumed to be the internal representation held by the drawer. This in turn would point towards circularity being a core feature of a plate, just as a handle is a core feature of a mug. Replicating these findings more recently, Taylor and Mitchell (1997) showed that prior knowledge about an object contaminated judgement about the appearance of that object (again looking at over-exaggeration of circularity in matching an ellipse to a circular model). Furthermore, this interference or contamination was shown to impact on an adult's drawing ability, whereby conceptual knowledge of an object can impair accurate drawing of that item when presented in a way that may contradict that *a priori* knowledge (Matthews & Adams, 2008; Mitchell, Ropar, Ackroyd & Rajendran, 2005). For example when core features were not displayed. What this research also begins to introduce is the idea that the core features that children represent in their drawings may reflect the internal representation that is held regarding an object. As will be discussed in Section 1.2.5 this internal representation is argued to be linked with the word label for an object, and the role that naming plays in triggering an internal representation is examined in studies reported in Chapters 5 and 6 of this thesis.

The term *internal representation* is used in this thesis to describe anything other than an external representation that may influence how a child draws. As Morra (2008) points out, what is required in order to make a graphic representation of an object from memory is "a mental representation of the visual aspect of a pattern of shapes that can stand for a certain item" (Morra, 2008, p.68). The current review of the literature reveals a variety of terms that have been used in different areas of research that have nonetheless all sought to examine the way in which objects are represented and stored in the brain and the potential role that internal representations play in influencing what children draw. The internal representation has variously been described as a visual memory, image schema, internal mental model, internal representation, object-centred mental representation, simple schema, visual schema, stored structural description and pictogen (Barsalou, 1999; Golomb, 2004; Humphreys, Riddoch & Quinlan, 1988; Luquet, 1927/2001; Serre et al., 2007; Seymour, 1979; VanRullen, 2007; Willats, 1997, 2005).

As the similarities in the core features children use in their drawings are likely to be a result of children having similar internal representations, questions naturally arise about why different children have similar internal representations. A brief examination of the way in which internal representations are formed and stored will be reviewed in the next section of this chapter, this is relevant to the subject matter of Chapters 4 to 8.

1.2.4 Children's internal representations of objects. This sub-section presents evidence to suggest that children show similarities in the core features they display in their drawings due to processes occurring in the visual system. Evidence to suggest that children's drawings do not show similarities is then reviewed. The hypotheses that children's drawings display similarities in terms of the features drawn due to the iconic and/or symbolic nature of IR representations are then discussed. The exact nature of how these internal representations are formed is not something that the current research set out to explicitly examine; instead the primary concern was the extent to which an internal representation may influence the way in which children draw as opposed to other information about the representation (e.g. emotional valance, the name of the item) or indeed an external representation (a model to copy from for example). However, examination of, and evidence for, similarities found in the core features children draw leads to speculation as to why children draw similar core features. Therefore the literature regarding the formation of internal representations and the iconic or symbolic nature of children's drawings is briefly reviewed. This then leads to the position taken in the current thesis that stimulus naming will influence the way in which children draw.

Luquet (1927/2001) argued that when drawing according to IR, children do so from an internal mental model and he argued that this consisted of a canonical view of an object that displayed the most defining and distinctive features of that object. He also supposed that the internal model involves a cognitive structure which took precedence over perceptual experience in determining drawing style. Evidence for the influence of an internal model can be seen when children are required to draw from memory an object presented to them in a viewpoint that they were unfamiliar with. In these experimental situations children displayed a tendency to draw the object from a normally preferred viewpoint and include features which they had not in fact been shown (Toomela, 2003; Walker, Bremner, Smart, Pitt & Apsey, 2008). Thus they must be working from an internal representation that differs from the model they have been shown (Golomb, 2004).

Indeed neuropsychological evidence has confirmed that drawing from long-term memory is mediated by internal representations held of the object that is drawn (e.g., Bozeat et al. 2003; Jankowiak, Kinsbourne, Shalev, & Bachman, 1992; Magnie, Ferreira, Giusiano, & Poncet, 1999; Stangalino, Semenza, & Mondini, 1995).

What constitutes this internal representation, and why it (as opposed to a model that may be the target to be drawn), can influence how a child draws is however still not clear. A drawing made from a child's internal representation is not to be seen as a direct print-out of the child's complete knowledge of the topic, as only certain features are included. Golomb (1973, 1981), Brittain and Chien (1983) and Cox (1993), using the example of human figure drawings, have all shown that children have more detailed knowledge about the constituent parts of the human body than their drawings might indicate. Children are able to identify and name more parts of their own bodies and of pre-drawn figures than they represent in their drawings. An internal representation however may provide a simple schematic image that can facilitate the recognition of an object based upon the core features of that object category. As is discussed in Section 1.2.5 and examined in the studies reported in Chapters 5 and 6, this schematic image may be closely linked to the word label for that object. There is little experimental evidence that has adopted a similar method to that used in the studies reported in Chapters 5 and 6 to support the existence of similarities in children's drawings. Therefore the detail regarding iconicity and symbolism discussed below provides a theoretical justification for the examination carried out about the similarities of features included in children's free drawings.

There have been contrasting views about the reasons children produce similar features in their drawings. One explanation is that children learn conventional ways of drawing many of the topics that they draw. Gombrich (1977) argued that it was not possible to make a picture without having learnt to do so from other pictures stating that "the starting point of a visual record is not knowledge but a guess conditioned by habit and tradition" (Gombrich, 1977, p. 77). Similarly, Goodman (1968) in discussing his theory of symbols argued that a pictorial representation is a conventional system of symbols to the same degree that verbal descriptions are. Both Gombrich's

(1977) and Goodman's (1968) position would therefore support the notion that children's drawings are symbolic, the meanings is derived from culturally accepted norms as opposed to any inherent direct resemblance between the drawing and the topic it seeks to represent. The other explanation is that children's drawings are similar due to the iconic nature of the internal representations they hold, namely the direct resemblance to the signifier that the drawing displays. These two explanations, iconicity and symbolism will be briefly reviewed and this will include a discussion of the literature regarding how visual information is processed and stored as well as evidence to suggest that internal representations differ across cultures.

1.2.4.1 Iconicity. Inspired by the way in which simple line drawings could be recognised so easily, Marr (1982) proposed they must correspond to the same symbols that the brain computes out of the image during the normal course of its interpretation. Hayes and Ross (1995) supported this notion in maintaining that it is highly unlikely that the visual system would have developed separate processes for the interpretation of objects and line drawings. Freeman (2008), when examining the role of various domain specific processes in drawing, also noted that "the visual system has the status of something that has been harnessed as resource when people make pictures." (Freeman, 2008, p.42).

If the way in which visual images are processed by the perceptual system is similar to that used for simple line drawings then it is possible that both systems may involve a similar set of core features, stored as an internal representation. In light of this, storage of visual memories as internal representations would be as prototypical representations that do not hold great detail, but are more focussed on preserving the basic, core features required for recognition of an object as a member of an object category.

Reflecting this idea of basic prototypical, schematic images and supporting the theories proposed by Marr (1980, 1982), studies have shown that people are spontaneously predisposed to segment objects into parts and then use these parts as perceptual units to determine object encoding and subsequent recognition (Barenholtz & Feldman, 2003; Bertamini & Farrant, 2005; Biederman, 1987). These visual memories or simple *schema* in effect then provide a type of visual dictionary from which future objects can be defined (Serre, Krieman, Kouh, Cadieu, Knoblich & Poggio, 2007). Evidence from the studies reviewed in Section 1.2.3 indicates that a well-established internal representation may be difficult to inhibit and thus children may draw according to this even when a task requires otherwise (including the handle in a drawing of a mug even when no handle is visible, for example).

1.2.4.2 Symbolism. The literature discussed above would suggest that internal representations may be based upon the way in which the visual system processes and stores visual images. Therefore it supports the notion that children's drawings, when drawing from an internal representation, will show similarities due to the iconicity of the drawing, i.e. the way in which it directly represents its referent due to the way the visual system extracts and stores schematic representations, features and topics. However, the role that conventionally defined symbols (as a product of learning, therefore influenced by culture and education) may play in determining what a child draws must also be considered. Were children's drawings to be solely based upon the way in which the visual system perceives and stores information then it could be assumed that there would a great deal of similarity in all children's drawings. However, clinical drawing assessments that are based upon the universality of children's drawings styles have found limited cross cultural support.

Koppitz, when developing the Draw-a-Person Technique (1968), founded her analysis on assumed universality of features displayed by children in their drawings. Based upon human figure drawings made by 1,856 American children she found thirty emotional indicators (EI's) identified as displaying abnormal emotional adjustment. More recently the Draw A Person: Screening Procedure for Emotional Disturbance (Draw A Person: SPED) was developed based on a set of what are described as 'representative norms' taken from a sample of 2,260 students whom the authors felt to be representative of the U.S. population (Naglieri, McNeish & Bardos, 1991). There is evidence to suggest the validity and thus usefulness of both Koppitz's (1968) test and the Draw a Person: SPED test should be questioned (Catte & Cox, 1999; Cox & Catte, 2000; Wrightson & Saklofske, 2000). The usefulness of Koppitz's test has been particularly questioned when it is applied to other cultures (Ozer, 2009; Velez van Meerbeke, Sandoval-Garcia, Ibanez, Talero-Gutierrez, Fiallo & Halliday, 2011; Wrightson & Saklofske, 2000). All this suggests that 'norms' cannot be assumed to exist, not only across cultures but also within the same culture across generations.

This sub-section has presented a brief description of the literature regarding the way in which internal representations, which would form the basis for a drawing made from memory, may be formed. The role that iconicity and symbolism play in the formation of children's internal representations is alluded to throughout the empirical chapters of this thesis: The studies reported in Chapters 4 to 8 provide evidence that indicates that children do exhibit similarities in their drawings. The question that this naturally prompts therefore is why this is the case? The general discussion in Chapter 9 will return to the notions of iconicity and symbolism when discussing why children are showing similarities in their drawings where it is suggested that neither iconicity nor conventionally defined symbolism is likely to provide a complete explanation for how children come to draw topics in certain ways. The core features produced in children's drawings are likely to be a product of both iconicity and convention.

Whilst the exact nature of children's internal representations remains an area of debate, a wide range of literature demonstrates the close link between a word label and internal representations and this points to the potential influence of a word label to trigger this representation, to the detriment of the child's ability to draw an alternative. As Luquet (1927/2001) originally pointed out, drawing according to VR may require the inhibition of more IR representations suggesting the dominance of canonical representations. The current research specifically examines the extent to which a word label may influence the way in which children draw, therefore the literature regarding the relationship between the word label and drawing is the subject of the next section of this review.

1.2.5 IR, word labels and drawing. This sub-section examines theories and research that concern the link between internal representations and word labels and whether this link influences the way in which children draw. Specifically children will draw more in keeping with the internal representation that is associated with the word label to the detriment of their ability to draw an image that differs from that word linked internal representation. The studies presented in Chapters 5 and 6 explicitly examine the influence that the word label has on the way in which children draw (and the research that prompted these studies is discussed here and in Section 1.2.6).

Developing Marr's (1982) computational theory of vision McMahon (2002) cites the three methods that were proposed for representing objects in the brain: the *structural*, *denotative* and *configural* descriptions. The configural description carries information about the spatial interrelations between component parts of an image. Structural descriptions are seen as the initial mental visual construction of an object, and contain all the structural visual information of what forms the object: the lines, shapes, form (McMahon, 2002). The denotative description parses this down and contains only those elements of the structural description that are needed to be able to recognise an object as a member of a particular class of objects; hence 'denotative' as it denotes a member of a class (McMahon, 2002). The denotative description is based on our concept of an object, this concept being itself formed by the specific role of the object to us and our interaction with it: it thus has top-down influences. Denotative descriptions require semantic processing. Semantic memory is defined as containing knowledge about words and concepts, their properties, and interrelations (Tulving, 1972). When retrieving semantic memory, it is not bound to the specific context in which knowledge was acquired, because it was likely to have been accumulated across multiple experiences in a variety of contexts, thus forming a general semantic category linked to a general denotative description forming a generic mental representation. This denotative description is argued here to be linked to the word label for an object.

Another reason for believing that internal representations have an effect on children's drawings comes from discussion of working memory. As working memory of visual memory and verbal retrieval of information from memory have been shown to share the central resource of attention (Ricker, Cowan & Morey, 2010) it is thought that verbal retrieval and the subsequent schematic image that is triggered could cause the neglect of the retention of the primary visual input. When one draws a specific object from memory (such as a mug with no handle visible), access to a full structural description of the object is required in order to provide a more complete, VR representation of it. This structural representation within the brain is referred to as the *imagery* (McMahon, 2002). However, imagery retrieval and its subsequent inspection inhibit the simultaneous perception of objects, as both require the use of the same operations; hence they cannot operate at the same time (Chatterjee, 2004; McMahon, 2002). Drawing from memory onto a surface requires one to carry out both these operations, to access the imagery as well as to observe the lines being drawn on the page. When this occurs perception dominates, to the detriment of the inspection of the image (Kosslyn & Rabin, 1999; McMahon, 2002). The structural information needed (the imagery) to create a drawing is suppressed and replaced by the more simplistic and idiosyncratic, denotative description that in turn promotes the drawing of the image based upon an internal representation linked to the word label. The evidence presented here would suggest that the word label triggered internal representation of an object will form the basis of a drawing made from memory, to the detriment of the ability to recall and draw a more VR representation.

1.2.6 The relationship between word label and mental representations. This section presents experimental evidence to support the argument raised in the previous section, that naming results in the recall of simplistic images that may then influence what a child draws.

In their early research, Palmer, Rosch and Chase (1981) found that an image in a canonical position was recalled when participants in their study were simply given the name of an object. Recent research looking at the link between words and the images they activate also suggests that adults routinely activate perceptual symbols during language comprehension, an image of what the language is describing is produced (Kellenbach, Wijers & Mulder, 2000; Pecher, Zeelenberg, & Barsalou, 2003; Stanfield & Zwaan, 2001; Zwaan, Stanfield, & Yaxley, 2002; Zwaan & Yaxley, 2003).

Functional MRI studies have also provided evidence to support the linking of words with the activation of images gathered in studies such as those mentioned above. For example reading the names of animals and tools evoked category-related responses in adults in the same brain regions activated by pictures of animals and tools respectively (Chao, Haxby & Martin, 1999). Indeed the neuronal architecture devoted to mental representations of objects has been proposed to be located in the left inferotemporal cortex where it can interface with language structures (Levelt & Indefrey, 2000). What is of interest for the current research is that a word will automatically trigger a mental representation, as has been suggested by Palmer et al. (1981) and more recently by Zwaan et al. (2002).

The developmental literature provides further evidence for a link between language and mental representations. The close relationship between linguistic and conceptual development has been well established, not only in terms of how conceptual development shapes linguistic development, but more importantly, with regards to the current research, how learning words impacts on conceptual development (Lupyan, Rakison & McClelland, 2007). Words have been shown to highlight the commonalities between objects (Waxman, 1999; Waxman & Booth, 2003); they also can serve as invitations to form new categories and concepts (Waxman & Markow, 1995) and facilitate the categorisation process in infants. For example 2-year-old children classified as late talkers (who had a productive vocabulary in the bottom 20^{th} percentile) were less able to recognise images of objects represented in more abstract forms (with identification manipulated to rely simply on shape, for example), than when those objects were shown in more detail (Jones & Smith, 2005). Furthermore, echoing the results of Jones and Smith (2005), Casasola (2005) showed that 18-month-olds were only able to form an abstract spatial category when accompanied by a familiar word. Being able to label a referent (i.e. a picture) has also been shown to improve the ability of young children (≥ 3-years-old) to recognise graphic pictures (Callaghan, 2000) and signs, such as those used in sign language (Tolar, Lederberg, Gokhale & Tomasello, 2008). This suggests a strong relationship between the ability to recognise and represent objects by an abstract shape and a word label. Walker et al. (2008) provided further evidence for the relationship between a word label and internal representations where the labelling of objects increased the likelihood of encoding that object in a categorical and viewpoint-independent way.

The strength of the specific link between the word label as opposed to any other non-verbal relevant trigger, and a schematic internal representation of an object has also been shown. The special effect that the use of a label can have on the type of conceptual or perceptual information that is activated in the brain, rather than any other cue (for example, reading or hearing the word *cow* as opposed to hearing a *moo*) in adults, has received recent empirical support. Lupyan and Thompson-Schill (2012) found that verbal labels (cow) were not only more effective at activating concepts than non-verbal triggers (*mooing* sound), but also that word labels triggered conceptual representations that corresponded to more typical category exemplars. Furthermore the representations triggered by the word label showed greater similarities across participants, thus suggesting that they were more universally held images. The ability of a word label to trigger an internal representation that then influences what features children draw is investigated in the studies reported in Chapters 5 and 6.

In their influential study that first defined the term *verbal overshadowing* (VO), Schooler and Engstler-Schooler (1990) showed that when adults were asked to verbally describe the features of a 'bank robber' they had been shown in a video, they were less able to identify the robber from a line-up than those participants who were not asked to verbally describe the robber and instead were given an unrelated filler task. Thus the verbalisation impeded their subsequent perceptual abilities. It could be hypothesised that the words used were triggering categorical representations and as such the subsequent attempt to identify a specific (subordinate) exemplar, as opposed to a basic category, was impeded. Again words appeared to trigger a canonical representation that then dominated. Schooler and Engstler-Schooler (1990) themselves proposed that VO is a result of the dominance of a verbal trace over a visual trace at the time of memory retrieval, verbalisation producing a verbally biased representation that overshadows the original visual memory. This echoes the notion put forward by McMahon (2002) whereby an internal representation (the denotative description) that is then linked to the word would come to dominate a child's drawing as the word label triggers this representation.

This capacity for words to influence, even shape, perception has been shown in adults in a variety of domains, such as colour (Roberson, Pak & Hanley, 2008), time (Casasanto & Boroditsky, 2008), motion (Meteyard, Bahrami & Vigliocco, 2007) and emotion (Gendron, Lindquist, Barsalou & Barrett, 2012). Gendron et al. (2012) examined the *Emotion Paradox* put forward by Barrett (2006), where objective measures of facial actions using facial electromyographic measurements revealed that people rarely display what are assumed to be typical indicators of emotion on their faces, i.e. they rarely scowl when angry or pout when sad. Gendron et al. (2012) demonstrate that it is in fact conceptual knowledge about emotion, which is anchored in words used to describe emotion that plays a primary role in generating an emotion perception.

Further evidence for the influence of word labels on a drawing can also be found in the literature regarding clinical populations. Due to strong association between the left temporal lobe and language processing (Binder, Frost, Hammeke, Cox, Rao & Prieto, 1997) damage to the cerebral left hemisphere (LH) would be hypothesised to impact upon an individual's ability to access the internal representation that would be associated with a word label. Indeed examination of adults with associative visual agnosia as a result of lesions in the left cerebral hemisphere has shown they struggle to copy drawings of familiar images, and succeed only by slow and meticulous copying of each individual line. The ability to recreate the overall general shape (Farah, 2000) could be argued to have been facilitated by access to a mental representation linked to the word.

Examination of the drawings made by children with congenital focal brain injury has also found similar results to support the link between IR representations and language. Children with pre- or perinatal injury to their right hemisphere (RH) show an over reliance on the use of schematic, prototypical representations that followed strict graphic formulas than children with either no damage or those with LH damage. This was evidenced in their lack of variability in impossible drawing tasks, where they would have to alter their usual drawing style (Stiles, Trauner, Engel & Nass, 1997). However, as Hilgetag, Théoret and Pascual-Leone (2001) point out, evidence derived from clinical populations of the effect of language on drawing and of its role in producing IR representations, has to be tempered by the fact that the location of lesions or dysfunction is not entirely systematic, and their influence can be widespread. Interestingly, more recent experimental techniques have provided a practical alternative to studying pre-existing cases of hemispheric dysfunction and results have echoed the results found in clinical populations (Laeng, Zarrinpar & Kosslyn, 2003).

The evidence reviewed from drawing research and clinical populations has indicated that a decrease in linguistic ability can result in the production of less canonically orientated drawings. The close relationship between a word label and an IR representation in the typically developing population has also been highlighted. It is suggested that the inhibition of the IR representation through inhibition of the word label is required in order to draw a non-canonical representation. Teaching techniques in Art that aim to improve the student's ability to draw realistically have often focussed on trying to distract from activating internal representations, by focusing on local details and trying not to be inhibited by the naming of an object (Edwards, 1989; Nicolaides, 1990).

Edwards (1992), following neurological findings (Sperry, Gazzaniga, & Bogen, 1969), emphasised that a VR drawing is a function of the right brain, specialized for spatial processing. In order to capture an image in a more VR manner she advises turning away from the drawing product towards the model, and to trace the object contour slowly and blindly on paper, while focusing the eyes on the model's details as opposed to the whole. This procedure is recommended to bypass the previous symbol and naming system and thus memory templates whereby recognition of the whole object may cause latent naming and thus trigger the internal representation. This would result in a conflict between the internal representation triggered by the word label and the model that the artist is trying to represent. When this happens the internal image dominates. Edwards (1992, p. 92) clarifies her method: "This way you will avoid any dredged-up symbols from childhood." Milbrath (1998) further acknowledged this when she wrote of the difference between her perception of an object and an artist's perception, "where they saw edges, light, shade and texture, I saw an orange, apple or bowl" (Milbrath, 1998, p.3). The word label would trigger an associated internal representation of an object providing an overall schematic representation of the core features of the object, this internal representation then providing a basis for the drawing to be made. The drawing techniques proposed by Edwards (1992) seem to echo research that has looked at drawing ability in artistic savants. This notion, of details being favoured over the global whole, is seen in the contrast of their style to that of expert drawers without cognitive impairment. Where the latter group would begin drawing an image by sketching an outline of the object, the autistic savant drawer however will not work from an overall configuration to then include the detail; instead contiguous lines are drawn, irrespective of their positions in relation to the final image (McMahon, 2002; Mottron & Belleville, 1993; Selfe, 1995).

This focus on local detail is also seen in normally-developing children talented in realistic drawing (Drake, Redash, Coleman, Hamison & Winner, 2010). It often manifests itself in the way in which drawings are begun from non-canonical positions, drawing details first rather than a whole: for example, starting the drawing of a face with the eye or nose as opposed to drawing the enclosed whole face first.

The research presented in this sub-section therefore clearly demonstrates the strong link between a word label (naming) and the internal representation associated with that word label. The evidence suggests that naming will prompt the recall of a simplified internal representation of a topic which then has the potential to influence the way in which that topic is drawn. The influence of naming upon children's drawings, specifically the extent to which it may attenuate the ability to draw a non-typical version of objects is directly examined in Chapters 5 and 6. Specific research conducted in this area is therefore briefly reviewed below.

1.2.6.1 Recent developmental research regarding the influence of naming on children's drawings. Previous research conducted in this area, examining drawings according to IR or VR, has found that the word label used to describe an object influences the way in which children draw. Bremner and Moore (1984), Lewis, Russell and Berridge, (1993) and Taylor and Bacharach (1982) all showed that naming influenced the way in which children drew, with children more likely to draw in an IR style. Furthermore when prior naming of an object to be copied was omitted, children produced more VR drawings of the models they were presented with (mug with handle turned away).

More recently, Walker, Bremner, Smart, Pitt and Apsey (2008) showed that a familiar object was more likely to be drawn in a canonical representation, especially when drawn from longer-term memory. Once again, the object to be drawn in their study was a mug. However, in the Walker et al. (2008) study the child's influence of the word label in causing the child to produce a more canonical representation of mugs could not be verified. Children's free drawings of mugs were not collected from which to make a direct comparison with the experimentally manipulated drawings. It can be assumed that drinking mugs, for example, only serve their usual function from a limited range of orientations, and they normally do this best when their handles are pointing to the viewer's right (so that a right-handed person can grasp the mug easily); thus children would tend to represent a drawing of a mug with a handle. The results however do not provide direct evidence of the child's typical representation of a mug, as would be displayed in freehand drawings. In light of this the studies presented in Chapters 5 and 6 compare drawings made from a model with children's freehand drawings in order to examine the influence that an internal representation, that would have provided the basis for the freehand drawing, may have in children's drawing from a model specifically in terms of the inclusion of core features.

1.2.7 The sequence with which children draw features in their drawings. This section will review the literature regarding the sequence with which children draw the features in their drawings in order to provide further evidence to support the identification of certain features as core. Procedural knowledge would suggest that children will produce a set sequence in their drawings (Karmiloff-Smith, 1990). Evidence will be presented that suggests that whilst children may follow fixed sequences more importantly the sequence with which children draw will involve producing core features first.

Karmiloff- Smith (1990) argued that the relative rigidity which young children display in their drawings, notably of human figures, provided evidence that children had not yet reached the developmental level of moving from an internal representation that was sequentially fixed, towards structured yet flexible and manipulate-core features, moving through the explicit levels of encoding.

Karmiloff-Smith argues for four levels at which knowledge is represented and re-represented (RR) within the brain: Implicit (I), Explicit-1 (E1), Explicit-2 (E2) and Explicit-3 (E3). At level-I information is encoded in procedural form, the encodings are sequentially specified, new representations are independently stored and ultimately intradomain and interdomain representational links cannot be formed. Level-E1 representations come about following the redescription of level-I information. These representations are reduced descriptions that have lost much of the detail of the level-I information. Although this redescribed representation is simpler, it is more flexible cognitively (Karmiloff-Smith, 1994), and it thus enables the child to make other inferences. After level-E1, representations are redescribed again and accessible to consciousness, though they are coded similarly to that of level-E1: i.e. in a non-linguistic format. The final redescription takes place at level-E3 where knowledge is recorded into a cross system code (Karmiloff-Smith, 1994).

The full extent to which typically developing children are constrained in drawing by their developmental progression through the RR stages has been questioned. In the tasks that Karmiloff-Smith (1990) used to provide evidence for the RR model, children were asked to draw impossible figures (e.g. a man with two heads, a house with wings). The ability of children to interrupt their usual drawing schema, or not, was thought to provide evidence for procedural flexibility or rigidity respectively. Subsequent research has demonstrated once again that the results gained may have been due to the task demands, rather than the actual lack of flexibility (Berti & Freeman, 1997; Burkitt & Barrett, 2010; Zhi, Thomas & Robinson, 1997). Such evidence caused Karmiloff-Smith (1999) to revise her theory in relation to children's drawings, suggesting they were not as rigid as she first proposed; but she still speculated that there may be sub-routines that did display rigidity.

A high-level of habitual drawing sequences (graphic formulae) in terms of the core elements of features drawn in human figures has nonetheless been found. Stiles (1995) has shown that very young children (aged between 2- and 3-years-old) used graphic formulae in their free drawings. Zhi, Thomas, and Robinson (1997) have shown that young children use relatively fixed sequences to produce familiar human figure drawings. Using a free drawing task of a postman and a Father Christmas, the authors recorded the sequence in which head, trunk, arms, and legs were drawn by a group of children aged 3- to 5-years-old. Twenty-five of the 32 children followed exactly the same sequence of steps for their two drawings of the different human figures. Similar results were obtained by Barlow, Jolley, White, and Galbraith (2003) in a repeated free drawing task (in which the figure was drawn three times) of the human figure by 4-, 6-, and 8-year-old children. The drawings were examined for the pairs of elements that were drawn together in the same order throughout all three drawings. Forty percent of the children used the same sequence of production across the three human figure drawings, regardless of their age. When children subsequently took part in a repeated drawing task of a not frequently-drawn object (a cracker), a consistent graphic formula was not as evident. These results suggest that a graphic formula was not yet established for this object. Barlow, Jolley, White and Galbraith, (2003) have suggested that use of graphic formulae may be due to ease of representation. Another possibility for this observed preferred sequence is the core-to-periphery progression principle (Van Sommers 1984; Picard & Vinter, 2005), described below and examined in the current research.

In a free drawing task involving familiar objects, Van Sommers (1984) noted that 5- and 6-year-old children's graphic formulae were consistent. With respect to movement sequence and stroke production the sequence of the representational features of an object was highly structured and reasonably consistent. He proposed three main principles that motivate graphic formulae: an accretion principle (tendency to draw new parts on already-drawn ones), a core-to- periphery progression principle (tendency to draw core features prior to peripheral ones), and a subsystem elaboration principle (tendency to draw geometrically and semantically linked representational units in sequence). The accretion principle, shows some parallels with Freeman's (1980) cue dependency model, whereby the order of production of the different parts of an object follows a natural logic, by which a new part tends to be drawn (accreted) on the basis of an already-drawn one. The core-to-periphery progression principle is seen as more semantic in nature in that core features (i.e. parts of an object that are essential to define its identity) tend to be produced before more peripheral features (i.e. parts of an object whose presence is not fundamental to the identification of the object). So, for example, in a drawing of a man the head, trunk, arms, and legs (core features) would be produced prior to more peripheral parts such as shoes, eyebrows, teeth etc. The subsystem elaboration principle explains how some peripheral features (e.g. hair) may be drawn directly after a core feature of the object (head), while other core features have still not been drawn (e.g. body) due to their geometric location.

Developmental studies that have sought to examine the sequence with which children draw features in light of Van Sommer's (1984) model are limited. Picard and Vinter (2005) have found encouraging results regarding children's canonical representations of a house and a television, following this principle; however they point out that further evidence is needed that examines a wider range of drawing topics. The current research sought to test Van Sommers (1984) model for the sequence with which drawings are made as well as responding to Picard and Vinter's (2005) call for an examination of a greater range of drawing topics in doing so. The use of a core-to-periphery progression principle could also provided evidence to support the interpretation of what features may be deemed core in children's drawings.

1.2.8 Summary of Section 2. This section examined factors, other than affect, that may influence the way in which children draw. It was shown that children are not constrained in the way they draw as strict stage-like theories would suggest. The literature that indicates that children draw according to an IR style, despite having the ability to draw more VR images was presented. These IR drawings occurred in the depiction of features that the child was not shown, but that they drew because of their internal representation of the topic. Evidence to support the link between a word label and children's internal representations was reviewed. It was argued that the use of a word label could trigger an internal representation that would in turn reduce the child's ability to draw an image that deviated from that internal representation. This led to the hypothesis that the use of a word label will promote the use of a more IR style when drawing. Furthermore that drawing according to an IR style would result in the inclusion of the core features of a topic in a drawing despite task demands that may demand otherwise.

1.3 Outline of the aims of the studies presented in this thesis

The first study, reported in Chapter 2, addressed the methodological inconsistencies that were discussed in Section 1.1.3 of this chapter. With these inconsistencies addressed, the study sought to test the reliability of children's use of size as an indicator of affect in their drawings of positively and negatively characterised human figures. Children also took part in a picture perception task. This sought to assess pictorial convention. Children's production and perception task results were then compared in order to examine any relationship between the two as providing support (or otherwise) for the APC theory discussed in Section 1.1.7.

The second study, reported in Chapter 3 involved comparing children's drawings of positively and negatively characterised humans figures when they were drawing for an external audience and when they were not. It was hypothesised that the children who were drawing for an audience would make the differences between the positively and negatively characterised figures more explicit, in line with audience effects reviewed in Section 1.2.2 than those not drawing for an audience. Thus, it was argued that children's use of size would be more clearly expressed. Children once again took part in a picture perception task so the relationship between their production and perception results could be compared.

The third study reported in Chapters 4 and 5 moved on from examining the relationship between size and affect in children's human figure drawings. Based upon the results gained from the drawing perception tasks conducted in the first two studies, similarities in children's drawings in terms of the features drawn were examined. The research reviewed in Section 1.2 indicated that children would show similarities in their drawings, in the absence of a model. A content analysis of children's drawings was conducted in order to establish the existence and prevalence of similar features across different children's drawings. The second half of the study, reported in Chapter 5, examined the influence of word labels on the features included in the children's drawings. Specifically, as suggested by the literature reviewed in Section 1.2.6, it was hypothesised that the use of a word label would impact upon children's ability to accurately draw a model from memory. The second half of the study therefore directly tested the effect that naming would have upon children's drawing.

The fourth study reported in Chapter 6, built upon the research reported in Chapters 4 and 5. Methodological improvements were made. Similarities in children's drawings made in the absence of a model were again examined. The core-to-periphery progression principle, reviewed in Section 1.2.7 was examined across a wider range of drawing topics than had been previously studied in the literature. The influence of naming upon children's drawings of a model from memory was again tested.

The fifth study reported in Chapters 7 and 8, also focused upon the similarities in children's drawings, both in terms of the features drawn and the sequence with which those features were drawn. The study sought to provide evidence to support the hypothesis that children draw according to a core-to-periphery progression principle. This provided a validation of the identification of core features and extended previous research on this subject. The subject of the size of positively and negatively characterised human figures was returned to, with these figures now drawn in the absence of a model, in order to assess the reliability of the relationship between size and affect in free drawings.

The studies all examined the influences of affect and naming on children's drawings. The differential use of size in children's drawings as a result of the affective label given to a human figure model was evaluated. The proposed mechanisms (APC or ADM) that may be motivating any such size change were also examined. The hypothesis that children will show similarities in their free drawings (made in the absence of a model) was tested. Furthermore the position that the close relationship between the word label and children's internal representations will result in the use of a word label influencing the way in which children draw. Specifically that they will include core features in their drawings when named.

Thus these studies as a whole were concerned with the issue of how affect and the use of word labels can influence the way in which children draw in terms of the size of drawings as well as the features included in children's drawings. By examining these topics the research was designed to increase our understanding of the influences on the content and form of children's drawings.

Chapter 2

The use of size as an indicator of emotional affect in children's human figure drawings

2.1 Introduction

As already outlined in Chapter 1, Sections 1.1.1 and 1.1.3, the use of children's drawings for diagnosis and assessment in both research and clinical practice has a long tradition in the fields of psychiatry, psychology, and education (e.g. Buck, 1948; Burns & Kaufman, 1970; DiLeo, 1970, 1973; Goodenough, 1926; Harris, 1963; Kellogg, 1969; Koppitz, 1968; Machover, 1949, 1951; Tielsch & Allen, 2005). Drawings have been seen as an important medium through which to examine affect and emotional adjustment in children (Burns & Kaufman, 1970; Koppitz 1968, 1984; Thomas, Chaigne & Fox, 1989). This is partly because children's limited vocabulary as well as their under-developed capacity for self-reflection can lead to emotions being less amenable to verbal description by them (Booth, Hall, Robinson & Kim, 1997; Damon & Hart, 1982; Sharpe & Zelazo, 2002).

However, the prevalence of subjective analyses of children's drawings (Smith & Dumont, 1995; Wanderer, 1969) in a clinical setting led to criticism regarding the low reliability and/or validity of professional interpretations (Anastasi & Urbina, 1997; Motta, Little & Tobin, 1993). Furthermore, validation studies conducted upon specific diagnostic instruments failed to support widely used diagnostic interpretations (Anastasi & Urbina, 1997; Ter Laak, De Goede, Aleva & Van Rijswijk, 2005). Yet projective drawing tests, such as those mentioned in Chapter 1, Section 1.1.1, continue to be used in empirical research and clinical practice (Bekhit, Thomas, & Jolley, 2005; Camara, Nathan & Puente, 2000; Cashel, 2002; Watkins, Campbell, Nieberding & Hallmark, 1995). More recent research (e.g. Burkitt, Barrett & Davis 2003a, 2003b, 2004) has responded to uncertainties surrounding the interpretation of children's drawings by the use of formal and carefully controlled experimentation upon which objective interpretations of influences on children's drawings can be made. One strand of this work has begun to systematically investigate whether children alter specific aspects of their drawings in response to their feelings towards the topic.

The study reported in this chapter is located within this experimental tradition and looks at the specific aspect of size of human figure drawings as a possible index of at least temporary affect felt towards the topic drawn. The study had two purposes: first, to investigate whether, as predicted by some investigators in relation to children's drawings, larger drawn figures of people are associated with positive characteristics and, to a lesser extent, smaller drawn figures with negative characteristics (Burkitt et al. 2003a, 2003b, 2004); second, to evaluate the role of two theories, acquired pictorial convention (APC) and an appetitive/defensive mechanism (ADM) which make predictions about the relation between size and affect in children's drawings (Burkitt et al. 2003a, 2003b; Thomas, Chaigne, & Fox, 1989). To address these two purposes children completed a drawing perception and drawing production task.

The idea that size is a reliable indicator of emotion in children's drawings has received support over the years (Burkitt et al. 2003a, 2003b; 2004; Cleeve & Bradbury, 1992; Craddick, 1961, 1963; Di Leo, 1973; Sechrest & Wallace, 1964; Thomas et al., 1989). It has been argued that children usually increase the size of positively characterised topics (Burkitt et al. 2003a, 2003b; Fox & Thomas, 1990; Thomas, et al., 1989) and less reliably decrease the size of negatively characterised or threatening topics (Burkitt et al., 2003b; Burkitt & Barnett, 2006). However, as documented in Chapter 1, Section 1.1.5, there have been a sufficient number of inconsistent findings to challenge the assumption that size, by itself, provides a reliable indicator of specific kinds of emotion (Joiner, Schmidt, & Barnett, 1996; Jolley & Vulic-Prtoric, 2001; Thomas & Jolley, 1989).

Although the last decade has seen more systematic methods being used to examine this issue, there remain variations in research procedures that could account for the inconsistencies in the research findings. Some studies have used freehand drawings (Burkitt et al. 2004; Craddick, 1961, 1963; Sechrest & Wallace 1964), while others have used a model (Burkitt et al., 2003b; Thomas et al., 1989) and the gender of any model used has also varied (Burkitt & Barrett, 2011). Some have used naturally occurring relationships to distinguish between different emotions felt towards subjects (Aronsson & Andersson, 1996; Craddick, 1961, 1963; Jolley & Vulic-Prtoric, 2001; Sechrest & Wallace 1964), while others have manipulated affect felt towards a topic through the use of brief task instructions, and the affect manipulated has itself also differed (nice and nasty as opposed to happy and sad for example) (Burkitt et al., 2003a, 2003b; Burkitt & Newell, 2005; Jolley, 1995; Thomas et al., 1989). Researchers have also differed in their use of between- or within-subject designs. Between-subject designs may have introduced large error variance and reduced the likelihood of detected differences between conditions due to the large variability in the size of individual children's drawings (Hammer & Kaplan, 1964; Sechrest & Wallace, 1964).

The first aim of the current study was therefore to examine the possibility that the inconsistent findings may have been the result of methodological differences which have obscured the relation between size and emotional valance. Steps were taken in the present study to minimise confounds and potential biases that could influence the way children draw affectively characterised human figures. In the present study children were asked to complete a drawing of human figures characterised as *nice*, *nasty* or *neutral* in order to examine any size change as a result of these characterisations. It was further assumed that the nice and nasty characterisations would be associated with positive and negative affect.

To control for the role that inclusion of details (Henderson & Thomas, 1990) and planning difficulties (Thomas & Tsalimi, 1988) can have upon size in children's drawings, the children were asked to copy from a model when they were executing their drawings. Previous studies had used a shaded outline figure (Figure 2.1). However, the colour and shape of such a model may have affected the neutrality with which the figure was viewed prior to having a characterisation applied to it by the experimenter. Indeed Black and Niven (1993) found that the majority of children who saw a shaded outline figure presupposed it to be nasty. Further to this Burkitt et al. (2003a, 2004) found that in children's drawings black was the colour that was most closely associated with nasty figures. Therefore pilot work was carried out that sought to establish a more neutral model for use in the present research.

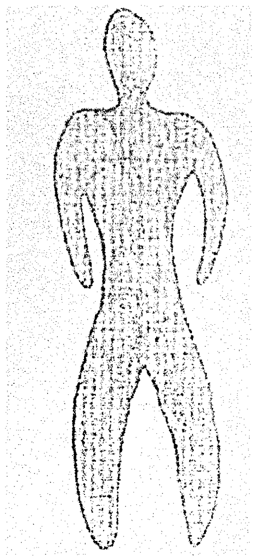


Figure 2.1: An example of an outline human figure used in drawing production (Thomas, Chaigne & Fox, 1989) and perception (Jolley 1995[3]) tasks.

An unshaded figure similar in shape to those that had been used before (see Figure 2.1) was piloted. However, the results gained in the pilot work suggested that the shape of the figure was also a factor that may influence the way in which it was viewed by children. Anecdotal evidence (Galpin, 2006) pointed towards the fact that about 30% (n = 17) of children who viewed the figure reacted with amusement when it was presented to them. This reaction might possibly have inhibited the ability of the child to view the figure in the negative light by which it was characterised or indeed their ability to represent a neutral figure in the baseline tasks. A more neutrally viewed shape of figure was developed in further pilot studies in order that a negative or positive characterisation could be more reliably projected onto it. This further pilot study (Galpin, 2008) resulted in a *stick figure* model (see Figure 2.2) to be used in the current research as it had been found to be the most neutrally viewed of a series of four prototypical figures examined. The

[3]Jolley (1995) also used an un-shaded figure in some of his series of studies

four figures examined were a stick figure, a contour figure (similar to that shown in Figure 2.1) a segmented figure and an outline figure. The segmented and outline figures were included as these figures both have correlates in the sequential development of children's human figure drawings (Cox, 2005).

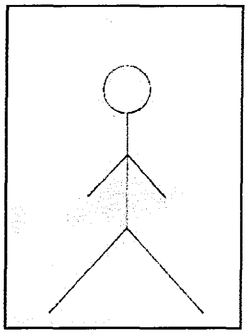


Figure 2.2: The human figure model used in drawing production tasks.

Brief mood induction (MI) has been shown to be sufficiently strong in an experimental setting to induce the desired affect towards characterised human figures (Burkitt & Barnett, 2006; Cleeve & Bradbury, 1992; Thomas et al., 1989). Consequently, instructions were used to induce the desired affects rather than relying upon naturally occurring relationships. Instructions similar to those found in Burkitt et al. (2003b, 2004) were used in the production and perception tasks in order to characterise a nice and a nasty person in the drawing tasks. Criticism has also been levied at the verbal manipulations used in previous drawing research arguing that they are not strong enough to induce the desired emotion towards the topic (Thomas & Jolley, 1998). However, Burkitt and Barnett (2006) examined the effect on children's size changes of positive and negative topics with brief mood induction (MI), such as that used in the current study, and more elaborate MI. The results supported the use of brief MI in an experimental setting as being sufficiently strong to at least temporarily induce the desired affect. The more elaborate MI failed to lead to any size changes in children's drawings, with the use of the brief MI inducing scaling changes in line with previous research (Burkitt et al., 2003b, 2004; Fox & Thomas, 1990; Thomas et al., 1989).

Although the affects being induced were those of happy and sad as opposed to nice and nasty (as in the current research) the results still demonstrated the ability of brief MI to induce a positive or negative temporary affective view of a specific topic. The elaborate MI was thought to achieve less indicative results as it may have placed too high a demand on children in terms of attending to the scenario, storing the relatively large amount of content and then producing drawings (Burkitt & Barnett, 2006). Thus brief MI instructions were used in the current research.

The figures to be drawn had their gender specified as male as the stick figure model to be copied was consistently identified as male in a pilot study (Galpin, 2008) and children's drawings of females have been found to be drawn larger than males so as to accommodate the inclusion of more hair (Davis, 1985). Furthermore, children in the present study were asked not to include details as this could have affected the size of the drawing (see Chapter 1, Section 1.1.3).

Further to this, a seven-point smiley face Likert scale was used as an independent measure of affect to provide quantifiable evidence that the desired affect had been induced during both the production and perception tasks. This scale was chosen for ease and speed of administration due to its non-verbal pictorial nature. The scale was also chosen because it was very similar to the Self Assessment Manikin (see Figure 2.3) used for measuring emotional valence (positive versus negative) in the International Affective Picture System (IAPS). The reliability of this in assessing reports of affective response to pictures has been shown to be extremely good (Bradley & Lang, 1994). The scale was extended to seven-points to allow for a greater range of responses to be gained and account for a greater degree of individual difference in terms of strength of affect felt. A pictorial scale was also preferred to a questionnaire as it was thought to be far easier to be utilised by young participants. It is noteworthy that Russell and Bullock (1985, 1986) demonstrated that children as young as two-years old were able to correctly understand the emotions conveyed by pictures (Cox, 2005). Although these results (Russell & Bullock, 1985, 1986) were obtained using photographs, unlike the drawings used in the current Likert scale, there is some evidence that recognising emotions in drawings of faces compared to photographs is easier for young children (Cox, 2005; MacDonald, Kirkpatrick & Sullivan, 1996).

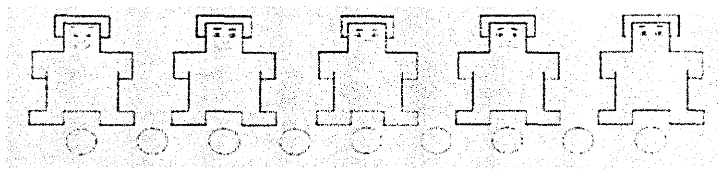


Figure 2.3: The Self Assessment Manikin used in the IAPS

Although previous studies have analysed size change using height, width and surface area measurements (Burkitt et al.2003a, 2003b) height was the measure used in the current study. Height has shown more predictable patterns in terms of increases in the size of drawings of positive and less reliable decreases in the size of negative stimuli (Burkitt et al. 2003a, 2003b). Furthermore, as the children were copying from a model of a stick figure, surface area did not provide an accurate measurement of the whole figure and the lack of a rounded torso also reduced the ability of the child to use width to demonstrate affect felt towards the subject.

The second aim of the study was to investigate the mechanisms responsible for relations between the size of a figure and associated affect. As reviewed in Section 1.1.6 of Chapter 1, Thomas et al. (1989) and Burkitt et al. (2003b, 2004) identified two potential mechanisms motivating this process: (i) acquired pictorial convention (APC) and (ii) an appetitive/defensive mechanism (ADM). According to APC theory children draw according to the conventions they have observed or learnt in relation to how topics are drawn (Jolley, 2010; Thomas et al., 1989).

It was proposed that any convention (perception or production) that the child has acquired would be something that children would learn over time and it would therefore be expected that the use of APC would increase with age (Jolley, 2010). In the ADM theory it is proposed that there is a reduction in the size of children's drawing of negative topics because of a motivation to gain psychological distance from such topics and thus reduce the threat they may pose (Burkitt et al., 2003b, 2004; Jolley, 2010). Positive topics on the other hand would be increased in size in children's drawings in response to an appetitive mechanism that seeks to gain psychological affinity with the topic.

There were two main tasks in the present study, namely a production task and a perception task. As has been suggested previously (Burkitt et al. 2003a), any study examining the use of APC would need to look at children's drawing production and perception. To date only two such studies have done this and neither of these was published (Galpin, 2006; Jolley, 1995). Jolley (1995) raised the point that children may hold different pictorial conventions for production and perception. This is a point acknowledged by the current study; however it was hypothesised that children would be more likely to show similar conventions for production and perception. It has been shown that children will often maintain real world size in their drawings (Konkle & Oliva, 2010) suggesting that children will reflect in their drawings what they perceive.

In the drawing production task the children were asked to produce drawings of *neutral*, *nice* and *nasty* people. Two experimental conditions were used in order to investigate an important potential cause of the inconsistencies in previous findings. Studies in which children have been asked to draw positively and negatively characterised figures on the same sheet of paper have provided results in which negatively characterised figures were drawn larger than positively characterised figures (Cotterill & Thomas 1990; Galpin, 2006). These results reflect the pictorial conventions reported by Jolley (1995) whereby children viewed larger figures negatively compared to smaller figures. As such these results would support the APC hypothesis and are in keeping with the cue-dependency model of children's drawings (Freeman, 1977, 1980) that would suggest that the presence on the same piece of paper of another drawing (with which a direct comparison could be made) would cue a clearer difference in size between the figures drawn.

When drawings are made on separate pieces of paper it has been shown that children draw larger positively characterised figures (Burkitt et al. 2003a, b; Cleeve & Bradbury, 1992; Di Leo, 1973;

Sechrest & Wallace, 1964; Thomas, Chaigne & Fox, 1989). To test the reliability of the different use of size depending upon whether drawings were made on the same or separate sheets of paper children were asked to make drawings of nice and nasty figures on both the same and separate sheets in the production task. It was hypothesised that should a convention be used it would be more likely to be expressed in the drawings made on the same sheet of paper. A clear differentiation between the figures would be required and the child may therefore then utilise their knowledge of conventions (in terms of size) to do this. On the separate sheets of paper however there is no immediate point of reference for each figure and therefore, should children draw according to an ADM it would be more likely to be expressed in this condition.

It was decided to examine drawing across two age groups because it was anticipated that this would test predictions derived from ADM and APC. In the case of APC one would predict that the use of conventions should increase with age so that a higher proportion of children would be expected to characterise larger figures as having a particular emotional valance and smaller figures having the opposite emotional valance. In the case of ADM, it might be expected that older children would be less susceptible to the influence of ADM either because of greater psychological maturity or because they adopted a pictorial convention.

A baseline drawing of an uncharacterised (neutral) human figure was also made by all the children. Previous studies have examined the size change of positively and negatively characterised human figures when compared to such a baseline (Burkitt et al. 2003b). The primary comparison in the current study was between the size of the nice and nasty figures. It was hypothesised that the size change between the nice and nasty figures would show the clearest difference. Therefore the height of the nice and nasty human figures was compared.

The primary hypothesis tested was therefore that children's drawings of a human figure characterised as nice or nasty would show a significant size difference in terms of height. Furthermore the APC theory was examined through the comparison of children's production and perception results. Should APC be motivating any size change it would be hypothesised that children's drawing production and perception results should be similar.

2.2 Method

All of the studies reported in the thesis were conducted with approval of the Open University Human Research Ethics Committee and conformed to British Psychological Society ethical guidelines. Consent was sought from all participating schools, parents or carers of the children and the children themselves were made aware of their ability to choose to take part in the studies or not. Copies of the consent letters that were sent out to schools and parents can be found in Appendix A.

2.2.1 Participants. One hundred and twenty-seven children (63 boys and 64 girls) aged between 5 years, 2 months and 11 years, 1 month participated in the experiment. The children were divided into two age groups with as near equal numbers of males and females as possible. The mean age of the younger group (*N* = 61) was 5 years, 9 months (range: 5:2 to 6:2, *SD* = 7 months). The mean age of the older group (*N* = 66) was 10 years, 7 months (range: 9:10 to 11:1, *SD* = 8 months). The children were attending two mainstream primary schools. None of the children had any special educational needs that the school was aware of.

2.2.2 Materials. In the separate sheet condition children drew their figure on A4 plain white paper using an HB pencil. In the same sheet condition a sheet of white A3 paper presented in landscape orientation and on which a black line had been drawn vertically down the centre was used. A drawing of a human stick figure presented in portrait (see Figure 2.2) was used as a model for the children to copy. Two A3 drawing perception cards (Card A and Card B see Appendix B for non-scale images) upon which two human stick figures were drawn, with one 40% larger than the other were used in the drawing perception task. On Card A the larger figure was on the left when presented to the child and on Card B the positions were reversed. A seven-point smiley-face Likert scale (see Figure 2.4) was used to gather affect ratings towards each picture drawn by the child as well as the figures in the drawing perception task, scores ranged from 1 (very positive) to 7 (very negative).

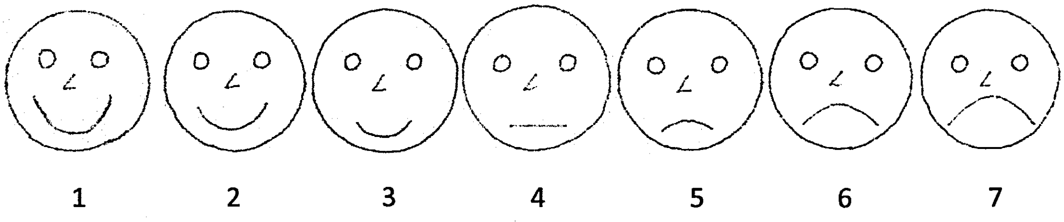


Figure 2.4: The seven-point smiley face Likert scale used to rate affect. Scores ranged from 1 (very positive) to 7 (very negative).

2.2.3 Procedure. All children completed three test sessions. In Session 1 the children completed a baseline drawing and one of the two conditions of the drawing production task (same or separate sheet) and in Session 2 they completed the other condition (separate or same sheet). In order to control for possible order effects children were randomly assigned to complete either the same or separate sheet condition in the first session. Session 3 (drawing perception task) was always completed after Sessions 1 and 2 in order that the figures presented in this task did not influence the children's own drawings. Children were seen individually in a quiet area of their school for all three sessions, which were administered in one sitting on the same day.

Session 1 Baseline drawing task. At the beginning of Session 1, before the administration of the production task, all children were required to complete a baseline drawing task. For the baseline drawing task children were given a sheet of A4 paper presented in portrait and the laminated model stick figure drawing was placed, on the table, in front of the child. The following instructions were used:

I'd like you to draw a man. I'd like you to draw them like this one. Use the pencil to draw them. Draw the whole man as well as you can but don't show any details such as their face or clothes.

Their drawing was left in place, and the child was asked to rate his/her affect towards the subject of the drawing using the seven-point Likert scale. S/he was instructed as follows:

What I'd like you to do is point to the face that best shows how you feel about this man. Here are the faces we are going to be looking at [pointing to each face]. *The first one is a very happy face; the next is a happy face; the next is a quite happy face; the middle one is a neither happy nor unhappy face; the next is a quite unhappy face; the next one is an unhappy face and this one is a very unhappy face. I'd like you to point to the face that describes how you feel about this man.*

Sessions 1 and 2 experimental drawing tasks. *Separate sheet drawing condition.* The child was asked to draw an affectively characterised human figure (either nice or nasty in counter-balanced order) on a sheet of A4 with the model placed in view. Once this was completed their drawing was removed and the child invited to draw the other affectively characterised figure on a second sheet of A4. The participants received the following instructions:

I would like you to draw me a picture of a man on this piece of paper. I'd like you to draw them like this one [pointing to the model]. *Now think of the man as very horrible and mean (or very kind and nice), and they are very unfriendly (or pleasant and friendly) to everyone. Draw the whole man as well as you can remembering how nasty (or nice) they are but don't show any details such as their face or clothes. Now* [once first drawing was removed] *I would like you to draw a picture of a nice/nasty man. A man who is very kind and nice (or very horrible and mean) and they are very pleasant and friendly (or very unfriendly) to everyone. Draw the whole man as well as you can remembering how nice/nasty they are but don't show any details such as their face or clothes.*

Immediately after each drawing was completed, the model was taken away and then using the Likert scale the children's affect towards the man they had drawn was assessed using the same instructions as above.

Same sheet drawing condition. The children were asked to produce nice and nasty versions of the human figure on a single piece of A3 paper. Half the children were asked to draw the nice man first; the others drew the nasty man first, there was no constraint upon which side of the paper children drew the first figure. These instructions were counterbalanced in light of Thomas and Gray's (1992) findings that the order in which drawings of figures were made on the same sheet of paper could affect their size. The following instructions were given:

I would like you to draw me a picture of two men on this piece of paper. I'd like you to draw them like this one [pointing to the model]. *Now think of one of the men as very horrible and mean, and they are very unfriendly to everyone. Draw the whole man as well as you can remembering how nasty they are but don't show any details such as their face or clothes. Think of the other man as a nice man, a man who is very kind and nice and they are very pleasant and friendly to everyone. Draw the whole man as well as you can remembering how nice they are but don't show any details such as their face or clothes.*

Immediately after the two figures were drawn, the model was taken away and then the Likert scale was once again used to measure the children's affect towards both men in turn using the same instructions as above.

Session 3 drawing perception task. Half of the children were shown Card A and half were shown Card B. Half of the children who were shown each card were given the following instruction:

One of these men is very horrible and mean, and they are very unfriendly to everyone and the other man is a nice man, a man who is very kind and nice and they are very pleasant and friendly to everyone. Can you tell me which one is the nasty man and which one is the nice man?

The other half of the children were given the following instruction:

One of these men is very kind and nice and they are very pleasant and friendly to everyone and the other man is very horrible and mean, and they are very unfriendly to everyone. Can you tell me which one is the nasty man and which one is the nice man?

Again in order to gain a quantitative measure of how the children felt about each figure they were presented with the Likert scale and asked to rate how they felt about each figure after they had identified them as nice or nasty.

For all the conditions (perception and production) the instructions were repeated in full if the children indicated they had not understood. It was also made clear to the children that there were no right or wrong answers. All that was important was that they responded exactly how they felt.

2.2.4 Measurements. As argued in Section 2.1, height was chosen as the primary measure for analysis and was measured in centimetres from the lowest part of the drawing to the highest.

However, in order to check whether height was an appropriate measure of size and was related to the other measures, a factor analysis was carried out on the three measures (height and width of the whole figure and surface area of the head) for nice and nasty drawings in both same and separate sheet conditions as well as the baseline drawings to further justify the examination of just one measure. The factor structure of the three items in the four main conditions (1 – same nice, 2 – same nasty, 3- separate nice, 4 – separate nasty) was examined. For all four conditions the Kaiser-Meyer-Olkin measure of sampling adequacy was above the recommended value of .6 (.63, .69, .69 and .66 respectively) and Bartlett's test of sphericity was also significant, $\chi^2(3) = 133.57, p < .05$, $\chi^2(3) = 149.22, p < .05$, $\chi^2(3) = 151.27, p < .05$ and $\chi^2(3) = 158.15, p < .05$ respectively. The diagonals of the anti-image correlation matrix were all over 0.5 supporting the inclusion of each item in the factor analysis for each of the four conditions. Finally the communalities were all above 0.3 in each of the analyses further confirming that each item shared some common variance with other items.

Principal components analysis was used in order to examine the potential correlation between the three measures. The initial Eigen values showed that the first factor accounted for over 70% of the variance across each of the four conditions. No rotation was possible as only one factor was extracted. This analysis indicated that the three measures of size were related to one another thereby providing support for the use of height as the principal measure of size; it also had the highest factor loadings. Analysis of size change using the single measure of height was therefore shown to be a valid method of analysis as the three factors when combined loaded onto a single factor.

2.3 Results

2.3.1 Order effects. The data were screened for order effects. The height of the nice and nasty drawings in both conditions were submitted to a 2 (Presentation of characterisation) x 2 (Condition) x 4 (Drawing Type) mixed design ANOVA with Presentation of characterisation (nice or nasty characterisation given first) and Condition (same or separate sheet condition completed first) entered as between subjects measures and Drawing Type (same nice, separate nice, same nasty, and separate nasty) entered as the repeated measure. No main effects were found for: drawing type, $F\ (2.47, 303.14) = 0.75, p > .05, \eta^2 = .01, P = .19$; condition, $F\ (1, 123) = 1.04, p > .05, \eta^2 = .01, P = .17$, or characterisation, $F\ (1, 123) = 0.04, \eta^2 = .00, P = .06$. No significant interactions were found between drawing type and characterisation, $F\ (2.47, 303.14) = 0.35, \eta^2 = .00, P = .12$ or drawing type, characterisation and condition, $F\ (2.47, 303.14) = 1.93, \eta^2 = .02, P = .45$. A significant interaction between drawing type and condition was found although it had a very small effect size, $F\ (2.47, 303.14) = 4.98, p < .05, \eta^2 = .04, P = .87$. Independent samples *t*-tests revealed that nasty drawings made on separate sheets of paper were drawn significantly larger, $t\ (119.77) = 2.15, p < .05$, when the same sheet condition was completed first (M = 14.20, SD = 6.86) as opposed to the separate sheet completed first (M =11.89, SD = 5.12). Given the large number of comparisons and the low effect size of the significant effect that was detected it was decided to proceed with the analysis of the data without any adjustments, as it is unlikely that this significant difference could account for the other effects that were found.

2.3.2 Drawing production tasks. *Likert ratings.* This first analysis was conducted to examine whether the children gave an appropriate Likert rating of affect towards the drawings they had produced of nice and nasty figures. The mean Likert ratings for the baseline, separate sheet and same sheet drawings are displayed below in Figure 2.5. The scores given ranged from 1 (*very nice*) to 7 (*very nasty*).

The Likert ratings for responses to each drawing were submitted to a 2 (Age Group) x 5 (Drawing Type) mixed design ANOVA with drawing type (baseline, same nice, separate nice, same nasty, and separate nasty) entered as the repeated measure and age as the between subjects measure.

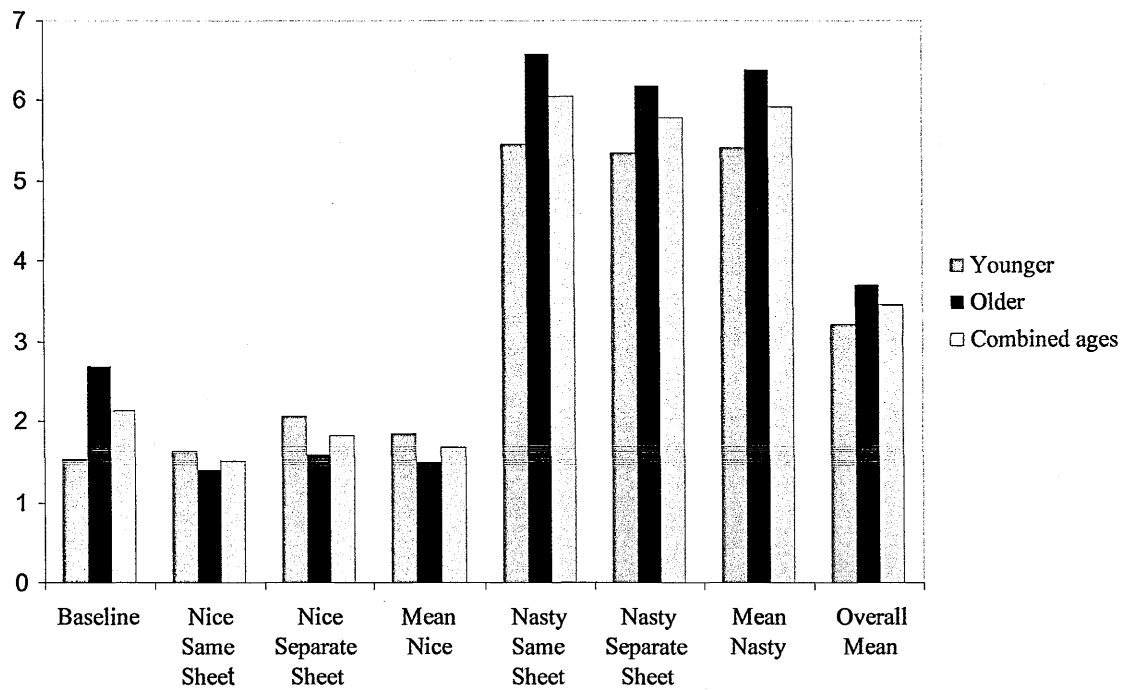


Figure 2.5: The mean Likert ratings for baseline, same sheet and separate sheet drawings for each age group.

A main effect for age, F (1, 125) = 24.20, $p < .001$, $\eta^2 = .16$, $P = 1$, was found. Inspection of the means in Figure 2.5 showed that older children gave higher and so more negative ratings overall than younger children. The main effect for drawing type was also significant, F (3.20, 399.50) = 489.87, $p < .001$, $\eta^2 = .80$, $P = 1$. Bonferroni adjusted paired *t*-tests showed that nice drawings on both same ($M = 1.51$, $SD = 0.92$) and separate ($M = 1.82$, $SD = 1.15$) sheet conditions were rated *nicer* ($p < .001$) than nasty drawings on the same ($M = 6.05$, $SD = 1.19$) and separate sheets ($M =$

5.78, $SD = 1.45$), also same sheet nice drawings were rated nicer ($p < .001$) than the baseline drawings ($M = 2.14$, $SD = 1.38$). There was a significant interaction effect between age group and drawing type, F (3.20, 399.50) = 14.39, $p < .001$, $\eta^2 = .10$, $P = 1$. *Post hoc* independent *t*-tests revealed that older children gave significantly higher ratings (ie more nasty) than younger children for the baseline and nasty drawings in both conditions (for all comparisons $p < .001$). In comparison, the younger children gave significantly higher ratings ($p < .001$) than the older children for the nice drawings in the separate sheet condition. There was no significant age difference for nice drawings in the same sheet condition. These results confirm that the appropriate rating of affect was given by the children towards the figures they had drawn.

The height of the baseline, nice and nasty figures. The means of the height measurements for all the drawings made in the production tasks are presented in Figure 2.6.

In order to examine whether there was any significant difference between the baseline, nice and nasty drawings the height measurements were submitted to a 2 (Age Group) x 5 (Drawing Type) mixed design ANOVA, with drawing type (baseline, same nice, separate nice, same nasty, and separate nasty) entered as the repeated measure and age as the between subjects measure. No significant main effects for age, F (1, 125) = 0.02, $p > .05$, $\eta^2 = .00$, $P = .05$ or drawing type, F (3.32, 415.31) = 0.57, $p > .05$, $\eta^2 = .01$, $P = .18$ were found. There was no significant interaction between age and drawing type, F (3.32, 415.31) = 1.74, $p > .05$, $\eta^2 = .01$, $P = .48$. The results indicate that there were no significant differences in the size of the nice and nasty drawings in either age group across the five types of drawing conditions. Although the results do not demonstrate any significant difference in the size of the nice and nasty drawings, the data in Figure 2.6 suggest that there is a trend towards drawing nasty figures larger than nice figures at both ages, but particularly for the older age group.

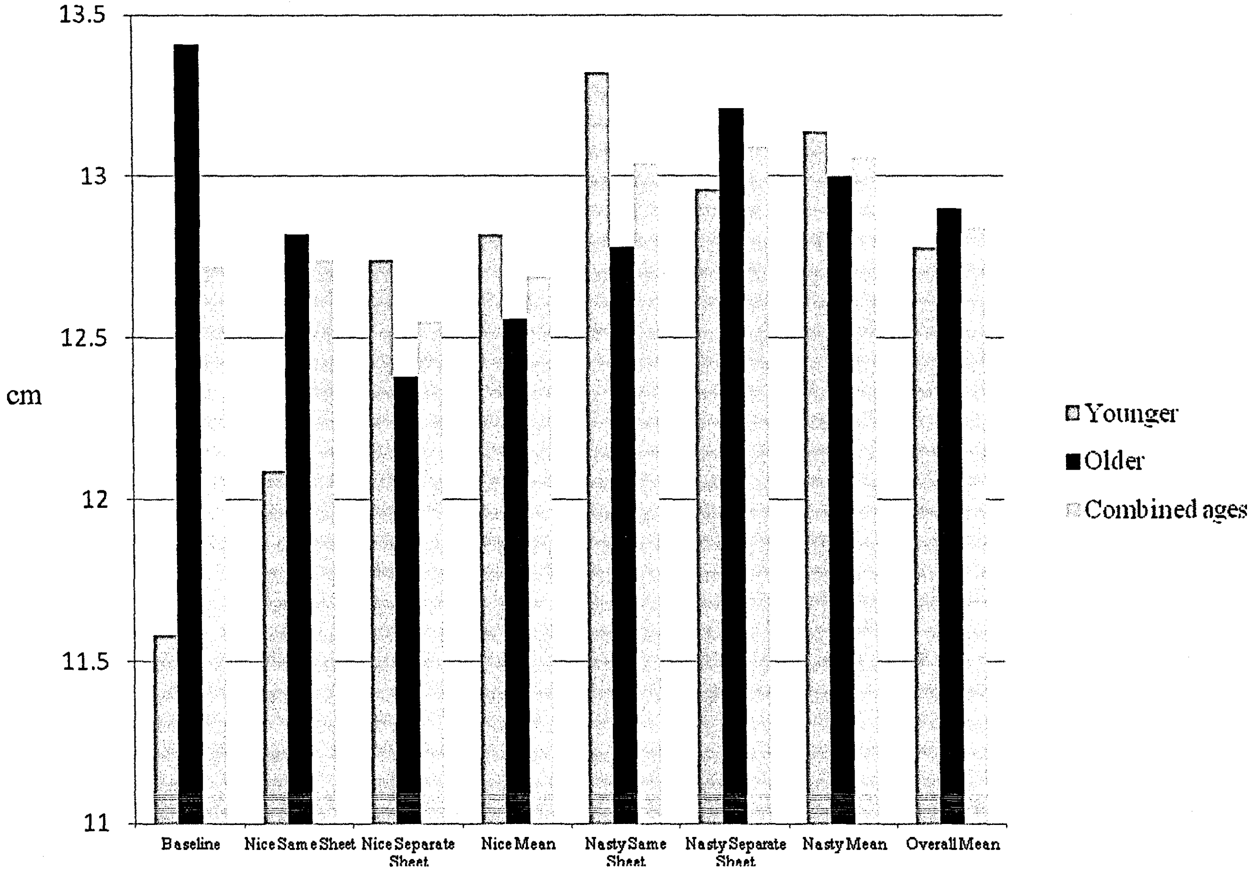


Figure 2.6: Mean height measurements for baseline, same sheet and separate sheet for each age group in cm.

Consistency in drawing production with same and separate sheets of paper. An analysis was conducted to address the question of whether children showed consistency across the same or separate sheets in the size of nice and nasty figures. Participants were identified as belonging to one of four groups:

Group 1 contained children that had drawn a taller nice figure in both conditions.

Group 2 contained children had drawn a taller nasty figure in both conditions.

Group 3 contained children that drew a taller nasty figure in the separate sheet condition and taller nice figure in the same sheet condition.

Group 4 contained children that had drawn a taller nice figure in the separate sheet condition and taller nasty figure in the same sheet condition.

The results are displayed in Figure 2.7.

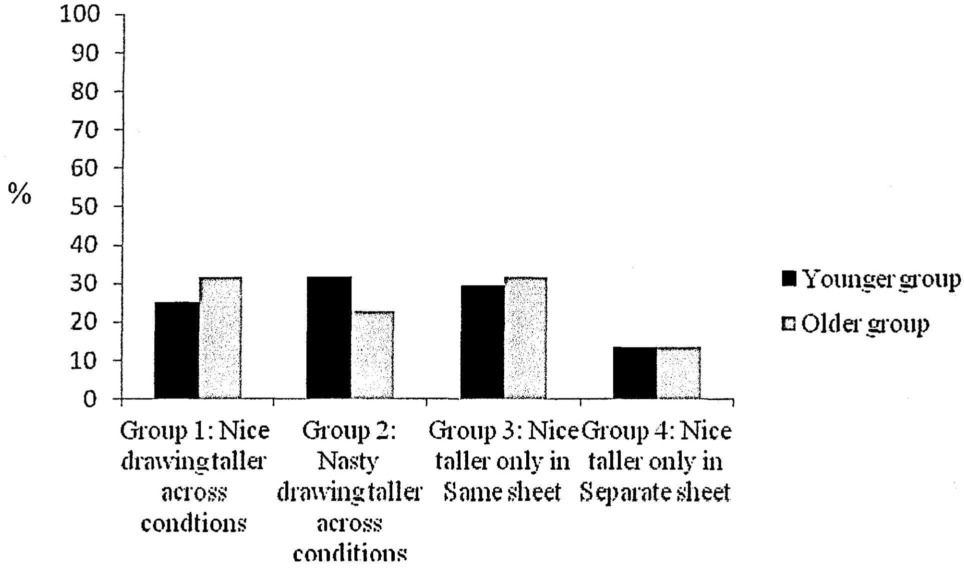


Figure 2.7: Histogram displaying consistency of response (in percent) in the drawing production task.

The results show that just over half of the participants (51.9%, $n = 70$) were consistent across conditions (either nice taller or nasty taller across both conditions) indicating that many children were consistent in their use of height when drawing on same and separate sheets. Nevertheless, the largest group ($n = 39$) did not show a consistency of response, rather, they drew a taller nice figure in the same sheet condition and a taller nasty figure in the separate sheets condition.

2.3.3 Drawing perception task. The drawing perception task allowed investigation of the relation between the height of a figure and children's perception of affect. Children were shown a card featuring two figures differing in size and asked to identify which they felt was nice and which was nasty. The percentages of the responses given are shown in Figure 2.8.

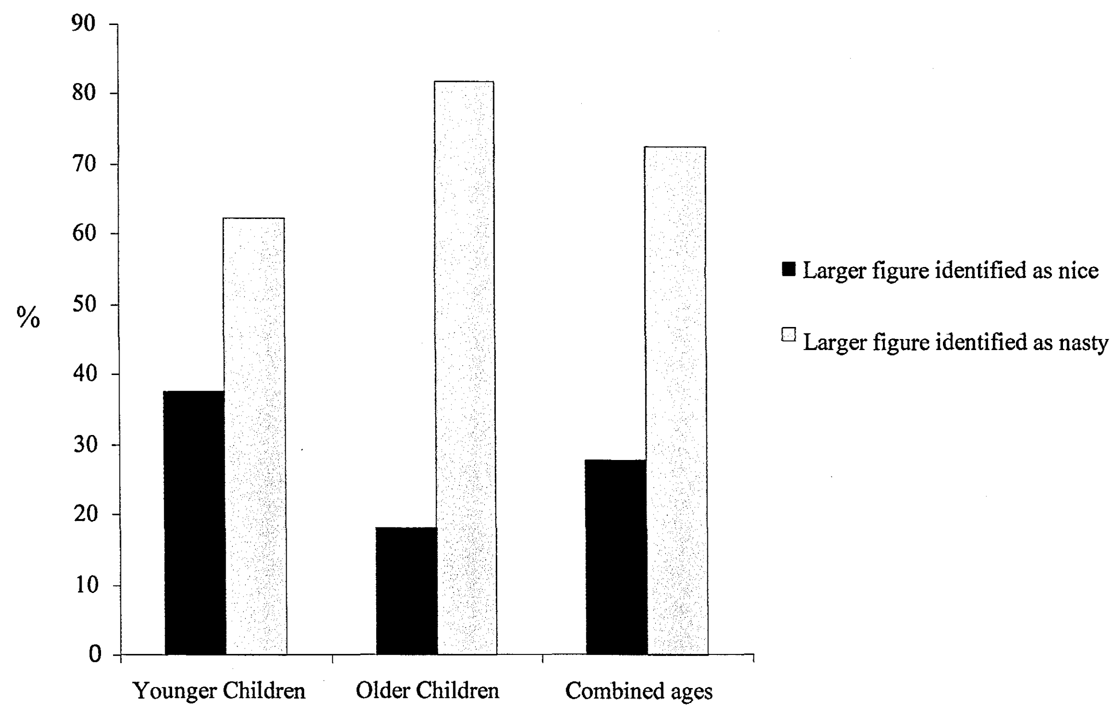


Figure 2.8: Histogram displaying drawing perception task responses for each age group in percent

Figure 2.8 indicates that most children (72.4%, $n = 92$) rated the larger figure as nasty. The data suggest that this tendency to identify larger figures as nasty also increased with age.

Likert ratings of affect towards the figures were also obtained. The means for these responses are displayed in Table 2.1.

Table 2.1: *Mean Likert ratings (SD) given for figures in the drawing perception task. Scores ranged from 1 (very positive) to 7 (very negative)*

Figure Size	Age		
	Younger	Older	Overall
Larger	3.84 (SD = 2.18)	5.59 (SD = 2.02)	4.75 (SD = 2.27)
Smaller	2.82 (SD = 2.13)	2.14 (SD = 1.94)	2.47 (SD = 2.05)
Overall	3.33 (SD = 0.76)	3.86 (SD = 0.43)	3.60 (SD = 0.67)

These Likert ratings were submitted to a 2 (Age) x 2 (Figure size) mixed design ANOVA with figure size entered as the repeated measure and age as the between subjects measure. Significant main effects for figure size, $F(1, 125) = 40.68$ $p < .01$, $\eta^2 = .25$, $P = 1$ and age, $F(1, 125) = 24.35$ $p < .01$, $\eta^2 = .16$, $P = 1$ were found as well as a significant interaction, $F(1, 125) = 12.07$ $p < .05$, $\eta^2 = .09$, P = .93. An examination of Table 2.1 shows that the larger figure was rated significantly higher and therefore more negatively than the smaller figure and that older children gave higher ratings than younger children. In terms of the interaction between age and figure size, *post hoc* independent *t*-tests, $t(125) = 4.71$, $p < .001$ revealed that older children rated the larger figure significantly higher (and therefore nastier) than younger children. No other comparisons were significant.

2.3.4 Relation between production and perception tasks. An analysis was made of whether height was used consistently across the production (in both the Same and Separate sheet conditions) and perception tasks in relation to affect (i.e. nice or nasty) to examine if there was a relationship between perception and production task results. Children were cross-classified according to whether or not they had, in absolute terms, drawn a taller nasty figure than nice figure in their drawing and whether or not they had identified the larger figure as nasty in the perception task. A chi-square test was carried out for each experimental condition. The consistency between production and perception task results for the same sheet condition is displayed in Figure 2.9.

A chi-square test showed that there was no significant association between the drawing production and perception tasks for either the younger, χ^2 $(1, N = 61) = 0.18, p > .05$) or for the older group, χ^2 $(1, N = 66) = 2.44, p > .05$ for the Same sheet condition.

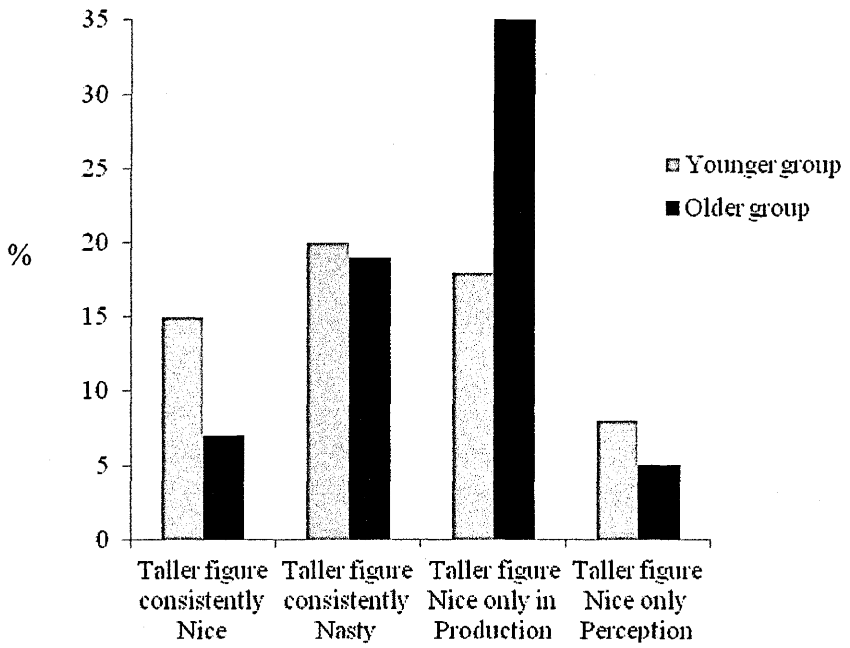


Figure 2.9: The consistency in use of size by children (as a percentage) between same sheet drawing production and perception tasks

The consistency between production and perception task results for the separate sheet condition is shown in Figure 2.10.

There was no significant association between the drawing production and perception tasks for either the younger, χ^2 $(1, N = 61) = 0.10, p > .05$ or for the older, χ^2 $(1, N = 66) = 0.87, p > .05$ group in the Separate sheet condition.

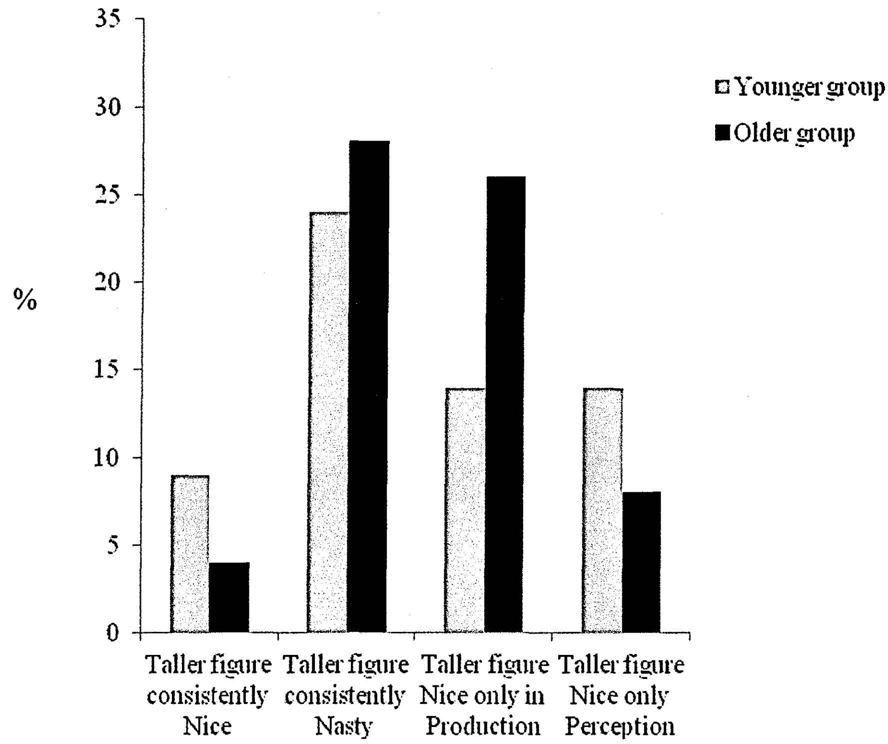


Figure 2.10: The consistency in use of size by children (as a percentage) between separate sheet drawing production and perception tasks

2.4 Discussion

Following the methodological considerations described in the introduction, discussion of the findings from the present chapter focuses on the following: (1) whether larger figures in children's drawings are associated with positive characteristics and smaller figures with negative characteristics, and (2) evaluating the influence two mechanisms (APC and ADM) which were proposed to explain the relationship between size and emotion in children's drawings.

2.4.1 Size changes of affectively characterised figures. The study reported in this chapter addressed methodological issues that have been raised about previous investigations into size and affect in children's drawings. Following concerns regarding the negative association that a model can have (Black & Niven, 1993), the type of model used in previous research (Thomas et al. 1989; Jolley, 1995; Burkitt et al. 2003) was replaced with a more neutrally viewed model (Galpin, 2008). The ability of the instructions used in some previous research to elicit the desired emotional affect has been questioned (Aronsson & Andersson, 1996; Jolley & Vulic-Prtoric, 2001; Burkitt et al., 2003a, b; Jolley, 1995; Thomas et al., 1989). The instructions used in the current study have been shown to be capable of temporarily inducing the desired mood (Burkitt & Barnett, 2006). Independent measures of affect were also obtained to provide evidence that the figures were rated in a differential way to show that the desired characterisation was perceived, something that has been lacking in some previous work (Thomas et al. 1989; Jolley, 1995). In addition, a within-subject design was adopted to minimise potential effects of large error variance which can result from the use of independent samples (Cleeve & Bradbury, 1992; Fox & Thomas, 1990; Jolley, 1995).

Despite these concerns being addressed, no significant differences were observed between the positively or negatively characterised figures in either of the two experimental conditions. This is consistent with the concerns raised by previous researchers (Thomas & Jolley, 1989; Jolley & Vulic-Prtoric, 2001) about the reliability of size in children's drawings as an emotional indicator of affect felt towards the topic being drawn. And is inconsistent with more recent work in which children had been shown to reliably increase the size of positively characterised human figures (Burkitt et al. 2003b).

In the current investigation particular attention was paid to the possibility that size differences were influenced by whether or not emotionally characterised figures were drawn on the same sheet of paper as would be suggested by the cue-dependency model of children's drawings (Freeman, 1977, 1987). However, in keeping with previous studies that have explicitly examined size change as a result of affect felt towards the subject drawn on same and separate sheets (Jolley, 1995), this was not found to be the case and no significant size change was observed.

Despite the trend found in the current chapter towards nasty figures being drawn larger than nice figures, the potential examination of size alone as a reliable indicator of emotional affect felt towards a drawn subject is limited. The lack of significance of this trend and indeed the small effect size of results that do find significant size changes (Burkitt et al. 2003b) may be a result of the highly structured experimental design. It is worth emphasising that the current study employed a tightly controlled experimental design in order to address a primary concern that methodological issues could have accounted for the contrasting results found in the existing literature. It also enabled the control of factors other than emotion that may cause size changes (such as detail inclusion, hence the instructions used specified no detail to be drawn and the model to copy from also contained no detailed features). However, it could be argued that the use of such a method may have too tightly controlled what the children could draw. As a result the children may not have used their imagination or empathetic abilities to a great enough extent in conceiving the emotional character of the figures and as such the figures may not have reached a significant level of positive or negative characterisation to merit the use of size as a determinant of characterisation, although the Likert ratings do suggest that the appropriate emotion was elicited, the efficacy of the instructions is discussed further in Chapter 9, Section 9.2.1.

A further limitation with the use of a model is that the aim of the task may not have been clear to the children. Rather than making a clear distinction between nice and nasty figures, the child may have focussed on producing an accurate copy of the model. The use of free drawings and more naturally occurring emotions within an experimental framework may provide a more reliable indicator of the extent to which size may be used to display emotion felt towards a topic and indeed contribute further to the debate regarding what may be motivating any size change. The results from the current study directly contrast with those of Burkitt et al. (2003b) that found nice figures being drawn larger. This may suggest that the use of size is unreliable or a difficult effect to examined within an experimental setting. The possibility that the results may have been affected by confusion over the task demands, and in particular the need to accurately copy the model as opposed to represent a nice and nasty person is addressed in the study reported in Chapter 3.

2.4.2 Appetitive/Defensive Mechanism. The ADM hypothesis predicts that negatively characterised figures are drawn smaller than positively characterised figures to increase their psychological distance from the child. However, in the current study, the nasty figures were not drawn significantly smaller than the nice figures in either age group or in either experimental condition. These results therefore provide little evidence to support ADM. When the consistency of response across production and perception tasks was examined, participants who drew their nasty figures smaller than their nice figures were less likely to have their production and perception task results matching with only 21 out of 85 (25%) in the same sheet condition and 13 out of 53 (25%) in the separate sheet condition. This would suggest that they were not likely to have drawn on the basis of APC: if children were drawing according to an APC then their production and perception task results would be expected to match. Therefore, while there is very little evidence to support the ADM hypothesis, those children who did draw the nasty figures smaller than the nice figures were less likely to produce results in line with the APC hypothesis. This in turn suggests that, with regards to these individuals, the ADM would be the more viable of the two theories in terms of explaining any size change. Despite this, whilst the influence of an ADM cannot be ruled out, the overriding case remains that if there is an ADM effect then it is an unreliable or difficult one to identify using the existing experimental paradigm.

2.4.3 Acquired Pictorial Convention. If size differences in children's drawings of affectively characterised figures are caused by the acquisition of a pictorial convention then one would expect there to be a high degree of consistency across production and perception tasks (i.e. if children view larger figures as nasty they would be expected to draw figures characterised as nasty larger than those characterised as nice). Age differences would also be expected as the convention becomes more established in older children. However, there was no significant relationship between perception and production of drawings. In the same sheet drawing condition 39% (n = 66) of the older children and 57% (n = 61) of the younger children produced drawings that matched their perception. In the separate sheet drawing condition 48% (n = 66) of the older children and 54% (n = 61) of the younger children produced drawings that matched their perception. These results are in contrast to the prediction from APC in which more of the older group should draw according to their perception. The results could also suggest that children may hold different conventions for perception and production.

However, what is worth noting from the perception task results is the fact that, in accordance with previous research regarding drawing perception (Jolley, 1995), there was a noticeable trend in terms of identifying figures as nice or nasty based solely on size, with 72.4% of children identifying the larger figure as nasty in the drawing perception task. The percentage of this response in the drawing perception task showed a developmental shift with 62.3% of the younger children identifying the larger figure as nasty and 81.8% of the older children doing so. These results suggest that children might develop a pictorial convention in terms of their perception of pictures suggesting that the effect of APC on children's drawings merits further investigation.

A potential limitation observed regarding the results reported in the current study concerns children's understanding of the exact nature of the task. Anecdotal evidence suggested that the children may have been primarily concerned with successfully copying the model as opposed to seeking to represent a nice or nasty figure. During drawing production tasks, the children would frequently refer to the model and ask if their drawing was *good*. The school environment in which the drawings were collected may have further exacerbated this potential effect in that it could be argued that children would be more familiar with copying tasks in school that required an accurate replication of a model as the primary aim of and measure of success of such a task.

In conclusion, the current study supports previous claims (e.g. Thomas & Jolley, 1989; Jolley & Vulic-Prtoric, 2001) that size cannot be used as a reliable indicator of affect felt towards children's drawings of affectively characterised human figures. As this primary effect cannot be established, any exploration of mechanisms that could motivate size change (APC or ADM) would be seen to be premature. A justification for the present study was that the lack of consistency in the results found in previous studies within this field may have been a result of the varied methodologies used and sometimes lack of appropriate controls. The current study addressed these variations in order to examine this possibility. However, due to the highly proscribed nature of the drawing task, specifically the need to copy from a model, the children may not have employed their usual drawing style. It is possible that children's more natural drawing style could reveal effects of affect on figure size (see Burkitt et al. 2004). However, the use of a model was required in order to control for other potential confounds discussed in the introduction. In order to therefore address the possibility that the requirement of the task may have been unclear and in order to attempt to optimise the conditions in which children may display a size change the study reported in the study described in the next chapter introduced an audience condition to the methods. It was made explicit to one group of children (the audience condition), but not the other group, that they would have to make the difference between their nice and nasty drawings clear as an audience of peers would have to guess which of their drawings was nice and which was nasty. It was hypothesised that this would provide results in which any size change between nice and nasty drawings would be clearer.

Chapter 3

The effect of drawing for an audience on the use of size as an indicator of emotional affect in children's human figure drawings

3.1 Introduction

The study reported in Chapter 2 has further demonstrated that concerns regarding the reliability of size differences in drawings of affectively characterised human figures are justified (Thomas & Jolley, 1989; Joiner, Schmidt, & Barnett, 1996; Jolley & Vulic-Prtoric, 2001). However, in the course of the examination of the use of size in children's drawings and the mechanisms motivating its use, there was some support for the existence of one of the proposed mechanisms, APC, that merits further examination of size and affect. In drawing perception tasks designed to assess children's use of APC, larger figures have reliably been identified as negative (nasty) and smaller figures have been identified as positive (nice) (Chapter 2; Cotterill & Thomas 1990; Galpin, 2006; Jolley, 1995). The study reported in Chapter 2 pointed towards a tendency for children to draw larger figures as representing negatively characterised figures and smaller figures representing positively characterised figures. The study reported in the present chapter was designed to examine whether drawing for an audience (and thus emphasising the nature of the task and the use of conventions) would more clearly demonstrate that there is a relationship between size and affect that is consistent with children's perception task results.

The motivation for the design for this study came from the significant results in the drawing perception task described in Chapter 2. In the perception task children were more likely to identify a larger figure as nasty and smaller figure as nice. However, such a clear distinction based on size was not seen in their drawings. Thus, if children are displaying a clear convention in their perception of drawings, this raises the question of why children are not using these conventions in drawing tasks? It could be argued that children may hold different conventions for perception and production. However, the trend towards perception and production results matching, with larger figures being perceived of as nasty and nasty figures being drawn larger, would suggest that these conventions are similar.

A further possible explanation for the lack of a significant relationship between production and perception task results is that an ADM, and not an APC, may be the mechanism influencing any size change. However, the lack of any reliable size change found in Chapter 2 would limit the viability of this explanation. Were the ADM mechanism motivating any size change the negatively characterised drawings would be expected to have been reduced in size as a defensive reaction and larger figures increased in size as a possible appetitive response. This lack of support, as well as the perception data which suggest the existence of a convention, at least in perception, led to the design of the current study. The study reported here sought to optimise the conditions in which an APC would be utilised in children's drawings and a size difference between nice and nasty figures would be observed.

In order to optimise the potential for an APC to be used, without compromising the tight experimental controls, the current study sought to highlight the need for the drawing to be interpreted by others in order to assess whether explicitly drawing for an audience of peers would result in a clear size difference between nice and nasty figures. Half of the children participating were placed in an experimental condition in which it was made explicit that the aim of the task would be for a peer to be able to successfully identify their drawings as a *nice* or *nasty* person. By manipulating the audience for which the drawing was intended, it was hypothesised that the communicative function of the drawing would be made clearer to the child, and therefore they would have more recourse to use APC. The focus on having to make a distinction between the nice and nasty drawing was also thought to draw focus away from the children potentially interpreting the task as having to carefully replicate the model figure. In order to further optimise the potential for children to make the distinction between the figures clear, children completed the drawing production task on a single sheet of paper. In light of Freeman's cue-dependency model (1980) the presence on the same sheet of each figure may cue the children to make the differentiation between the figures clearer.

Recent research has drawn attention to the function of drawing as a meaning-making activity, and as a semiotic mode whereby children produce visual-graphic signs to both represent and communicate their ideas and knowledge (Hopperstad 2008; Kress & van Leeuwen 1996; Kress, 1997, 2003). Indeed, children have been shown to alter positional aspects of their drawing when the communicative function of the drawing has been highlighted, and, as discussed in Section 2.1.1 of Chapter 1, audience effects have also been shown to impact on the categorical features used to depict affectively characterised figures (Burkitt, Watling & Murray, 2011; Callaghan, 1999; Jolley, 2010; Light & McEwan, 1987; Light & Simmons, 1983; Sitton & Light, 1992). It could be argued that the use of a school setting and the use of an audience of peers might facilitate the displaying of a pictorial convention as children will often engage in drawing with their peers and this may result in the formation of shared pictorial associations. Children's drawing interaction in a school setting has been shown to also involve sharing of drawing strategies, with copying a crucial process in ideas-spreading (Pahl, 1999) thus further supporting the likelihood of shared pictorial associations having been formed.

That children will more likely use a convention in their drawings made for peers in a school setting is supported by socio-cultural studies undertaken in educational contexts. These studies have highlighted that children interact with each other when they draw, with drawing and talking often going hand in hand (Dyson, 1989; Thompson & Bales, 1991; Coates, 2002). This interaction with peers can in turn lead to the influence of peers altering the content and direction of a drawing (Coates, 2002). Such influence could not only account for, but also dictate, a homogenisation towards a conventional form of representation for objects and figures in order for them to be successfully interpreted by others. Whilst assertions that children develop their drawings through a range of schemata that are universal across the world (Kellogg, 1955; Gentle, 1985) may prove too ambitious, the initial data regarding pictorial conventions (at least in terms of perception task results), as well as those regarding peer influence and interaction during drawing, support the notion of the existence of a common pictorial language or convention across certain groups of children.

The effects of an audience in altering aspects of children's communication have also been shown in how children present themselves to others verbally using a range of self-presentational tactics (Aloise-Young, 1993; Fu & Lee, 2007) and the type of vocabulary they use (Hoff, 2010). Recent research has shown that certain features used to demonstrate emotion in children's drawings are associated not only with the existence of an audience but also with the type of audience (Burkitt et al., 2011). Burkitt et al. (2011) showed that 6-year-old children would alter aspects of their drawings of emotionally characterised figures (happy or sad) depending on whether they were drawing for an audience of adults or peers. Furthermore it was argued by Burkitt et al. (2011) that children displayed elements in their drawings for peers that their peers would be able to associate with easily or that were more socially acceptable for a peer rather than an adult to see (such as stomping to display unhappiness). Therefore, by explicitly stating that children should draw a picture so that it can be successfully interpreted by a peer (i.e. that they are able to identify it as a nice or nasty person) it is hypothesised that, in the current study children will utilise pictorial convention to a greater extent than those children who are not drawing for an explicit audience.

Whilst a large age range was not examined in the present study it was hypothesised that older children would use pictorial convention when drawing their nice and nasty figures to a greater extent than younger children. A pictorial convention about a drawn topic could be expected to be learned and as such children would be thought to become more fluent and use conventions more as they became older, therefore children aged 9- to 10-years-old were sampled. This age range was also selected as size has been considered a non-literal indicator of mood (Picard, Brecht & Baldy, 2007) and it has been shown that not until after the age of around 7 years have children been shown to be more aware of the expressive, less literal qualities of art (Parsons, 1987).

Similar materials to those used in the study reported in Chapter 2 were used in the present study. The model used was retained for this study. This allowed for the control of factors other than affect accounting for the size of the figure drawn. Furthermore it permitted the results to be compared to previous studies that had used a model. The perception cards and the Likert scale used in the study reported in Chapter 2 were used in the present study with similar task instructions also used as the reliability of all these instruments has been supported (see Chapter 2, Section 2.1).

The two issues that were investigated in this study therefore were:

The influence of APC was evaluated by investigating whether children who were told that they were drawing for an audience made a greater difference in size between nice and nasty figures, than children who were not told about an audience. The presence of an audience, which would be expected to increase the use of pictorial conventions, resulted in a greater size difference between nice and nasty figures than in those children not drawing for an audience.

The similarity between conventions in production and perception was evaluated. The relationship between the perception and production task results for all of the children was therefore examined. Those children drawing for an audience would be expected to use pictorial conventions to a greater extent than those not drawing for an audience. Should perception and production conventions be similar, the audience group would be expected to highlight this similarity to a greater extent.

3.2 Method

3.2.1 Participants. Fifty-one children aged between 9 years, 2 months and 10 years, 8 months (mean age 9 years, 11 months, *SD* = 7 months) participated in the study. Gender was not a factor being examined though a roughly equal number of males and females took part (24 males and 27 females). The children were randomly assigned to one of two conditions based on class lists, with the constraint that approximately similar numbers of males and females were assigned to each condition. The two conditions were defined by those who received explicit instructions regarding audience (the Audience condition, $n = 26$, mean age 9 years 10 months, 12 boys and 14 girls) and those who did not receive explicit instructions (the Reference condition, $n = 25$, mean age 9 years 11 months, 12 boys and 13 girls). The children all attended a mainstream UK primary school. None of the children had any special educational needs that the school was aware of.

3.2.2 Materials. As in the study presented in Chapter 2 a drawing of a human stick figure presented in portrait (see Chapter 2, page 61) was used as a model for children to copy. Children drew onto A4 paper (presented in portrait orientation) and A3 paper (presented in portrait) with a black line drawn down the centre in order to provide an even amount of space for each of the figures to be drawn and therefore control for any possible planning difficulties that may cause the child to have less space in which to draw their second figure. Pencils (HB) were provided for all drawing tasks. A seven-point smiley-face Likert scale (See Chapter 2, page 67) was used to gather affect ratings towards each of the pictures drawn by the child as well as the figures in the drawing perception task. For the perception task two A3 drawing perception cards (Card A and Card B, see Appendix B) showing two human figures were used. On both cards one figure was 40% larger than the other, on Card A the larger figure was on the right, on Card B the larger figure was on the left.

3.2.3 Procedure. All children completed two test sessions with Session 2 immediately following Session 1. In Session 1 the children completed the drawing tasks and in Session 2 they completed the drawing perception task. The order of the sessions was not counterbalanced in order that the figures presented in Session 2 did not influence the children's own drawings. Thus all children completed Session 1 prior to Session 2.

Session 1. All children were required to complete a baseline drawing task first. For the baseline drawing task children were given a sheet of A4 paper presented in portrait and had the laminated model stick figure drawing placed flat on the table above the A4 sheet. The following instructions were used:

I'd like you to draw a man. I'd like you to draw them as a stick man, like this one. Use the pencil to draw them. Draw the whole man as well as you can but don't show any details such as their face or clothes.

Their drawing was left in place, and the children were asked to rate their affect towards their drawing of the man using the seven-point Likert scale. They were instructed as follows:

What I'd like you to do is point to the face that best shows how you feel about this man. Here are the faces we are going to be looking at [pointing to each face]. *The first one is a very happy face; the next is a happy face; the next is a quite happy face; the middle one is a neither happy nor unhappy face; the next is a quite unhappy face; the next one is an unhappy face and this one is a very unhappy face. I'd like you to point to the face that describes how you feel about this man.*

Upon completion of the baseline drawing children were asked to produce (in counterbalanced order) a nice and nasty version of the human figure on a single piece of A3 paper. The following instructions were given:

The participants in the Audience condition received the following instructions:

We're going to draw some pictures of nice and nasty men that I'm going to show to class X [class of peers, not taking part in the study]. *They're going to try to guess which one is the nice man and which is the nasty man by looking at your picture.* [A3 paper is then placed in front of the child]

I would like you to draw a picture of two men on this piece of paper. I'd like you to draw them as a stick man, like this one [pointing to the model]. *Now think of one of the men as very horrible and mean, and they are very unfriendly to everyone. Draw the whole man as well as you can remembering how nasty they are but don't show any details such as their face or clothes. Think of the other man as a nice man, a man who is very kind and nice and they are very pleasant and friendly to everyone. Draw the whole man as well as you can remembering how nice they are but don't show any details such as their face or clothes.*

Remember to draw them so that class X will be able to know which one is the nasty man and which one is the nice man.

The participants in the Reference condition received the following instructions:

I would like you to draw a picture of two men on this piece of paper. I'd like you to draw them as a stick man, like this one [pointing to the model]. *Now think of one of the men as very horrible and mean, and they are very unfriendly to everyone. Draw the whole man as well as you can remembering how nasty they are but don't show any details such as their face or clothes. Think of the other man as a nice man, a man who is very kind and nice and they are very pleasant and friendly to everyone. Draw the whole man as well as you can remembering how nice they are but don't show any details such as their face or clothes.*

Immediately after the drawing was completed the model was removed and the Likert scale was once again used to measure the children's affect towards each of the men they had drawn using the same instructions as above.

Session 2. In counterbalanced order the children were shown either Card A or Card B and they were given the following instructions which were also administered in counterbalanced order:

Either:

One of these men is very horrible and mean, and they are very unfriendly to everyone and the other man is a nice man, a man who is very kind and nice and they are very pleasant and friendly to everyone. Can you tell me which one is the nasty man and which one is the nice man?

Or:

One of these men is very kind and nice and they are very pleasant and friendly to everyone the other man is very horrible and mean, and they are very unfriendly to everyone. Can you tell me which one is the nice man and which one is the nasty man?

To measure how the children felt about each figure, they were presented with the Likert scale and asked to rate how they felt about each figure after they had identified them as nice or nasty.

For all of the tasks (perception and production) the instructions were repeated in full if the child indicated they had not understood. It was also made clear to the children that there was no right or wrong answer, all that was important was that they responded exactly how they felt.

3.3 Results

3.3.1 Size change measured using height.

In order to examine the extent to which the children in the Audience condition would display a size change to a greater extent than those in the Reference condition the height of the nice, nasty and baseline figures were compared. The mean height in centimetres of the nice, nasty and baseline drawings are displayed in Table 3.1. As the children in the Reference condition drew, on average, taller figures than the Audience group, the percentage change between the nice and nasty figures was also calculated. The mean percentage change in height of nice and nasty drawings relative to the baseline and in terms of the mean change between the nice and nasty drawings is also displayed in Table 3.1. Table 3.1 also displays the size of nice and nasty drawings minus the baseline height. There were large standard deviations that reflect the large variability in the range of heights with which human figures were drawn by the participants. The mean percentage changes between nice and nasty drawings show that children in the Audience condition ($n = 26$) increased the size of their nice drawing relative to their nasty drawing by 1.94%, and the children in the Reference condition ($n = 25$) increased the size of their nice drawings relative to their nasty drawing by 2.99%.

To compare size differences in nice and nasty drawings between the Audience and Reference conditions a two-way repeated measures ANOVA was conducted with Characterisation (nice or nasty) entered as the repeated measure and Condition (Audience or Reference) as the between subjects measure. There was no significant main effect of Condition on size of drawings, F (1, 49)

$= 1.31, p > .05$ with a small effect size $\eta^2 = .03$ and a low P (.2). There was also found to be no significant main effect of Characterisation on the size of children's drawings, $F(1, 50) = 1.52, p > .05$ and $\eta^2 = .03$. There was also no significant interaction found between Characterisation and Condition, $F(1, 49) = 0.10, p > .05, \eta^2 = .002$.

A second analysis was conducted in which the height of the baseline drawing was subtracted from the height of the nice and nasty drawings. The revised nice and nasty heights were submitted to a two-way repeated measures ANOVA with Characterisation (nice or nasty) entered as the repeated measure and Condition (Audience or Reference) as the between subjects measure. There was still no main effect of Condition, $F(1, 49) = 0.10, p > .05, \eta^2 = .002$ or Characterisation, $F(1, 49) = 1.51, p > .05, \eta^2 = .03$. There was also no significant interaction found between Characterisation and Condition, $F(1, 49) = 0.12, p > .05, \eta^2 = .002$.

Table 3.1: *Mean height (SD) of Nice and Nasty drawings, mean percentage change and nice and nasty heights minus baseline*

		Audience ($n = 26$)	Reference ($n = 25$)	Whole Group ($N = 51$)
Drawing height (cm)	Baseline	16.14 (6.05)	18.23 (4.64)	17.17 (5.45)
	Nice	16.47 (5.71)	18.08 (4.23)	17.25 (5.05)
	Nasty	16.15 (5.01)	17.54 (4.21)	16.83 (4.64)
Height change (%)	Nice vs. Base	+2.05	-0.82	+0.47
	Nasty vs. Base	+0.06	-3.79	-1.98
	Nice vs. Nasty	+1.94	+2.99	+2.44
Difference from Baseline (cm)	Nice - Baseline	0.33 (3.04)	-0.15 (2.5)	0.09 (2.77)
	Nasty - Baseline	0.01 (2.73)	-0.69 (3.32)	-0.33 (3.02)

Likert ratings. A comparison of the Likert ratings of nice and nasty figures was conducted to verify that children made different judgements about the two types of figures that were in line with the characterisations the figures had been given. Scores given ranged from 1 (*very nice*) to 7 (*very nasty*). The means and standard deviations are displayed in Table 3.2.

Table 3.2: *The mean Likert ratings (SD) given during the drawing task*

Drawing Type	Audience	Reference	Total
Baseline	3.23 (1.03)	3.56 (1.19)	3.39 (1.12)
Nice	1.88 (0.65)	1.76 (0.72)	1.82 (0.68)
Nasty	5.62 (1.02)	5.76 (1.05)	5.69 (1.03)

The Likert ratings for responses to each drawing were submitted to a 2 (Condition) x 3 (Characterisation) mixed design ANOVA with Characterisation (baseline, nice and nasty) entered as the repeated measure and condition as the between subjects measure. No main effect for Condition was found F (1, 49) = 0.28, $p > .05$, $\eta^2 = .006$. The main effect of Characterisation was found to be significant F (1, 49) = 172.4, $p < 0.001$, $\eta^2 = .78$. *Post hoc* paired *t*-tests revealed that the nice drawings (M = 1.82, SD = 0.68) were rated *nicer* ($p < .001$) than both nasty (M = 5.69, SD = 1.03) and baseline (M = 3.39, SD = 1.12) drawings. Nasty drawings were also rated *nastier* ($p < .001$) than both nice and baseline drawings. These results confirm the appropriate rating of affect was given by the child towards the characterised figure they had drawn.

3.3.2 Drawing perception task results. Children were asked to identify which of two figures, differing only in size, was nice and which was nasty. The results from this task provided an indication of the pictorial convention held by the child (at least in terms of perception). These results were then used to examine any potential relationship between production and perception results. The frequencies of responses given during the drawing perception task are displayed in Table 3.3.

The results for the perception task indicate that the majority of children (72.5%) identified the larger figure as nasty. This is in keeping with previous results (Chapter 2; Cotterill & Thomas

1990; Galpin, 2006; Jolley, 1995) that have found larger figures to be more consistently identified as negative.

Table 3.3: *Identification of Nice and Nasty figures according to the size of the figures.*

Children's Judgment	Condition	Frequency	Percent
Larger figure is identified as nasty	Audience	17	65.4
	Reference	20	80.0
	Whole Group	37	72.5
Smaller figure is identified as nasty	Audience	9	34.6
	Reference	5	20.0
	Whole Group	14	27.5

Likert ratings. An independent measure of affect was taken during the perception task to confirm that the appropriate affect had been associated with each figure. The same Likert scale rating that was used in the production task was used. Scores ranged from 1 (*very nice*) to 7 (*very nasty*). The results are displayed in Table 3.4.

Table 3.4: *Mean Likert scores (SD) for the perception task*

Size of Figure	Identified as Nasty	Identified as Nice
Larger	5.62 (1.30)	1.79 (1.12)
Smaller	5.29 (1.44)	3.00 (1.47)

In order to confirm that the appropriate affect had been felt for each figure during the perception task a 2 (Size of Figure) x 2 (Identification) mixed design ANOVA was carried out. Size of Figure (larger or smaller) was entered as the repeated measure and Identification (figure identified as nice or nasty during the perception task) as the between subjects measure. A main effect for identification was found, F (1, 49) = 190.31, $p < .001$, $\eta^2 = .62$. Those who identified the larger figure as nasty rated it nastier (gave it a higher Likert rating score) than those who identified it as nice. The children who identified the smaller figure as nasty rated it nastier than those who identified it as nice. These results confirm that children did feel the appropriate affect towards the model images.

3.3.3 Production and perception task results. In order to examine the relationship between production and perception, the data for the two tasks were compared. Table 3.5 displays the frequencies of response for the perception task alongside the frequency with which the nice or nasty figures were drawn taller. The number of participants whose drawing production and perception matched (i.e. perceived the larger figure as nasty and drew their nasty figure larger) is also displayed in Table 3.5.

Table 3.5: *Frequencies with which the larger figure was perceived or drawn as Nice or Nasty and the frequency with which production and perception results matched*

		Audience ($n = 26$)	Reference ($n = 25$)	Combined Groups ($N = 51$)
Perception	Nasty Larger	17 (65.4%)	20 (80%)	37 (72.5%)
	Nice Larger	9 (34.6%)	5 (20%)	14 (27.5%)
Production	Nasty Larger	11 (42.3%)	10 (40%)	21 (41.2%)
	Nice Larger	15 (57.7%)	15 (60%)	30 (58.8%)
Production and Perception match	Nasty Larger	8 (31%)	8 (32%)	16 (31%)
	Nice Larger	6 (23%)	3 (12%)	9 (17%)
	No Match	12 (46%)	14 (56%)	26 (50.9%)

A chi square test was conducted to examine the relationship between children's drawing perception and production results. The children were cross-classified according to whether they had viewed the larger figure as nice or nasty in the perception task and whether they had drawn the larger figure as nice or nasty in the production task. The contingency data are displayed in Table 3.6.

Table 3.6: *Contingency data for frequency of matching production and perception results for all children (N = 51)*

	Production task	
	Nice larger than Nasty	Nasty larger than Nice
Perception task		
Nice larger than Nasty	9	5
Nasty larger than Nice	21	16

Overall there was no significant association between the size of nice and nasty drawings and the results of the drawing perception task, χ^2 (1) = 0.44. When the chi square test was conducted specifically to examine the association between drawing production and perception results for the participants who were drawing for an audience no significant association was found, χ^2 (1) = 0.40. Nor was a significant association between perception and production results found for the reference group, χ^2 (1) = 0.69.

The odds ratio that production and perception task results would match were only 0.46 when the larger figure was identified as nasty. The odds of production and perception task results matching if children identified the larger figure as nice were 1.8. The odds ratio does however suggest that if you perceived the larger figure as nice in the perception task, production and perception results were 2.37 times more likely to match than if children had perceived the larger figure as nasty.

3.4 Discussion

The current study was designed to investigate the effect that drawing for an audience would have on the size of affectively characterised human figure drawings. It had two aims: firstly to examine the effect of an audience on the size of affectively characterized drawings and secondly in this way evaluate the predictions from APC. Whilst the means pointed towards an overall tendency to draw figures characterised as nice larger than those characterised as nasty, the difference in size between the figures was not significant. Thus not only was there no significant difference between the size of nice and nasty figures in the Audience and Reference conditions, but also there was no significant difference in size found in the participants overall. Secondly, the relationship between the perception and production results was also evaluated and it was predicted that there would be a closer similarity in the Audience condition as these children would more likely be using an APC. No significant relationship between production and perception task results was found, either overall or for the Audience condition.

It could be argued that any significant difference between the Audience and Reference conditions may have been reduced due to the presence of the researcher during the administration of the task, making them an implicit audience. However, the experimenter was the same for all the participants and thus should standardise any such audience type effects. Furthermore, the researcher was an adult and would provide an alternative audience to the explicitly defined audience of peers in the Audience condition. Indeed Burkitt et al. (2011) provided evidence that children would alter which features they displayed in a positive (*happy*) or negative (*sad*) image depending on whether they were drawing for an audience of peers or adults. However, Burkitt et al.'s (2011) findings were based on children's free drawings of happy and sad figures for these audiences.

A further consideration to be taken into account in explaining why the current study did not find any audience effects compared to previous studies (Burkitt et al. 2011) were sample differences between the studies. The difference in the educational provision that differing groups may have had could impact upon the variability of results seen across studies reported in the literature. Schooling has been shown to influence the way in which children draw, specifically in terms of an increase in conventionality in the representation of human figures between those who had and those who had not received formal education (Martlew & Connolly, 1996). Furthermore, conceptual accuracy and enhanced detail have been shown in children's drawings as a result of increased observational coaching (Vlach & Carver, 2008), further suggesting that the level of art education received can strongly impact on the way in which children draw. All the children in the literature reported here attended formal education, the majority of which was in the UK. As such it could be assumed that they would have been exposed to similar conventions in terms of how they were taught to draw. However, this may not have been the case: whilst Art and Design teaching in English schools is informed by the National Curriculum (suggesting uniformity in how art is taught), individual classroom teachers have been found to take the primary role in the development and delivery of art teaching (Burkitt, Jolley & Rose, 2010). This relative autonomy, combined with the findings that primary school teachers often receive little standardised formal training in facilitating children's artistic experiences (Burkitt, Jolley & Rose, 2010; Crace, 2003), suggest there could be variability in the way in which children are taught across schools within the same educational system, which in turn may impact upon the conventions that the children hold and how they draw. The data from the first two studies was collected from different schools that in turn had different sets of teachers. Therefore the participants could have all been exposed to a wide variety of art teaching methods.

The lack of evidence for audience effects in the current study, and also for the lack of any overall size change, may also be due to the use of a model, and to the restrictive nature of the task having suppressed children's use of their typical method of depicting a nice or nasty figure. The current study was designed to temper this possibility through the explicit use of an audience. However, these results when examined in the context of previous studies add greater weight to the concern that, due to the highly controlled nature of the experimental approach used in researching the use of size as a determiner of affect, children may not be using their usual drawing strategies. A less proscriptive method may allow children to fully express themselves (Thomas & Jolley, 1995) and potentially then be able to use any conventions, not simply size, they hold to signify differences between the two emotionally characterised figures.

The potential for the experimental conditions to have hindered the children's ability to differentiate clearly between the two figures using size is further supported by children's development of strategies to depict emotion in drawings. The use of non-literal strategies (such as size and colour) to display mood in drawings develops more slowly than literal strategies (such as smiles and frowns) (Jolley et al., 2004) and as such the children in the current sample may not have been as familiar with or comfortable with the use of a solely non-literal strategy (size) to convey meaning, although the age of children sampled (older than 7-years-old) was chosen in order to minimise this. However, despite the age of the participants, their use of the non-literal strategy of size may have been compromised as there is evidence that children do prefer the use of literal strategies for displaying mood in human figures, as opposed to non-literal strategies (Picard, Brechet & Baldy, 2007). Indeed, studies that have allowed children to draw without copying from a model have found significant evidence for size change as a result of characterisation with positive affect (Burkitt et al. 2004), as well as audience effects on how an image is drawn in terms of the features chosen to depict a topic (Burkitt et al. 2011).

The current study therefore provides further evidence that size cannot be reliably used to determine affect in children's drawings when copying from a model. Furthermore the lack of consistency of a size effect is highlighted by the trend observed in the current study being in the opposite direction to that found in the previous study (reported in Chapter 2) that utilised the same methodology where children tended to draw nasty figures larger than nice. Whilst the power of the analysis carried out was low, suggesting that a larger sample may provide a significant set of results this would further highlight the fact that the effect is a weak one if such a large number of children are needed in order to detect it.

Children in the audience condition did not differ in the size of their drawings from those in the reference group. Those in the Audience condition were expected to show a greater level of concordance between their drawing perception and production task results than those in the Reference group because of pictorial convention. There was, however, no significant relationship between drawing production and perception tasks for the Audience condition, nor was there any relationship between production and perception task performance overall. Again, similar explanations to those put forward for the lack of size change can be used for why this was not the case. The tight experimental controls may have inhibited the children's use of a pictorial convention in the drawing production task. The perception task results did however provide results that were consistent with those reported in the literature that children perceive larger figures as negative and smaller ones as positive (Chapter 2, Section 2.3; Cotterill & Thomas 1990; Galpin, 2006; Jolley, 1995). Over 70% (n = 37) of participants in the current study identified the larger figure in the perception task as nasty. This therefore suggests that children use size as a feature with which to differentiate between nice and nasty figures when interpreting others' drawings, and indeed show consensus in how size is to be interpreted when a mutually exclusive binary choice between human figure images is required. These results point towards the existence of conventions in children's drawings, at least in perception. The failure to find any such convention, in terms of size and affect in children's own drawings based on a model led to the design of the study reported in Chapters 4 and 5, which is discussed below following a brief conclusion regarding the current study.

The highly proscribed experimental setting in the studies reported in Chapters 2 and 3 may be seen as a potential cause of the suppression of the child's use of APC. Despite the benefits of such a tightly-controlled methodology the task still required the child to draw figures that were unfamiliar to them, such that their usual drawing schema for a nice or nasty person was not activated and instead they had too closely followed the model provided as a guideline. Another explanation for the lack of a significant effect is that each child could hold a typical representation of a nice and nasty person that is idiosyncratic and as such a single universal pictorial convention does not exist. The influence of the educational setting to which the children has been exposed, as briefly discussed above, is also a factor that may influence the APC a child holds and is a variable that studies examining children from a range of schools or classes must take into account. Equally it could be supposed that children do not view size alone as a core feature in detailing the characteristics of human figures and as such do not expressively use it in their drawings when the context or details are removed. However, clear evidence was again reported that supports children's use of a convention during drawing perception tasks.

The study reported in the following chapter and Chapter 5 was therefore designed to build upon the evidence supporting a perception convention by examining any potential drawing conventions. Children's drawings of figures displaying affect as well as of simple objects made in the absence of a model were examined. These drawings were analysed for any similarities shown in terms of the features used that could in turn be seen to form part of a child's conventional way of representing certain drawing topics.

Chapter 4

Feature similarity in children's free hand drawings of six emotions and three simple objects

4.1 Introduction

The perception task results reported in Chapters 2 and 3 supported previous research that has examined children's perception of human figures. Based on size alone larger figures were perceived as nasty and smaller figures perceived as nice (Cotterill & Thomas 1990; Galpin, 2006; Jolley, 1995). It can therefore be argued that children, at least in terms of perception, hold a pictorial convention for larger figures being associated with the word label nasty and smaller figures with the word label nice (Jolley, 2010). This raised the question as to why children were not displaying any such convention in their drawings. In order to evaluate the extent to which drawings made by children may share similar features (that could indicate a convention) the current study moved away from experimental investigations. Instead the focus concerned children's drawings which are made in the absence of a model (referred to in this thesis as *free drawings*) to identify whether there are similar features in different children's drawings. The use of free drawings would remove the constraints placed upon the children in the previous studies that may have inhibited their conventional way of drawings. Furthermore rather than the examination of the influence of affective labels upon children's drawings the focus in the remaining investigations of this thesis was upon the influence of more simple naming, rather than affective characterisation, upon children's drawings.

The first part of the study, reported in this chapter, was designed to investigate what general categories of features (for example *nose* or *roof*) may be consistently represented in children's free drawings (of, for example, a face or a house) and to what extent these features were similar across children (specific variations of features such as *round hollow nose* or *triangular roof*). In this way, the extent to which children may be drawing according to a convention could be evaluated in greater detail.

Free drawings of nine topics (three objects and six emotions) were collected to establish if there was any consistency across children in what they chose to display in their drawings. The overarching hypothesis was that, in line with the data available (Brechet, Baldy and Picard, 2009; Burkitt, Watling and Murray, 2011; Picard & Vinter, 2005), that there would be high level of uniformity across children in terms of what features of a given topic they typically draw and how these features are represented.

A mixture of target objects and emotions were selected. Objects were examined in order to extend the existing data regarding children's drawings of objects (houses and televisions) provided by Picard and Vinter (2005). Emotions were also examined because the results reported in Chapters 2 and 3 would indicate that, in terms of size at least, when a person to be drawn is named as nice or nasty children do not employ specific common features.

The three object drawings requested in the present research were a *house*, a *flower* and the *sun*. Previous research has established that by the age of 4- to 5-years children will have reached *behavioural mastery* in the drawing of a house and a flower (Karmiloff-Smith, 1992; Picard & Vinter, 2005; Adi-Japha, Berberich-Artzi & Libnawi, 2010). The sun was also included as it was a familiar object to the children and was not considered to constitute a difficult task. It was further judged to be an object that children would be familiar with drawing. Therefore for all three object drawings it was thought that children would be able to represent these objects in a free drawing. In order to examine the extent to which children had reached behavioural mastery of the drawing of these objects (as well as the emotions described below) two adult judges, naive to the aims of the study, were asked to identify each drawing (the three objects and six emotions). Behavioural mastery is thus interpreted in line with Willats' (2005) definition of an effective representation whereby "...something specific can be seen and recognised clearly and unambiguously" (p.14).

Similar instructions to those used by Brechet et al. (2009) were used in the current study. The six emotions examined were *happy, sad, neutral, confused, scared* and *angry.* Whilst a neutral stimulus is acknowledged as not necessarily representing an emotion it was included to provide what may be considered a baseline drawing of a face. It was decided that these emotions would provide a range of expressions that children would be familiar with. Darwin (1872) claimed that there are six basic facial expressions of emotion: *happiness, sadness, fear, anger, surprise* and *disgust* (although the universality of these expressions has been contested; see Russell and Fernández-Dols, 1997). As such children should be familiar with happy, sad, scared and angry though less familiar with confused or neutral (Cox, 2005). Indeed Skipper (2001, as reported in Cox, 2005) found that children as young as four years old could recognise the basic emotions identified by Darwin when depicted in photographs of a human face (albeit with less success for the more complex emotions of disgust, fear and surprise).

Children within the target age group (6- to 8-years) have been shown to be able to successfully depict happy and sad facial expressions, with less success reported for the depiction of *angry* and *frightened* facial expressions (Larkin, 2001, as reported in Cox, 2005). The affective state of confused was also included as there was little data in the literature regarding this emotion and it was thought that children may not have an established way of representing this emotion. Therefore examination of this emotion was exploratory. In light of the difficulty which children have been shown to have in depicting anger and fear and the ease with which they can depict happy and sad the emotions children were asked to draw in the current study were split into two categories referred to in this thesis as: *simple* and *complex* emotions. The simple emotions were *happy, sad* and *neutral*. The complex emotions were *confused, scared* and *angry*.

The depiction of basic emotions in human figure drawing in recent research has involved either graphic completion tasks, or free drawing tasks (Brechet et al., 2007; 2009; Cox, 2005; Golomb, 1992; Missaghi-Lakshman & Whissell, 1991; Picard, Brechet, & Baldy, 2007; Sayil, 2001). The completion tasks were concerned only with the facial expression of emotion (Cox, 2005; Missaghi-Lakshman & Whissell, 1991; Sayil, 2001). In free drawing tasks, children were free to depict the target emotion in a whole human figure drawing any way they wanted in response to a minimal verbal demand (e.g. *draw me a sad person*) (Brechet et al., 2007; Golomb, 1992; Picard et al., 2007). The current study utilised a mix of these methods.

Children when representing human figures displaying the emotions of happy, sad or angry have been shown to focus primarily on the facial features of these figures (Golomb, 1992; Morra, Caloni & D'Amico, 1994). Furthermore, when children have not had any constraint placed upon their free drawings of emotions they have been shown to rely upon other contextual graphic cues such as the depiction of a specific scenario to depict more complex emotions (Brechet et al. 2009). The specific aim of the present research was to examine the representation of emotions with regards to facial features. Therefore children were asked to only draw the face of a happy, sad, etc. person. It was thought that this would ensure the children focused upon specific facial details to depict affect rather than relying on contextual graphic cues.

In examining a neutral face, the current study sought to replicate the findings by Schulenburg (1999) and Brechet et al. (2009). These studies indicated that the majority of children in their samples tended to draw an up-curved mouth (*smile*) on the face of a figure that had not been emotionally characterised (a neutral characterisation). Furthermore Cox's (2005) suggestion that children will use eyebrows to a greater extent to conventionally depict more complex emotions was also tested. Therefore specific hypotheses regarding the conventional depiction of a *smile* in neutral faces and a greater use of eyebrows in complex emotion drawings than simple emotion drawings were explicitly examined in order to examine the extent to which these features may follow a convention.

Due to the exploratory nature of the current study, a limited set of hypotheses were put forward. In line with the results available in the literature (Brechet et al. 2009; Burkitt et al. 2011; Picard & Vinter, 2005) it was hypothesised that children's drawings would show a high level of similarity in terms of the general categories of the features that were drawn.

Consequently, the questions addressed in this chapter were:

1). Do children show similarity in their free drawings of emotions and objects?

2). Can a smiling face be considered a conventional way of drawing a neutrally characterised face?

3). Will children use eyebrows to a greater extent in their drawings of more complex emotions and therefore can these be considered conventional, core, features?

This chapter and Chapter 5 present findings from the same study. The study involved one session (Session 1) examining the effects of labelling on the children's drawings and a second session (Session 2) during which the children provided free drawing of a number of topics. The results of Session 1 are reported and discussed in Chapter 5. The results of Session 2 are reported and discussed in the current chapter. The methods and procedure of the whole study (Sessions 1 and 2) are reported in this chapter. For the purposes of clarity and different research aims, the remaining sections of the method pertaining to additional data collected in Session 1 will be discussed in Chapter 5.

4.2 Method

Of primary relevance to the current chapter is the procedure for the free drawing task described in Session 2 and the data analyses described for the free drawing task in Session 2.

4.2.1 Participants. Forty children (17 boys and 23 girls) aged between 6 years, 9 months and 8 years, 10 months participated in the investigation, with a mean age of 7 years, 6 months (*SD* = 8 months). The children all attended a mainstream UK primary school. None of the children had any special educational needs of which the school was aware. For Session 1 (the results of which are reported in Chapter 5) the children were split into two experimental conditions. Full details regarding the participants in each of these conditions are reported in the Method section of Chapter 5.

All children completed two test sessions separated by between 5 to 10 days in order that the images presented in Session 1, which occurred first, would be less likely to influence the free drawings that the children were asked to make in Session 2. Session 1 was also completed prior to Session 2 so as to limit the possibility that children in one of the conditions would recognise the target images.

Children were seen individually in a quiet area of their school for both sessions. The materials and procedures relevant for each session are explained in turn below. The materials used in Session 1 are explained in greater detail in Chapter 5. Of primary concern for the analyses in the current chapter are the free drawing elements of Session 2 and the adult ratings given to those free drawings.

4.2.2 Session 1

4.2.2.1 Materials. Drawings were made on A5 plain white paper, presented in portrait, using HB pencils. Nine different unfamiliar representations of emotions and objects (these were referred to as the *target images*) were drawn by the children individually on 6cm x 6cm squares of paper: a happy face, a neutral face, a sad face, a house, a flower, the sun, an angry face, a scared face and a confused face (see Figure 4.1); (Chapter 5 explains the rationale behind the design of these images). A stopwatch was used to record drawing completion times.

A Rapid Automatised Naming (RAN) task which consisted of an A4 card, presented in portrait, upon which there were 50 images of a hat, a ball, a door, a table and a box (ten of images of each) that were in arranged randomly (See Appendix C).

An Animal Stroop test was also used as a distraction task in Session 1: stimuli included black-and-white cartoon style images (cow, pig, sheep, duck) with animal heads on the wrong bodies (See Appendix D).

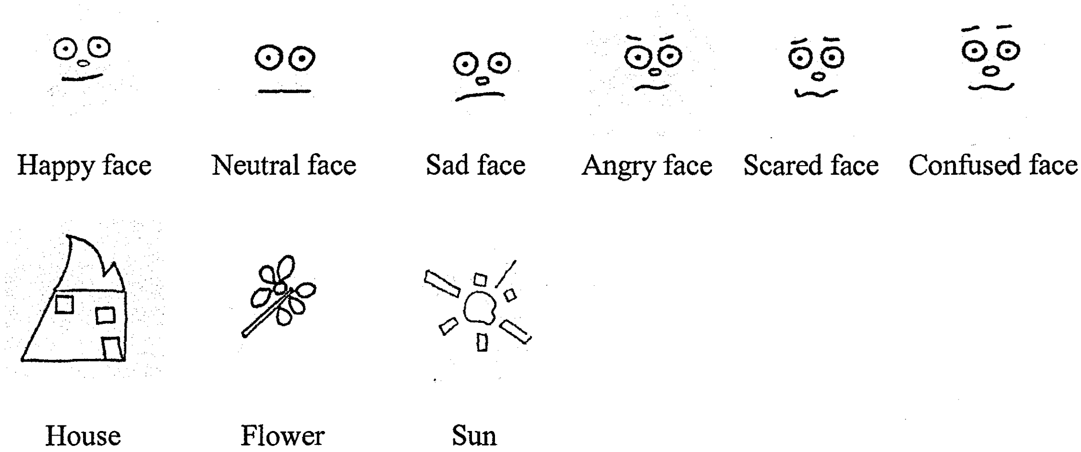


Figure 4.1: Target images used during Session 1

4.2.2.2 ***Procedure.*** During Session 1 children were shown a target image (the order in which the target images were presented was counterbalanced), then completed one of three different distraction tasks (Tasks 1, 2 and 3 described below) and were then asked to draw the target image from memory. This was repeated nine times with a different target image each time (the three objects: house, flower and sun; three faces expressing three simple emotions: happy, sad and neutral; and three faces expressing three complex emotions: angry, scared and confused).

The instructions differed for the two conditions (the rationale for the differing instructions is provided in Chapter 5). Children in the named condition were given the following instruction:

I am going to show you a picture of a [name of object or facial expression]. *I would like you to try to remember this picture of a* [name of object or facial expression] *as best you can because after we have played a quick picture game I would like you to draw this* [name of object or facial expression].

For the neutral face rather than the term *neutral* children were instead told the image represented:

A person who is neither happy nor sad. They are just ok.

The children in the unnamed condition were given the following instructions:

I am going to show you a picture. I would like you to try to remember this picture as best you can because after we have played a quick picture game I would like you to draw this picture.

Each child was then shown the first target image for two seconds before it was removed. Immediately following the presentation of the picture the child completed one of three distraction tasks presented in counterbalanced order. Thus each child completed each distraction task three separate times.

Distraction Task 1. This consisted of naming a sequence of images of a ball, a box, a hat, a table and a door based on rapid automatic naming (Fredrickson, Frith & Reason, 1997). Children were instructed to name each picture as the experimenter pointed to it. The activity lasted for one minute.

Distraction Task 2. This consisted of an Animal Stroop test (AST) based upon that developed by Wright, Waterman, Prescott & Murdoch-Eaton (2003). The AST was made up of a set of twelve cartoon images of a cow, a sheep, a duck and a pig. The heads and bodies of the animals had been mixed up so they did not match. The children were asked to identify each image according to the body of the animal rather than the head and the time taken to do this was recorded. If this time was less than one minute the initial time taken to complete the task was recorded and task was repeated until one minute had passed. All children completed the task within one minute.

Distraction Task 3. This consisted of children identifying the number of fingers being held up by the experimenter. Facing the child and holding up both hands the experimenter would rapidly alter the number of fingers (range from 1 to 10) being held up. This task was continued for one minute.

Immediately following the completion of the distraction task children were presented with an A5 piece of paper (in a portrait orientation) and pencil and invited to draw the target image shown earlier from memory. Children in the named condition were given the following instruction:

I would now like you to draw the picture of [name of object or facial expression] *that I showed you as best you can.*

Children in the unnamed condition were instructed as follows:

I would now like you to draw the picture that I showed you as best you can.

The time taken for the children to complete each drawing was recorded. Timing started as soon as the instruction had been given and stopped when the child put down their pencil. In order to limit the impact that the child's awareness of the fact they were being timed may have had upon the time they took to draw the image the stopwatch was kept out of the child's view and they were not made explicitly aware of the fact they were being timed.

All children drew all nine images. Presentation of the images was counterbalanced for all participants. Following the completion of all of the drawings the children in the unnamed condition were then shown the target images one at a time and asked what they thought the drawings represented. This was done in order to control for fact that the child may have been naming the images internally.

4.2.3 Session 2

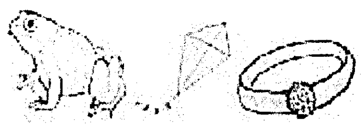
4.2.3.1 Materials. The children made drawings on A5 plain white paper, presented in a portrait orientation, with HB pencils. A picture span memory task (PST) consisting of:

(1) A practice set of four black line drawings (each on a 10 x 16cm white card – an owl, a book, a shoe and a kite) and two sets of pictures consisting of nine line drawings of objects were used in the actual test.

(2) A control set of nine pictures, whose names were similar in length and number of syllables but were neither phonologically, semantically nor visually similar (cake, drum, boot, clown, leaf, bus, frog, ring and chair).

(3) Nine line drawings of objects whose names were phonologically similar (bat, cat, hat, can, pan, van, fan, hand and ant) in that they shared the same vowel, [æ], which is regarded to be the most important factor for phonological similarity (Nimmo & Roodenrys, 2004).

For the practice trials a set of three 21 cm x 30cm response boards each containing all four pictures (differently ordered for each trial) was used for children's responses. For the memory tasks there were five 21cm x 30cm response boards, each of which corresponded to one of the two sets of visual stimuli. The response boards had a random arrangement of all nine objects in a 3 x 3 array. The drawings on the response board were changed after each trial to give a new random arrangement; this prevented participants from learning the spatial locations of the items during the picture memory span task. Figure 4.2 contains some examples of the control and phonologically similar pictures used.



Control images of a frog, kite and ring

Phonologically similar images of a pan, ant and hand

Figure 4.2: Examples of pictures in the control and phonologically similar sets of images used in the Picture Span Memory Task.

4.2.3.2 Procedure. *Free drawing task.* Children were invited to make free drawings of each of the nine objects/facial expressions in the same order in which they were presented to them in Session 1. Each drawing was completed on a separate piece of A5 paper. Children were instructed as follows:

I would like you to draw me a picture of (name of object or facial expression). *Can you draw it how you would normally draw a* (name of object or facial expression).

For the neutral emotion rather than being instructed to draw a neutral face the following specific instructions were given:

I would like you to draw me a face that is neither happy nor sad. A face that is just 'ok'.

Any queries as to what they could and could not draw we met with the same response

You can draw it however you would normally draw it.

The time taken for the children to complete each drawing was recorded without making them explicitly aware that they were being timed. Timing started as soon as the instruction had been given and stopped when the child put down their pencil.

Picture span memory task. Following the completion of the nine drawings the children then took part in a picture span memory task similar to that used by Henry (2008) though only consisting of two sets of pictures, those whose names were phonologically similar (PS) and those whose names were similar in length and number of syllables (the control set) but phonologically different. The PS set was chosen for use as the ability to code non-verbal and visual information into a phonological form is advantageous to the cognitive system as the capacity for phonological memory appears higher than the capacity for visual memory (Baddeley, 2007). Thus those who were superior phonological coders may have produced more accurate target drawings.

To determine the span length that children could successfully memorise, up to six lists of words were administered. For the youngest participants experimental trials started with a single item for each of the two sets of pictures, but lists of one were omitted for the oldest children or those whose spans were comfortably higher than two items on the first set they were presented with.

For each list length, if the child passed fewer than four trials in a row, they were deemed not to have passed that span level and testing ceased. A total of six attempts could be made for each span. If children were able to correctly remember the pictures in the correct order four times the sequence was increased by one. Each time a higher list length was introduced, children were informed about how many pictures would be shown to them next, and they were reminded each time to point to them in the correct order. Results were recorded as either correctly identified in the right order, correctly identified but in the wrong order or not correctly identified.

Children were instructed not to name items out loud during presentation of pictures in order to avoid adding overt verbal input (Hitch, Halliday, Schaafstal & Heffernan, 1991). If they were observed to do so, they were reminded again. All children completed a practice session using four pictures (an owl, book, shoe and kite) first in order to familiarise themselves with the task and the method of response. The remaining two sets of pictures were then presented in counterbalanced order. Children were shown each picture for two seconds. In their examination of the neural substrates of drawing Harrington, Farias & Davis (2009) found that a two second exposure to an image was long enough to activate the image within working memory. For all sets of pictures the following instructions were used:

Here are some pictures I want to show you [the child is then shown each picture which is named by the experimenter].

The child was then shown one of the response boards

Look at this board, it has all of the pictures on it. See?

The response board was then removed so the child could not see it. The child was then instructed as follows:

We are going to play a remembering game. I will show you some pictures. I will show you each picture, you must look at the picture without saying anything. Then I will show the board with all of the pictures on it. You have to point to the picture I showed you first, then point to the picture I showed you second and so on. Ready....

Pictures were presented in random order and a new response board was used for each trial in which the position of the pictures on the board had been changed.

4.2.4 Data analysis

As the current chapter examines the free drawings and the adults' judgements regarding them only the analysis for these data is described here. The data analysis specific to Session 1 and the PST is described in Chapter 5.

Session 2. ***Free drawings.*** A content analysis of all the nine drawings was carried out by the principal investigator. The analysis focussed specifically on the graphical features included in the drawings with a view to establishing the number of features that all children included in their drawings. An analysis was conducted in which every single feature (for example *nose* or *petals*) and specific variations of that feature (for example *round nose* or *curved petals* as opposed to *'L'-shaped nose* or *pointed petals*) for all of the children's drawings was noted by the principal investigator.

The list of features was then used to code all of the children's drawings with features recorded as either absent or present. Following this, for each of the drawings produced by the children, general categories of features were identified by the principal investigator under which the specific variations of features could be grouped:

Faces. In the emotionally characterised faces, six general categories were identified: *face*, *mouth*, *eyes*, *nose*, *hair* and *other*. Each category contained all the specific variations that had been drawn. For example in the emotionally characterised face drawings seven specific variations of face were included in the coding scheme: *no face*, *circular face*, *oval face*, *rectangular face*, *square face*, *potato-shaped face* and *incomplete circular face* as these were all of the variations of face that had been displayed in any of the drawings. Altogether 99 specific variations across all the main categories were produced in the happy, sad, neutral, angry, confused and scared face drawings. Whilst not a feature, *no face* was coded as it had relevance to the accuracy data discussed in Chapter 5.

House. Forty-nine specific variations across the five general categories of *body*, *roof*, *windows*, *door* and *other* were identified in the house drawings.

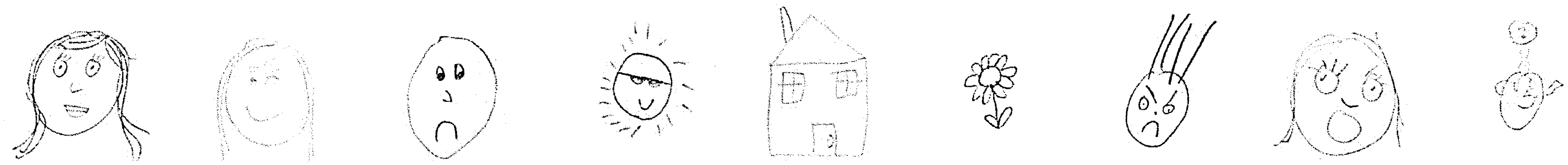
Sun. Twenty-five specific variations across the three general categories of *body*, *rays* and *other* were identified in the sun drawings.

Flower. Forty-three specific variations across the five general categories of *face*, *stem*, *petals*, *leaves* and *other* were identified in the flower drawings.

A random sample of 20% of the drawings was coded by a second rater (naive to the aims of the study). The inter-rater agreement was high, 96.2%, and Kappa coefficient for inter-rater reliability was .97, $p < .01$. Any disagreements obtained were settled by discussion so as to reach 100% agreement on the sample examined.

See Appendix E for a full list of the coded items. Figure 4.3 provides an example of how features in the children's drawings were coded. See Appendix F for further examples of the children's free drawings.

Adult judge's ratings. In order to examine the extent to which behavioural mastery of a topic had been reached (defined by the ability of a drawing to be recognised) two adult judges naive to the study were asked to write down what they thought each drawing represented. For the three object drawings the judges were not provided with any options as to what the drawing could represent, they were simply asked to identify the drawn object. The responses given by the two judges were then coded as being either *correct* (coded 1) or *incorrect* (coded 2). For the six emotion drawings the judges were presented with the children's drawings in a random order so that they did not view the same child's drawings all at once or the same sequence of emotions. Twelve of the images were also removed at random to ensure that there was not an equal amount of each emotion in the set. The judges were instructed to identify the drawing as being either a drawing of a happy, neutral, sad, angry, scared, confused or *other* face. For those identified as *other* the judge was asked to state what the other emotion was. Again the responses given by the two adult judges were then coded as being either correct (coded 1) or incorrect (coded 2).



Happy Face	Neutral Face	Sad Face	Sun	House	Flower	Angry Face	Scared Face	Confused Face
Round Face	Round Face	Round Face	Round Body	Square body	Round face	Round Face	Round Face	Round Face
Upturned mouth with central lip line	Upturned single line mouth	Down turned single line mouth	Straight line rays symmetrically around, unconnected to body	Triangular roof	Curved and shaped separate petals	Down turned single line mouth	'O' shaped mouth	Upturned single line mouth
Hollow round eyes	Solid round eyes	Hollow round eyes	Upturned mouth	Chimney	Vertical single line stem	Hollow round eyes	Hollow round eyes	Hollow round eyes
Solid round pupils – middle of eyes	Eyebrows - -	Solid round pupils - bottom of eyes	Sunglasses/glasses	Square windows (x2 ULH, URH)	Leaves on stem 2	Solid round pupils – middle of eyes	Solid round pupils – middle of eyes	No pupils
Eyelashes top	Eyelashes top	Backward 'L' shaped nose		Window panes	Leaves from base	Eyebrows\ /	Eyelashes top	'L' shaped nose
'L' shaped nose	Long hair single strands			Rectangular door in bottom centre		Round solid nose	'L' shaped nose	Thought bubble - with ?
Long hair single strands				Door knob		Hair standing on end	Long hair single strands	OTHER

Figure 4.3: Examples of the features coded in children's drawings.

4.3 Results

4.3.1 General Categories of Features. In order to examine the similarity of the features that made up children's free drawings the frequencies with which children drew the general categories of features were analysed. The numbers of children who used each of the general categories of features in the object drawings are displayed in Table 4.1 with those of the emotions displayed in Table 4.2.

Table 4.1: *The frequency of use of general categories of features in the object drawings (%) by all children (N = 40)*

	General Category of Feature									
Topic	Body	Rays	Roof	Windows (left & right)	Door	Face	Petals	Stem	Leaves	Other
Sun	40 (100)	40 (100)								14 (35)
House	40 (100)		40 (100)	38 (95)	37 (92.5)					7 (17.5)
Flower						40 (100)	39 (97.5)	38 (95)	38 (95)	10 (25)

Table 4.2: *The frequency of use of main categories of features in the emotion drawings (%) by all children (N = 40)*

	General Category of Feature					
Topic	Face	Mouth	Eyes	Nose	Hair	Other
Happy face	33 (82.5)	40 (100)	40 (100)	22 (55)	7 (17.5)	7 (17.5)
Neutral face	40 (100)	40 (100)	40 (100)	29 (72.5)	17 (42.5)	6 (15)
Sad face	36 (90)	40 (100)	40 (100)	29 (72.5)	17 (42.5)	6 (15)
Angry face	32 (80)	40 (100)	40 (100)	28 (70)	6 (15)	14 (35)
Scared face	35 (87.5)	40 (100)	40 (100)	24 (60)	9 (22.5)	11 (27.5)
Confused face	34 (85)	40 (100)	40 (100)	24 (60)	5 (12.5)	14 (35)

Objects. As shown in Table 4.1 there was a high level of consistency in terms of the general categories of features used for the objects, with a relatively small number of *other* features being included in the drawings. The lack of features in the *other* category, a category that included all those features that could not be grouped into a larger superordinate category (such as leaves for example) indicates that little additional detail was displayed in children's free drawings of the objects.

Adult judges. Behavioural mastery, as defined by the ability for the drawing to be easily recognised as unambiguously representing what was asked, was confirmed by the results gained from the adult judges. The results of the adults' judgment as to what was being depicted in the object drawings indicate that 100% of the drawings were correctly identified by both judges.

Emotions. Figure 4.4 displays the frequency (in percent) which each of the six general categories of features was represented for each of the six emotions. As Figure 4.4 illustrates, the general categories of mouth and eyes were the only general categories to be included by all of the children. Face was the next most consistently drawn general category of feature, followed by nose, hair and then *other*.

The general categories of hair and *other* resulted in the greatest difference between the simple and complex emotions. The general category of *other*, as can be seen in Appendix E, contained those features that could not be easily grouped into a single general category. The greater use of these types of details in the complex emotions, would suggest that differentiating between complex emotions required use of features outside of the general categories of features of face, mouth, nose, hair and eyes.

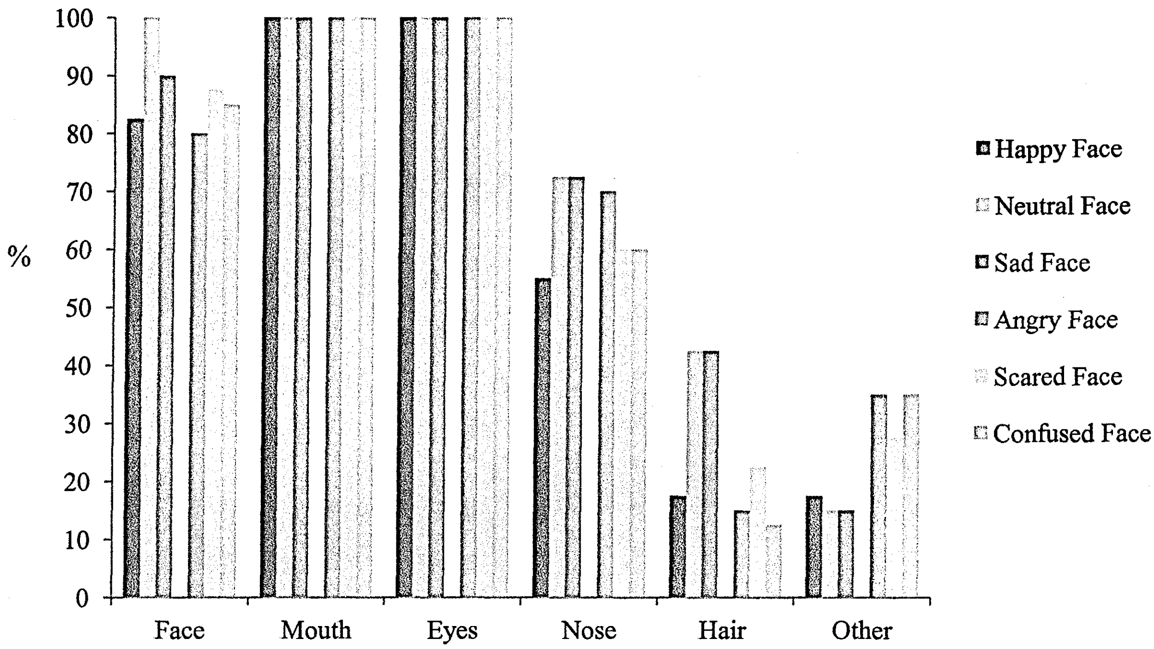


Figure 4.4: Frequency of occurrence, in percent, of the six general categories of features across all emotion drawings by all children ($N = 40$)

Adult judges. The results of the adults' identification of what emotions the drawings were depicting provided more discrepancies between the judges' responses than the object drawings. Table 4.3 shows the frequency of responses for the adults rating of all six emotion drawings. Table 4.4 displays the combined frequencies for the simple and complex emotions. Table 4.5 displays frequencies of all of the responses given by both judges for each of the emotion drawings.

Table 4.4 shows that overall the simple emotions were more successfully identified than the complex emotions by both judges. Examination of the specific emotions (Table 4.3) reveals that the happy and sad emotions were the most easily identified followed by the scared, angry, neutral and confused emotions.

Table 4.3: *Frequency (%) of Correct and Incorrect Identification of Children's Emotion Drawings*

		Happy ($N = 38$)	Neutral ($N = 39$)	Sad ($N = 37$)	Angry ($N = 38$)	Scared ($N = 37$)	Confused ($N = 39$)	Total ($N = 228$)
Judge 1	Correct	37 (97.4)	11 (28.2)	34 (91.9)	14 (36.8)	26 (70.3)	10 (25.6)	132(57.9)
	Incorrect	1 (2.6)	28 (71.8)	3 (8.1)	24 (63.2)	11 (29.7)	29 (74.4)	96 (42.1)
Judge 2	Correct	37 (97.4)	13 (33.3)	35 (94.6)	17 (44.7)	19 (51.4)	9 (23.1)	130 (57)
	Incorrect	1 (2.6)	26 (66.7)	2 (5.4)	21 (55.3)	18 (48.6)	30 (76.9)	98 (43)

Table 4.4: *Frequency (%) of correct and incorrect identification of the combined simple and complex emotions*

		Total Simple	Total Complex
Judge 1 ($N = 114$)	Correct	82 (72)	50 (43.9)
	Incorrect	32 (28)	64 (56.1)
Judge 2 ($N = 114$)	Correct	85 (75)	45 (39.5)
	Incorrect	29 (25)	69 (60.5)
Total ($N = 228$)	Correct	167 (73.3)	95 (41.7)
	Incorrect	61 (26.7)	133 (58.3)

Table 4.5: *Frequency (%) of all responses given by each adult judge for all of the emotion drawings*

		Identification given by judge					
		Happy	Neutral	Sad	Angry	Scared	Confused
Judge 1	Happy ($N = 38$)	37 (97.4)*		1 (2.6)			
	Neutral ($N = 39$)	25 (64.1)	11 (28.2)*	1 (2.6)	1 (2.6)		1 (2.6)
	Sad ($N = 37$)	1 (2.7)		34 (91.9)*		2 (5.4)	
	Angry ($N = 38$)		3 (7.9)	9 (23.7)	14 (36.8)*	12 (31.6)	
	Scared ($N = 37$)	2 (5.4)	3 (8.1)	5 (13.5)	1 (2.7)	26 (70.3)*	
	Confused ($N = 39$)	4 (10.3)	9 (23.1)	2 (5.1)	2 (5.1)	12 (30.8)	10 (25.6)*
Judge 2	Happy ($N = 38$)	37 (97.4)*		1 (2.6)			
	Neutral ($N = 39$)	22 (56.4)	12 (30.8)*		1 (2.6)	3 (7.7)	1 (2.6)
	Sad ($N = 37$)	1 (2.7)		35 (94.6)*		1 (2.7)	
	Angry ($N = 38$)		4 (10.5)	6 (15.8)	19 (50)*	6 (15.8)	3 (7.9)
	Scared ($N = 37$)		8 (21.6)	4 (10.8)	4 (10.8)	19 (51.4)*	2 (5.4)
	Confused ($N = 39$)	3 (7.7)	16 (41)	3 (7.7)	5 (12.8)	3 (7.7)	9 (23.1)*

* Indicates correct identification

4.3.2 Specific Variations of Features. In order to provide a more detailed evaluation of the similarities in the features drawn by children the specific variations of features (SVFs), *round hollow eyes* as opposed to simply *eyes*, for example, within the general categories were examined. Only those SVFs that had been included by over 50% of participants were examined. The frequencies of SVFs used by more than 50% of participants for all of the object drawings are displayed in Table 4.6 and those of the emotions displayed in Table 4.7. Included in these tables are the total number of different features used and the average number of features used for each of the topics. These data indicate the exact level of detail with which similarities in children's drawings are shown.

Furthermore all specific variations of smiling mouths (single line and hollow) were combined and all types of eyebrow were combined and added to Table 4.7. This allowed for the results reported by Schulenberg (1999) and Brechet et al. (2009) that neutrally characterised figures were depicted with a smiling face to be tested for their reliability in terms of replication. The eyebrow data allowed for Cox's (2005) hypothesis that eyebrows would be crucial to the successful depiction of emotions such as angry and frightened to be evaluated.

Objects. There was a high level of consistency in terms of the SVFs used for the object drawings. The specific variation of the general category of features in the object drawings included by all the children also showed a high level of consistency.

Sun. For the sun drawing all the children included the general category of body and rays and the percentage of children who drew the same specific variation of those features was 87.5% and 72.5% respectively.

House. For the house drawing all children included the general category of body and roof for which 97.5% and 92.5% of children drew the same specific variation of that feature.

Flower. For the flower drawing all the children included the general category of face and 80% drew the same specific variation of face.

These results suggest that the general category of features for representing these objects show little idiosyncratic variation in the specific way in which they were represented.

Emotions. Table 4.7 shows that once the specific detail of features used is examined the similarity across children's drawings is greatly reduced when compared to the general category of features used. Only two SVFs were used by over 50% of participants in the emotion drawings: round face, and hollow round eyes. This suggests that in contrast to the object drawings there is a higher level of idiosyncratic variation within the general categories of features displayed. There was also an increase in the amount of *other* features used in the complex as opposed to simple emotions.

Smiles in neutral faces. In terms of the specific hypotheses regarding the use of smiles in neutral face drawings Table 4.7 showed that in the neutral face free drawings 65% ($n = 26$) of participants drew a smiling mouth.

Use of eyebrows. With regards the use of eyebrows, for the angry face drawings 52.5% ($n = 21$) of children included eyebrows with eyebrows not used by over 50% of children for any of the other emotion drawings. Examining the use of eyebrows across all of the simple emotion drawings and the complex emotion drawings reveals that eyebrows were used in 13.3% ($n = 16, N = 120$) of the simple emotion drawings with 35% of the complex emotion drawings using eyebrows ($n = 42, N = 120$). Paired sample t-tests revealed that there was a significant difference ($p < .05$) between the frequencies of use of eyebrows between the simple as opposed to complex emotion drawings. Eyebrows were significantly more likely to be drawn on confused and angry faces than on any of the simple emotions. Eyebrows were only significantly more likely to be drawn on the scared face than the sad face.

Table 4.6: *The frequency of use of SVFs in the object drawings (%) including average and total number of different features used*

		SVFs											
		Round body	Straight line rays arranged symmetrically around body	Square body	Triangular roof	Window panes	Rectangular door, bottom centre	Door knob	Round face	Curved separate petals	Vertical single line stem	Average number of features used	Total number of different features used
Topic	Sun	35 (87.5)	29 (72.5)									2.55	25
	House			39 (97.5)	37 (92.5)	22 (55)	29 (72.5)	33 (82.5)				6.6	49
	Flower								32 (80)	22 (55)	24 (60)	4.8	43

Table 4.7: *The frequency of use of SVFs in the emotion drawings (%) including average and total number of different features used*

		Drawing Topic					
		Happy face	Neutral face	Sad face	Angry face	Scared face	Confused face
SVFs	Round face	25 (62.5)	33 (82.5)	29 (72.5)	27 (67.5)	28 (70)	25 (62.5)
	Upturned single line mouth	29 (72.5)					
	Down turned single line mouth			29 (72.5)			
	Hollow round eyes	21 (52.5)	21 (52.5)	20 (50)	20 (50)	22 (55)	21 (52.5)
	Eyebrows				21 (52.5)		
	Smile	38 (95)	26 (65)				
	Average number of features used	5.15	5.52	5.37	5.45	5.22	5.32
	Total number of different features used	44	42	43	52	51	52

4.4 Discussion

The current chapter set out to examine the extent to which children display similarities in their free drawings of three objects and six emotions. The features displayed by all children both at a general and more specific level were identified and quantified in order to examine which features were consistently used across children. The results indicated that children showed a high level of similarity in their drawings, most specifically in their drawings of objects and simple emotions.

A high level of similarity was found in terms of the general features drawn by children to represent all of the objects and emotions that were examined. This level of similarity is in line with a previous study that examined similarities in children's drawings of objects (Picard & Vinter, 2005). The degree to which free drawings showed similarities, both in terms of the general category of feature (*nose* or *roof* for example) and the specific variations of that feature (*round hollow nose* or *triangular roof* for example), across children varied depending on the topic being drawn. The objects showed the highest level of similarities followed by the simple emotions and the complex emotions showed lower levels of similarity. The results regarding the similarities in children's drawings will be discussed for the objects and then the emotions before a more general discussion of all of the results and how they may be explained.

Objects. For all three of the object drawings (house, sun, and flower) there was a high level of consistency in terms of the general category of features used, with the exception of the category of *other*, although this would be expected due to the nature of the category as it contained features that could not be easily grouped together. It therefore contained a diverse range of features (see Appendix E for a full list of details coded in this category). The low level of occurrence of features in the *other* category (< 36% across all objects) indicates that there was little individual difference between the general features used in the drawings, as the majority of details could be grouped into a more clearly defined general category of feature (*roof* or *petals* for example). The high level of consistency shown in the use of general categories of features was also seen when the SVFs were examined. For the sun 87.5% (n = 35) of children drew a round body and 72.5% (n = 29) drew straight lines symmetrically around the body; for the flower 80% ($n = 32$) drew a round face; for the house 97.5% ($n = 39$) drew a square body, and 92.5% ($n = 37$) drew a triangular roof.

These results provide clear evidence that these children's free drawings of the three objects are composed of extremely similar features. Only forty children took part in this study and as such caution must be exercised in any attempt to generalise the findings to suggest that the extent to which these similarities occur across all children. However, these results are in keeping with those of Picard and Vinter (2005), who examined free drawings of houses and televisions made by fifty-four French children. They too found that the general category of body, roof, windows and door were included by the majority (> 80%) of children in their house drawings.

The judges identified 100% of the object drawings correctly. This level of response suggests that the children had reached a level of behavioural mastery in successfully depicting these objects. There would also appear to be a relationship between the number of features that showed a high level of consistency across all children used in a drawing and the ease with which the drawing could be identified.

Emotions. Across the drawings of emotions, the frequencies of occurrence of the general categories of features showed that all children represented the eyes and a mouth, with the majority of children (≥ 80%) also including an enclosed face in their free drawings of a face depicting an emotion. None of the other three general categories of nose, hair and *other* reached a high level of consistency in terms of inclusion by all children across the emotion drawings. Cunningham and Odom (1986) also indicate that the mouth and eyes are important features related to emotions. They asked children (5- to 11-year-olds) to recall and match photographs of different facial expressions, the mouth was the region that children were found most likely to remember and evaluate, followed by the eye region, with the nose last. A high level of consistency in the use of eyes and a face was also reported by Merry and Robins (2001). They examined children's drawings of people and of 'people who could not exist'. Not one child in their study omitted the head (coded as face in the current study) or eyes in their drawings of a person that did not exist. This led Merry and Robins

(2001) to suggest that "the head and eyes may be particularly vital to children's mental models of people, and need to be included for the drawing to represent a person, even one who 'could not exist'"(p. 51). These features could thus be classified as core features in the representation of people.

None of the SVFs examined reached a high level of consistency of inclusion, although when all types of *smile* were combined (items 8 to 11 in Appendix E) this resulted in a high level of consistency in the depictions of a happy face, as a smile was included by 95% (n = 38) of children. Furthermore when all instances of *downturned mouth* were examined (items 17 to 21 in Appendix E) the use of a downturned mouth also reached a high level of consistency for a sad face, with 85% (n = 34) of children including it in their drawings of a sad face. These results support those found by Morra, Caloni and d'Amico (1994) where children focused upon the orientation of the mouth when drawing a happy and a sad person. It also suggests that a smile and frown could be considered a core feature for depicting a happy or sad face respectively. The high level of saliency of a smile and frown to happy and sad faces respectively could also explain why these two faces were the most successfully identified by the adult judges, with over 90% of happy and sad drawings correctly identified. These results also support those from studies that have previously examined children's ability to depict emotions. *Happiness* was the emotion which generated the highest success level, followed by *sadness* (Brody & Harrison, 1987; Burkitt & Barrett, 2010; Larkin (2001) as reported by Cox (2005); Widen & Russell, 2003; Wiggers & van Lieshout, 1985). This in turn suggests that children are using well-established core features that indicate the feature of a smile equates to happy and a frown equates to sad.

Indeed the close association between the feature of a smile and the emotion of happy is indicated by the adult judges' identification of neutral faces. Closer inspection of the adult judges' results showed that for both judges the most frequent incorrect identification of a neutral face was happy, with 25 of the 28 incorrect responses for Judge 1, and 22 of the 26 for Judge 2 being happy. This may be due to the high frequency of the depiction of a smile in neutral face drawings. A smile was depicted in 65% (n = 26) of children's neutral drawings. These results replicate the results of both

Schulenburg (1999) and Brechet et al. (2009) and therefore address the question raised in the introduction as to whether children will be more likely to include a smile in a neutrally characterised face. The results suggest that a smile forms a core feature for children's drawings of neutral faces and the high level of frequency of occurrence of this feature mean it can be considered to be conventional.

Again these results would suggest that there is a relationship between the frequency of occurrence of a feature across all children's drawings and the ease with which it could be identified.

However, the results indicate that children did not show high levels of similarities in the SVFs they use to represent the complex emotions. Missaghi-Lakshman and Whissell (1991) maintain that in order to depict different facial expressions children must learn conventionally understood symbols that represent these emotions. This point has been supported in examinations of emotions in drawings where certain characteristics of facial expression for depicting more complex emotions, such as anger (e.g. downturned eyebrows and creases on the face), do not usually appear in drawings until about the age of eleven (Brechet et al., 2007; Golomb, 1992; Sayil, 2001). The results reported here would suggest that the children in this study have not yet learnt the conventionally understood symbols to represent the complex emotions.

Two conventionally understood symbols proposed by Cox (2005) were eyebrows and specific representations of hairstyle. Cox (2005) suggested that these features are beginning to be established as part of children's free drawings of complex emotions (Cox, 2005). Examination of the representation of these two features in the drawings made in the current study suggests that children may be developing an understanding of their use as core features to depict complex emotions.

One question raised in the introduction was whether children would display eyebrows to a greater extent in the drawings of the complex emotions. Whilst not used by over 50% of children, there was found to be a greater use of eyebrows in children's depiction of complex (used in 35% of complex emotion drawings), as opposed to simple emotions (used in only 13.3% of simple emotion drawings). This suggests that children may be developing an understanding that these features may be used to help define more complex emotions where simple manipulation of the mouth may not be sufficient. A caveat to this exists in the depiction of the scared face. The scared faces received the highest frequency of correct identification of all the complex emotions from the two adult judges, despite the lack of a significant use of eyebrows, when compared to happy and neutral drawings. This would imply that eyebrows were not an important defining feature of this complex emotion. Indeed Sayil (1997, as reported in Cox, 2005) found that few children in her sample (6- to 8-year-olds) drew appropriate eyebrows, seeming not to pay attention to these details, and instead focused upon the mouth in order to define emotion.

In terms of the use of hair there is also an indication that children are developing an understanding of how this feature can be used to depict more complex emotions. There was a higher inclusion of hair in the scared faces (22.5% of children included it), compared to angry (15%), and confused (12.5%). Of the hair included in the scared faces, it was all displayed in the same way: as vertical lines, *hair standing on end*. This is in keeping with results found by Golomb (1992) and Skipper (2001), suggesting that hair drawn standing on end may form part of a shared symbol system to denote fear. This is an area that may require closer examination as vertical line hair, drawn with heavy pencil pressure was also seen for angry faces. However, the adult judges' results provided evidence that could support the association of vertical hair and fear, as all of the *scared* faces that included hair (standing on end) were successfully identified as scared. That this feature appears to be easily interpreted yet not used by all children may suggest that the children who took part in this study have not yet developed a representation for *scared* faces that can be successfully interpreted.

The lack of a stable, consistent form of representation for the complex emotions is also seen in the higher number of total features used in the complex emotions, as well as the higher rate of occurrence of features in the general category of *other*. The greater use of these types of details (the *other* category) in the complex emotions, would suggest that general categories of features used to differentiate between complex emotions may not have been as well established or known, and that the children each held more idiosyncratic ways of seeking to represent these emotions utilising a wide range of features. This idea is supported by Brechet et al.'s (2009) findings. They examined children's ability to depict emotion with success defined by an adult's ability to correctly identify the emotion drawn. Adults ability to identify the more complex emotions of anger, fear and disgust, was greatly reduced when contextual graphic cues other than facial features were removed from children's free drawings (Brechet et al., 2009). Thus drawings of these more complex emotions do not appear to involve the use of a core feature/s that clearly indicates the emotion being drawn, unlike the object and simple emotion drawings (except the neutral face). These received a high level of correct identifications and this would suggest that children are using features that are easily recognisable as representing those specific topics, which could be considered to be core features.

4.5 General discussion

The data indicated that children show similarities in terms of the general features they use in their drawings, with a much greater level of similarities shown in the object drawings, followed by the simple emotions with the complex emotions showing the lowest level of similarity.

The extent to which these similarities are a result of similar internal representations is not something the data from the current study can explicitly address. However, there are several possible explanations for how children's internal representations may come to show similarities. The fact that the object drawings were unequivocally recognised by the adult judges may reflect the way in which the visual system recognises objects and as such how internal representations may be formed and stored. Initial recognition in the visual system of adults is initiated through the analysis of salient generic features of an object before processing more distinctive features during the recognition of an object (Crouzet & Serre, 2011; Clarke, Taylor, Devereux, Randall & Tyler, 2012) all of which information will be continually subjected to more top-down processing. In this respect a schematic, generic, representation would provide the most effective way of representing a superordinate or basic level category of object. The ease with which the objects examined in the current chapter were recognised by adults may be a result of the fact that the children were only required to draw a generic, superordinate example of that object (they were asked to draw *a flower* as opposed to *a rose* for example); although sun is not a superordinate category, it is often included in children's drawings and is depicted by the use of a limited set of features. Thus they were only required to draw the core generic features of that object. This allowed for ease of recognition. Indeed Allen, Bloom and Hodgson (2010) found that 3- to 4-year-olds when tasked with choosing a picture that best represented an object (house or cat, for example) would select the picture that contained the most relevant information, despite this picture being less detailed and more prototypical - what they term *vague*. Thus, the internal representation for these objects may have been based upon the core features, recognised by the visual system, of these topics. Equally however children may have been exposed to a greater number of pictorial representations of these topics and thus have learnt the pictorial conventions regarding these topics, such as would be the case with the children's drawings of the sun.

The lack of consistency in the features used in the complex emotions may have been due to children being less familiar with depictions of these emotions. Children may have been exposed to fewer examples of angry, scared and confused faces and thus had fewer opportunities to learn the pictorial conventions required to depict these emotions. They therefore may have been unsure what the core generic features were, whereas it could be argued that they would have had more exposure to and more occasions to draw happy and sad faces, flowers, houses and the sun and were thus more aware of what the core features were. Equally they may lack a generic prototypical visual memory of the complex emotions as, again, they may not have been exposed to a wide variety of these emotions nor had them clearly labelled so as to be able to form a categorical representation.

What is apparent, however, is that the drawings of the objects, and to a lesser extent the simple emotions, showed a greater similarity in terms of the features drawn than the complex emotions. This in turn could be argued to reflect the internal representations for these topics being more idiosyncratic in terms of the core features that represent them.

In conclusion, the children showed more similarities in their drawings of simple objects and emotions than of more complex emotions. Indeed the lack of similarity in the use of size to depict negatively and positively characterised human figures in Chapters 2 and 3 would also suggest that children display fewer similarities for these, more complex descriptive topics. The literature reviewed in Chapter 1, Section 1.2.3, indicated that similarities in children's free drawings would be expected due to the internal models that children hold regarding topics, and the results presented in this chapter support this position. What has also been argued (see Chapter 1, Section, 1.2.3) is that the internal representation upon which a drawn topic is based will be linked to the word label used to describe that drawing topic. Consequently the next chapter will examine the influence that the use of a word label had upon the children's free drawings as well as those that are copied from a model.

Chapter 5

The influence of naming upon children's drawings copied from a series of models

5.1 Introduction

The study reported in the present chapter was designed to examine the extent to which the use of a word label may influence the way in which children draw. Chapter 1, Sections 1.2.5 and 1.2.6 outlined research concerned with the influence naming has upon children's drawings and in particular the extent to which naming may cause children to draw their internal representation of the named item rather than the specific details of the item as shown in a model.

When young children are required to draw an object from memory that is presented to them in a particular viewpoint or with features with which they are unfamiliar, they show a tendency to draw that object from a normally preferred (canonical) viewpoint with familiar core features (a handle on a mug for example), as opposed to providing an accurate representation of what they had in fact been shown (a mug with no handle visible for example) (Barrett & Light, 1976; Freeman & Janikoun, 1972; Lewis, Russell & Berridge, 1993; Toomela, 2003; Walker, Bremner, Merrick, Coates, Cooper, Lawly, Sageman & Simm, 2006; Walker, Bremner, Smart, Pitt & Apsey, 2008).

Drawing from short-term memory or even when directly copying from a model has been shown to be mediated by pre-existing internal representations (Coltheart, Inglis, Cupples, Michie, Bates & Budd, 1998; Phillips, Hobbs & Pratt, 1978; Thaiss & de Blesser, 1992; Wapner, Judd, & Gardner, 1978). Walker et al. (2006) examined the representational basis for children's object drawings and the influence that internal representations of objects have upon the way in which children draw. Their results indicated that children would include hidden parts in drawings made from a model (i.e. they would include features that were not visible from the viewpoint from which the model was presented to them).Walker et al. (2006) explain children's inclusion of these hidden features as being the result of an established category representation influencing the child's drawing. The categorical status of the drawn object is thus maintained (Walker et al., 2006). This position was also put forward by Matthews (1999) who suggested that children may be including hidden features so as to maintain the categorical status of the drawn object. When examining the inclusion of hidden details reported by Freeman and Janikoun (1979), Matthews (1999) noted that one child when drawing a mug with no handle visible mentions "...without the handle it looks like a pot. Shall I put it in to make it a cup?" (Freeman & Janikoun, 1972, p.1120; Cox, 2005). This quote illustrates Walker et al.'s (2006) argument that hidden detail inclusion is motivated by a child intending to portray the representation of the object category they hold. Thus in such cases the child is drawing according to his/her internal representation.

Walker et al. (2006) further suggested that naming was a key factor in influencing the depiction of an object that included core categorical information, and it is this suggestion that is evaluated in the current study. Walker et al. (2006) posited that the act of naming an object will cause the child to draw according to an internal categorical representation that they hold rather than a contradictory visual model that is presented to them. Indeed Walker et al. (2006) argue that "[o]nce established, a category representation appears to impact on drawing automatically" (p.755).

The extent to which a child's drawing can be seen to accurately depict all the categorical knowledge a child holds is still a matter of debate (for example, Brittain and Chien, 1983 and Cox, 1993 demonstrated that children's knowledge of the human body is more detailed than a drawing may indicate) and is not something the current research sets out to examine. What is not in doubt is that prior knowledge about an object and the naming of that object can influence how children draw (Bremner & Moore, 1984; Lewis, Russell & Berridge, 1993; Walker et. al 2006, 2008). The current chapter reports on empirical research that was designed to investigate the extent to which naming a topic to be drawn influences what a child draws. Children were shown an unfamiliar, ambiguous picture (referred to as the *target image*) and asked to draw this picture from memory. For half the children the target image was named; for the others the image was not named (*named* and *unnamed* conditions). It was expected that naming would alter the content of the children's drawings.

Walker et al. (2006) only examined children's drawings of objects (such as a mug). Therefore the current study extended the range of topics to be drawn to include emotions. Children were asked to draw a series of objects (a house, the sun and a flower) and emotions (happy, sad, neutral, angry, scared and confused). Thus the topics formed three distinct categories to be examined, objects, simple emotions (happy, sad, neutral) and complex emotions (scared, angry and confused). The choice of these specific emotions and objects was also influenced by the extent to which it was thought children could draw these topics (see Chapter 4, Section 4.1 for a more detailed justification for the selection of these topics). Walker et al. (2006) attempted to distinguish whether or not a hidden feature had been included due to the categorical representation a child held or if it was simply due to the child having previously seen the object part that was hidden from view. They did this by requiring children to draw novel objects, named with novel nouns. The focus for the current study concerned the extent to which a word label may influence the way in which children draw familiar topics. Consequently novel objects were not used and this would have not been possible for emotions. Therefore an unfamiliar representation of all nine drawing topics was developed (the target image) in place of a completely novel object.

A pilot study (described in Method below, Section 5.2.2.1) was conducted to develop the ambiguous target images for the objects used in the present study. For the target images depicting the emotions, the extent to which the images could be manipulated was less than for the objects as the images still needed to be recognisable as faces and therefore the positioning of the core facial features (eyes, mouth) was not altered from what would be expected in a typical drawing of a face.

Children were shown the target image and asked to remember it. Half of the children had the image named (named condition) and half did not (unnamed condition). They were then asked, following a brief distraction task, to draw the image from memory. These drawings are subsequently referred to as the children's *target drawings*.

One of the distraction tasks was an Animal Stroop test (AST). The benefit of using this test is that it provided an assessment of the children's ability to inhibit a response. Inhibition is a cognitive process that allows for the delay or prevention of a pre-potent response (Williams, Ponesse, Schachar, Logan & Tannock, 1999). It can be hypothesised that if, as Walker et al. (2006) state, category representations automatically impact upon drawing, children's ability to inhibit a pre-potent response, in this case the representation of the target object, will be related to their ability to accurately draw the object. Thus those children who are better able to inhibit their typical representations (measured through their AST scores) would be hypothesised to draw more accurate target drawings.

The pre-potent response that children were hypothesised to have to inhibit was their typical representation of each object. As an extension of previous research (Brechet, Baldy & Picard, 2009) children's free drawings of the topics were collected to provide an indication of their typical representations (these drawings were described in detail in Chapter 4). Brechet et al. (2009) highlighted the benefits of collecting free drawings as they provide an example of the typical representations held by the child. The free drawings also allowed for a direct comparison with the children's target drawings. It was hypothesised that children in the named condition would show a greater similarity between their free drawings and their target drawings, specifically in terms of core categorical features (Walker et al. 2006).

Finally as the drawing task required children to remember the target image and then draw it from memory children took part in a Picture Span Task (PST) (Henry, 2008). This allowed for the role that superior short-term memory may play in children's drawing accuracy to be controlled for.

The hypothesis that the use of a word label would influence the way a child draws was examined in relation to four separate measures:

(1) *The accuracy of the target drawings.* This was measured by a *composite accuracy score.* It was hypothesised that children in the named condition would be more inaccurate than those in the unnamed condition.

(2) *The number of matching features present in the children's free and target drawings* of the same object/emotion. If the drawings of children in the named condition were influenced by their typical representations of objects/emotions then they should show a greater number of matching features between free and target drawings than children in the unnamed condition.

(3) *The time taken to complete the target drawings.* If children in the named condition had to inhibit their typical representations of an object/emotion when drawing a target object then it would be expected this would result in the children taking longer to draw the objects/emotions in the named than the unnamed conditions.

(4) *Animal Stroop test (AST) score.* As children would be hypothesised to have to inhibit their typical representation for the objects and emotions those children with a higher AST score would produce more accurate target drawings.

5.2 Method

The procedure and full list of all materials used in Sessions 1 and 2 were described in Chapter 4. For Session 1 children were assigned to different experimental conditions. Therefore details regarding the number of participants in each of these conditions are provided below. Session 1, reported here, also required the development of novel stimuli and a novel accuracy scoring system (the composite accuracy score) of the children's target drawings. The method section therefore focuses upon the rationale behind the development of both of these instruments (target images used and composite accuracy score) as well as providing evidence to support the reliability of the composite accuracy score. The pilot study carried out to establish the object target images is also described.

5.2.1 Participants. Children (all of whom also took part in Session 2, reported in Chapter 4) were randomly assigned to two conditions *named* and *unnamed* based upon class lists with the constraint that approximately similar numbers of males and females were assigned to each condition. The named condition comprised 19 children (eight boys and eleven girls) with a mean age of seven years, nine months (*SD* = 6 months). The unnamed condition comprised 21 children (nine boys and twelve girls) with a mean age of seven years, four months (*SD* = 7 months). An independent samples *t*-test was carried out to examine the possibility that there was a significant difference in the ages of the named and unnamed groups. No significant difference between the ages was found, $t\ (38) = 7.99$, $p = 0.07$.

5.2.2 Materials. ***Target Images.*** The ambiguous target images were developed to conform to two criteria: (a) they displayed the topic in a sufficiently unfamiliar form so as to not be easily recognisable; (b) they also bore a close enough resemblance to a typical representation so as to optimise any interference between recall of the target image and the typical representation held by the child. Pilot work was conducted to trial various ambiguous target images so that both these criteria could be met. Furthermore, a check was carried out to ascertain whether children in the unnamed condition had labeled the ambiguous target images.

For the named condition it was thought that children would not give an alternative name to that which had been explicitly given to them by the experimenter and as such the possibility of contrary internal naming was not seen to be a realistic potential confound. Children have been shown to accept a label of an object (*house* for example) despite the fact that it may not closely resemble that object, if they felt the artist's intentions had been to draw that object (house) (Bloom & Markson, 1998; Diesendruck, Markson, & Bloom, 2003; Jaswal, 2006). As the experimenter would be explicitly naming the objects and emotions it was felt that children in the named group would accept the word label.

Target images of emotions. In the creation of the target facial expressions the primary feature that was manipulated for the happy, neutral and sad emotions was the mouth. The mouth has been shown to be the primary feature used by children to display emotion in facial expressions (Buckalew & Bell, 1985; Morra et al., 1994; Golomb, 1992; Sayil, 2001). In particular, an upwardly curved mouth being used to display *happy* and a downwardly curved mouth used to display *sad* (Golomb, 1992). Therefore for the target images of happy, neutral and sad images were created whereby the extent to which the mouth conveyed the appropriate emotion was strongly reduced. The happy face contained only a slight upturned mouth, the sad face only a slight downturned mouth and the neutral face displaying a simple straight line mouth. A horizontal straight line was used for the neutral mouth as this also differed from children's typical representations of neutral faces. Children have been found to typically display neutral faces with smiles (Brechet et al. 2009; Chapter 4; Schulenberg, 1999).

For the scared, angry and confused target images the eyebrows were the primary focus of manipulation. Successful use of eyebrows has been hypothesised to be crucial to the effective depiction of emotions such as angry and frightened (Brechet et al., 2007; Cox, 2005; Sayil, 2001). As such the inclination of the eyebrows was altered slightly across the target images of angry, scared and confused (see Figure 5.2). Children have been shown to struggle to draw the oblique lines required to depict eyebrows (Sayil, 2001); however, as the target image eyebrows are closer to the horizontal this should in fact enhance their ability to accurately draw the target images.

5.2.2.1 Pilot study for the target images of objects. A pilot study was conducted to establish unfamiliar representations of a sun, house and flower that could be used as the target images. The *pilot target images* were created by manipulating what were hypothesised to be the salient features of the objects. Several images were developed. The design of these images was motivated by a need to create an image that was ambiguous enough that children in the unnamed group would not recognise and internally name it but also bore a close enough relationship to its referent that children in the named group would accept the word label assigned to it by the experimenter. The potential to invalidate the unnamed condition was a primary concern in establishing this balance between the extent to which the target image differed from or was similar to the typical form of its referent. If it too closely resembled the typical version of the referent children may still internally name the target image despite not having it explicitly named. Browne and Wooley (2001) showed that when children were asked to name images that varied in the extent to which they looked like their referent, resemblance to similar known images was used to identify the image. The potential for children to correctly internally name the target images will be examined prior to the main results section.

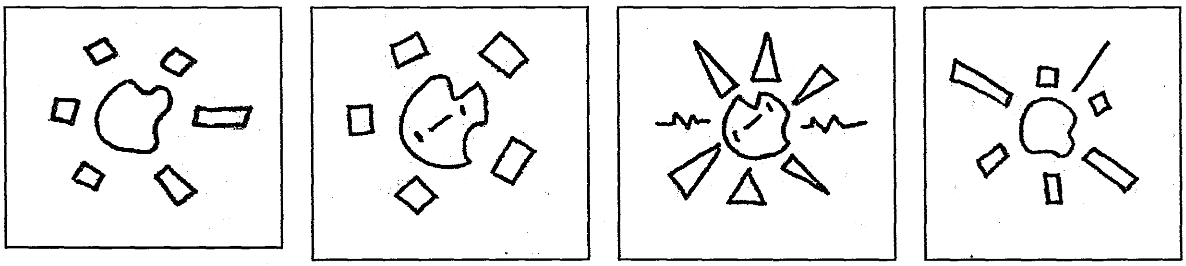
Picard and Vinter (2005) had shown that in pictures of a house children typically regard the body, roof, windows and door as salient features (demonstrated by their high rate of occurrence in children's free drawings of houses). All four features were included and manipulated to create four pilot target images for house.

For the sun, the *body* and *rays* were included and manipulated as these were thought, based on informal observation and anecdotal evidence, to be features present in typical representations (see the free drawing data in Chapter 4, Table 4.1 for confirmation of this). Four pilot target images for the sun were developed.

For the flower, *stem*, *petals* and *face* were included and manipulated, as these were thought to be features present in typical representations (again the free drawing data in Chapter 4, Table 4.1 provides confirmation of this). Three pilot target images for flower were developed. The pilot target images are displayed in Figure 5.1.

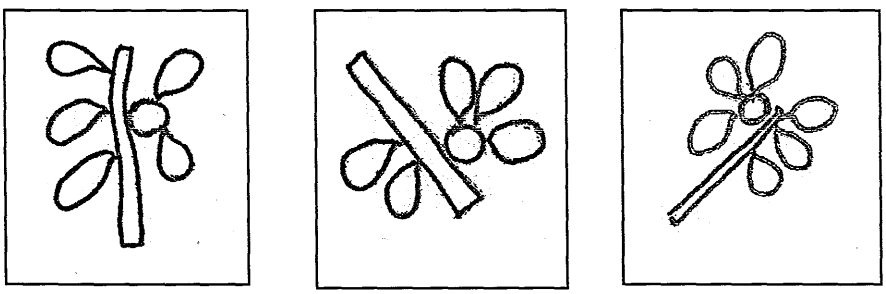
Participants and procedure. A small sample of children ($N = 11$) from within the target age group (6- to 7-years-old) consisting of five females and six males were seen individually. They were shown the pilot target images and asked for each topic (house, sun and flower) to rank them in order of how closely they resembled their referent. Children were also asked to rank the images in terms of how difficult they felt they would be to draw.

Pilot target images for the Sun



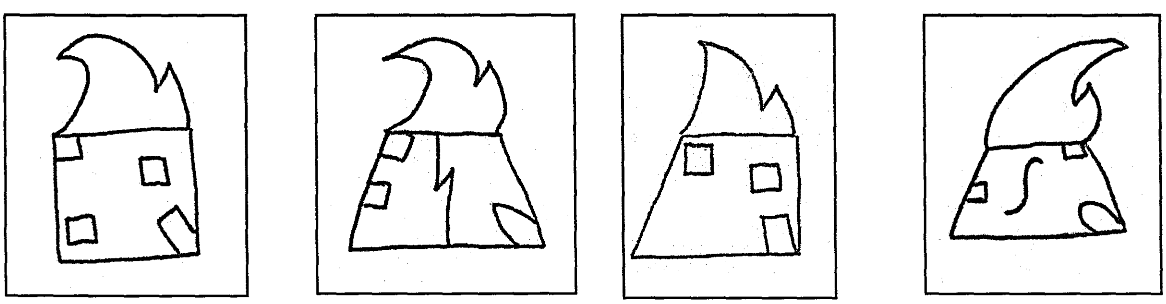
A B C D

Pilot target images for the Flower



A B C

Pilot target images for the House



A B C D

Figure 5.1: The pilot target images used in the pilot study.

Results. For the sun, Image D was chosen for use in the main study as it was ranked as bearing a close resemblance to its referent though not the closest and was also not ranked as being too difficult to draw.

For the flower, Image C was chosen as it was ranked as bearing a close resemblance to its referent though not the closest, the fact it was rated as being the most difficult to draw was thought to be relative based upon the fact it contained the greatest number of features (one more petal) of the three images.

For the house, Image C was chosen for use in the study as it was ranked as bearing a close resemblance to its referent though not the closest and was also not ranked as being too difficult to draw. The target images selected for use in the study and the target features that were identified and used to calculate the composite accuracy score (described below) are displayed in Figure 5.2.

5.2.3 Data analysis.

Content analysis. The accuracy of the children's target drawings was obtained by comparing the similarity between the features in their target drawings and those in the target images (referred to as the *target features*). The complete list of target features for each target image is displayed in Figure 5.2.

A content analysis of all the children's target drawings was made. As with the free drawings (analysed in Chapter 4) every single general category of a feature and the specific variation of that feature (target or otherwise) was noted by the principal investigator. This provided an exhaustive mutually exclusive list of all the features drawn. The absence of any of the target features was also noted as the absence of a target feature impacted upon a child's composite accuracy score (as described below). A random sample of 20% of the target drawings was coded by a second rater (naive to the aims of the study). The inter-rater agreement was high, 96.2%, and Kappa coefficient for inter-rater reliability was .97, $p < .01$. Any disagreements obtained were settled by discussion so as to reach 100% agreement for the sample examined. See Appendix E for a full list of coded features.

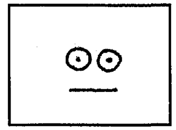
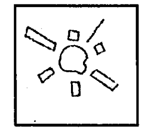
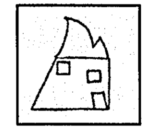
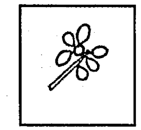
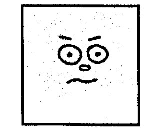
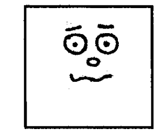
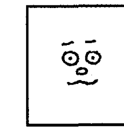
								
Happy face	**Neutral face**	**Sad face**	**Sun**	**House**	**Flower**	**Angry face**	**Scared face**	**Confused face**
Upturned single line mouth	Horizontal straight line mouth	Down turned single line mouth	Round Body with curve inward *OR* Round body with lump outward	Slanted square/rectangular body leaning right	Round 'face' off top to (LH) side	Horizontal undulating single line mouth	Horizontal undulating single line mouth	Horizontal undulating single line mouth
Hollow round eyes	Hollow round eyes	Hollow round eyes	Rays: Solid square x 2, solid rectangle (long x 2), solid rectangle (short x 2), single straight line	Two curved triangles roof	Oval shaped separate petals	Hollow round eyes	Hollow round eyes	Hollow round eyes
Solid round pupils – middle of eyes	Solid round pupils - middle of eyes	Solid round pupils – middle of eyes		Square windows x2 (1 x Upper Left Side, 1 x Centre of Right Side)	Petals coming out of 'face' and stem	Solid round pupils – middle of eyes	Solid round pupils – middle of eyes	Solid round pupils – middle of eyes
Round hollow nose		Round hollow nose		Slanted rectangular/square door on Right side	Straight stem on an angle (45°) bottom left to top right	Eyebrows \ / Round hollow nose	Eyebrows - - Round hollow nose	Eyebrows - - Round hollow nose

Figure 5.2 Target drawings with the target features listed

Measures of accuracy. In order to examine the accuracy of the target drawings the features drawn were compared with those in the target images (the target features). The quantity and quality of target features present or absent was noted and quantified. Each feature present in a target drawing was thus coded by the principal investigator as either:

(i) *accurate* (the feature was identical to that in the target image)
(ii) *inaccurate variation* (the feature differed from that in the target image)
(iii) *additional* (the feature was not present in the target image)
(iv) *missing* (a feature in the target image was not included).

The composite accuracy score for each target drawing was then calculated based upon the number of features coded into each of the above categories. The composite accuracy score is described below.

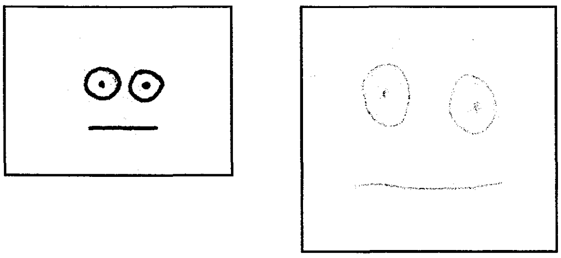
Composite accuracy score. The composite accuracy score was designed so that a score of 0 represented a perfect copy of the target image. The higher the accuracy score the less accurate the target drawing was. In order to gain a perfect score (a score of 0) a target drawing needed to contain all target features, accurately represented, with no additional non-target features.

The target drawings were initially assigned an arbitrary score of 1. The score was then reduced by the decimal expression of the percentage of correct features included. For example for the happy face (in which there were four target features) the score was reduced by 0.25 if a child only included one target feature accurately represented and by 1 if they included all four.

Scores were increased if: target features were present but were inaccurate variations (item [ii] above); additional non-target features were included in the drawing (item [iii]); or target features were missing (item [iv]). The extent to which a score was increased reflected the scale of error produced ranging from what was hypothesised as a minor error to a major error. Thus for an inaccurate variation of a target feature 0.1 was added to the child's score as this was posited as the smallest possible mistake. As adding a feature to a drawing constituted what was thought to be an important error 1 was added to the child's score when this occurred. Finally for each missing target feature, *2* was added to their score as this was arguably the largest error a child could make in seeking to replicate the target image. Figures 5.3 and 5.4 provide examples of the how composite accuracy scores were calculated. See Appendix G for further examples of the children's target drawings.

In order to examine any influence a child's typical representation had upon their target drawings (measured in terms of features from free drawings appearing in the target drawings) the accurate, inaccurate and additional features listed above were subdivided into (a) appearing only in target drawings and (b) appearing in both target and free drawings.

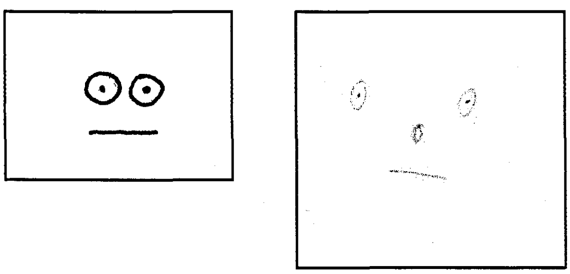
Target Face A



Face A was scored at 0

1 was removed from the initial score of 1 as all three target variables (horizontal straight line mouth, hollow round eyes, solid round pupils – centre) were coded as accurately represented. No further scores were added.

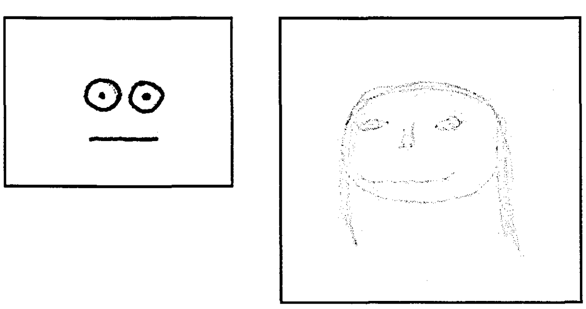
Target Face B



Face B was scored at 1

1 was removed from the initial score of 1 as all three target variables were coded as accurately represented. A score of 1 was added for the inclusion of the additional feature of a nose.

Target Face C

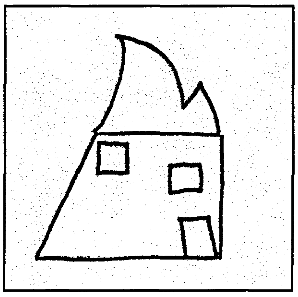


Face C was scored at 4.43

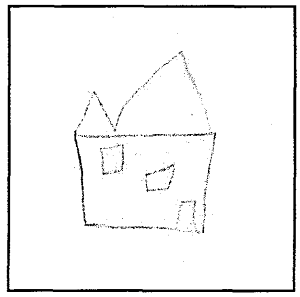
0.66 was removed from the initial score of 1 as two target variables were coded as accurately represented. A score of 0.1 was added for an inaccurate variation of a target variable (eyes). A score of 4 was added for the inclusion of four additional features (nose, face, hair and iris).

Figure 5.3: Examples of coding composite accuracy scores for target neutral face drawings

Target

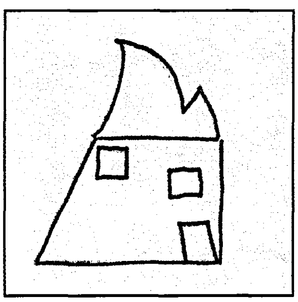


House A

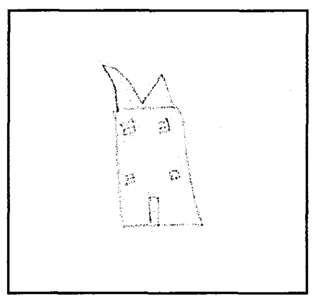


House A was scored at 0.35 0.75 was removed from the initial score of 1 as three of the four target features (roof, door and windows) were coded as accurate. A score of 0.1 was then added as the remaining feature (body) was coded as an inaccurate variation of the target feature.

Target

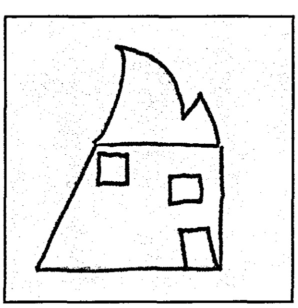


House B

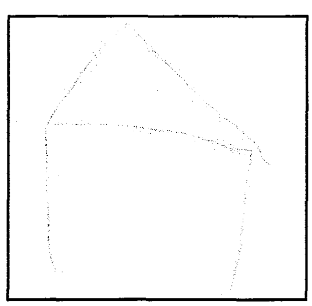


House B was scored at 3.05 0.25 was removed from the initial score of 1 as the roof was coded as accurate. 0.3 was added as the three other target features were included but coded as inaccurate variations. A score of 2 was also added as the drawing included two additional features (window panes and doorknob).

Target



House C



House C was scored at 5.20 Nothing was removed from the initial score of 1 as no target features were coded as accurately represented. A score of 0.20 was added for the inaccurate variation of the target features of roof and body. A score of 4 was then added as two target features (door and windows) were coded as missing.

Figure 5.4: Examples of coding composite accuracy scores for target house drawings

Reliability of the composite accuracy score. In order to examine the reliability of the composite accuracy score a second measure of accuracy was taken based upon adult judgments of drawing accuracy. Previous research that has examined various aspects of children's drawings, from simple identification of what a drawing depicts to the expressive content conveyed by a drawing, have utilised adults' ratings (Davis, 1997; Jolley, Cox & Barlow, 2003; Jolley, Fenn & Jones, 2004; Larkin 2001, Skipper 2001 – both reported in Cox, 2005). Thus it was thought that adult judgments would provide a valid secondary measure with which to compare the composite accuracy score. Four judges (A, B, C and D) naive to the aims of the study, were asked to rate on a Likert scale (ranging from 0 to 7 with 0 being *not at all accurate* and 7 being *very accurate*) how accurate they judged the target drawings to be when directly compared to the target images. This accuracy measure was referred to as the *Likert accuracy score*. The Likert ratings from the four judges for all of the nine drawings were strongly correlated as shown in Tables 5.1, 5.2 and 5.3. Therefore the scores from all four judges were combined to give an average Likert accuracy score for ease of statistical examination of the relationship between the Likert and composite accuracy scores.

A bivariate correlation was then carried out to examine the relationship between the composite and Likert accuracy scores for each of the nine target drawings. The two scores were strongly related for happy, r (40) = -.84, $p < .01$; neutral, r (40) = -.75, $p < .01$; sad, r (40) = -.74, $p < .01$; house, r (40) = -.47, $p < .01$; angry, r (40) = -.70, $p < .01$; scared, r (40) = -.68, $p < .01$ and confused, r (40) = -.69, $p < .01$. There was a weak relationship between the scores for both the sun, r (40) = -.27, $p > .05$ and flower, r (40) = -.01, $p > .05$.

In order to further examine the strength of this correlation a simple linear regression analysis was conducted to explore the ability of the Likert score to predict the composite accuracy score. Linear regression analysis revealed that the Likert accuracy score significantly predicted the composite accuracy score for happy, b = -.77, t (40) = -9.45, $p < .001$; neutral, b = -.53, t (40) = -7.02, $p < .001$; sad, b = -.86, t (40) = -6.80, $p < .001$; house, b = -.42, t (40) = -3.27, $p < .005$; angry, b = -.89, t (40) = -6.01, $p < .001$; scared, b = -.69, t (40) = -5.79, $p < .001$ and confused, b = -.73, t (40) = -

5.91, p <.001. The Likert scores did not significantly predict the composite numerical accuracy score for flower, $b = -.01$, $t\,(40) = -.08$, $p > .05$ and sun, $b = -.09$, $t\,(40) = -1.74$, $p > .05$.

The strong relationship revealed by the bivariate correlation and subsequently supported by the linear regression analysis provided support for the reliability of composite accuracy score. It was thus used as the primary measure of accuracy in the analyses discussed below as it allowed for a more detailed examination of the specific areas of accuracy and inaccuracy observed in the target drawings.

Table 5.1: *Bivariate correlations for Likert ratings from four judges for the simple emotions*

		Judge A			Judge B			Judge C			Judge D		
		Happy Face	Neutral Face	Sad Face	Happy Face	Neutral Face	Sad Face	Happy Face	Neutral Face	Sad Face	Happy Face	Neutral Face	Sad Face
Judge A	Happy Face				0.839**			0.833**			0.802**		
	Neutral Face					0.868**			0.792**			0.755**	
	Sad Face						0.672**			0.588**			0.577**
Judge B	Happy Face	0.839**						0.902**			0.864**		
	Neutral Face		0.868**						0.818**			0.814**	
	Sad Face			0.672**						0.799**			0.788**
Judge C	Happy Face	0.833**			0.902**						0.833**		
	Neutral Face		0.792**			0.818**						0.901**	
	Sad Face			0.588**			0.799**						0.745**
Judge D	Happy Face	0.802**			0.864**			0.833**					
	Neutral Face		0.755**			0.814**			0.901**				
	Sad Face			0.577**			0.788**			0.745**			

Note: Correlations marked with two asterisks (**) were significant at $p < .01$.

Table 5.2: *Bivariate correlations for Likert ratings from four judges for the objects*

		Judge A			Judge B			Judge C			Judge D		
		Sun	House	Flower	Sun	House	Flower	Sun	House	Flower	Sun	House	Flower
Judge A	Sun				0.657**			0.481**			0.383*		
	House					0.732**			0.670**			0.674**	
	Flower						0.728**			0.714**			0.757**
Judge B	Sun	0.657**						0.500**			0.503**		
	House		0.732**						0.841**			0.797**	
	Flower			0.728**						0.745**			0.702**
Judge C	Sun	0.481**			0.500**						0.457**		
	House		0.670**			0.841**						0.798**	
	Flower			0.714**			0.745**						0.760**
Judge D	Sun	0.383*			0.503**			0.457**					
	House		0.674**			0.797**			0.798**				
	Flower			0.757**			0.702**			0.760**			

Note: Correlations marked with two asterisks (**) were significant at $p < .01$. Correlations marked with one asterisk (*) were significant at $p < .05$

Table 5.3: *Bivariate correlations for Likert ratings from four judges for the complex emotions*

		Judge A			Judge B			Judge C			Judge D		
		Angry	Scared	Confused	Angry	Scared	Confused	Angry	Scared	Confused	Angry	Scared	Confused
Judge A	Angry				0.613**			0.686**			0.551**		
	Scared					0.514**			0.479**			0.521**	
	Confused						0.766**			0.590**			0.610**
Judge B	Angry	0.613**						0.914**			0.729**		
	Scared		0.514**						0.787**			0.777**	
	Confused			0.766**						0.748**			0.754**
Judge C	Angry	0.686**			0.914**						0.770**		
	Scared		0.479**			0.787**						0.711**	
	Confused			0.590**			0.748**						0.535**
Judge D	Angry	0.551**			0.729**			0.770**					
	Scared		0.521**			0.777**			0.711**				
	Confused			0.610**			0.754**			0.535**			

Note: Correlations marked with two asterisks (**) were significant at $p < .01$.

5.3 Results

5.3.1 Validity of the unnamed condition. Following children's completion of the two test sessions (the first of which was described in Chapter 4) all of the participants in the unnamed condition were asked to identify what they thought the target image shown to them had represented. This was done to examine the possibility that, despite not having the images explicitly named for them, the children in the unnamed condition may have been internally naming the images correctly. Such internal naming would have compromised the integrity of the unnamed condition. The frequency and percentage of correct identifications are displayed in Table 5.4.

The results show that the majority of the children did correctly identify the target image for all topics except that of the confused face. Whilst these results do not confirm that children were in fact internally naming the images at the point of presentation, it must be taken into consideration that the validity of the unnamed condition may have been compromised.

In order to control for the possibility that children were internally naming the images, the named and unnamed groups were reclassified. Children in the unnamed condition who had correctly identified the images were reassigned to the named condition. This regrouping (referred to as the *recoded groups*) provided a disproportionate split between the two conditions that limited the statistical power of subsequent analyses. Therefore the recoded groups were only used to examine the first two measures of the impact of naming, in which any internal naming would provide the biggest confounding effect: (1) that children in the unnamed condition would draw more accurate target images and; (2) the children in the named condition would have more features common to their target and free drawings than those in the unnamed condition. Thus analyses regarding these two hypotheses will be conducted using both the original named and unnamed condition groupings and then the recoded groups. Should the results differ it would emphasise the caution required regarding any effect that naming may have had upon accuracy.

Table 5.4: *Correct identification (%) of the target images by the children in the unnamed condition (n = 19)*

		Target Image								
		Happy	Neutral	Sad	Sun	House	Flower	Angry	Scared	Confused
Correctly identified	Yes	12 (63.2)	12 (63.2)	15 (78.9)	10 (52.6)	19 (100)	16 (84.2)	5 (26.3)	3 (15.8)	0 (0)
	No	7 (36.8)	7 (36.8)	4 (21.1)	9 (47.4)	0 (0)	3 (15.8)	14 (73.7)	16 (84.2)	19 (100)

5.3.2 Differences between conditions in Picture Span Task (PST) performance. The scores in the PST (in terms of longest span reached) were analysed in order to examine the possibility that there were differences between conditions in short term memory (named and unnamed).

The PST scores for both the Control group of pictures and those that were Phonologically Similar (PS) were submitted to a 2 (Condition) x 2 (Picture Type) mixed design ANOVA with Picture Type (Control and PS) entered as the repeated measure and Condition (named or unnamed) entered as the between-subjects factor. No main effect for Condition was observed, F (1, 38) = 3.03, $p > .05$, $\eta^2 = .07$, $P = .40$. A significant main effect of Picture Type was found, F (1, 38) = 87.45, $p < .01$, $\eta^2 = .70$, $P = 1.00$. The control images resulted in significantly longer spans ($p < .001$) than the PS images. This indicates that both conditions of named and unnamed had similar PST abilities. There was no significant interaction effect of Condition on Picture Type, F (1, 38) = 1.03, $p > .05$, $\eta^2 = .03$, $P = .17$.

5.3.3 Accuracy of target drawings. The mean composite accuracy scores for each condition (named and unnamed with no reassignment of participants) are displayed in Table 5.6. On average, children in the named condition drew more accurate target drawings of the neutral, sad and angry faces as well as the flower. The children in the unnamed condition drew more accurate happy, scared and confused faces as well as the house and sun.

The accuracy measurements were submitted to a 2 (Condition) x 9 (Drawing Topic) mixed design ANOVA with Drawing Topic (happy face, neutral face, sad face, house, sun, flower, angry face, scared face and confused face) entered as the repeated measure and Condition (named and unnamed) as the between-subjects measure. Mauchly's Test of Sphericity indicated that the assumption of sphericity had been violated, χ^2 (35) = 79.395, $p < .0005$, and, therefore, a Greenhouse-Geisser correction was used. No significant main effects for Condition (named or unnamed) was found, F (1, 38) = 0.203, $p > .05$, $\eta^2 = .005$, $P = .072$. A main effect for Drawing Topic was found, F (5.29, 200.95) = 15.35 $p < .01$, $\eta^2 = .29$, $P = 1.00$. Pairwise comparisons revealed that the target drawing of the flower was drawn significantly ($p < .001$) less accurately than any of the other target drawings. There was no significant interaction effect of Condition on Drawing Topic, F (5.29, 200.95) = .344 $p > .05$, $\eta^2 = .009$, $P = .14$.

To examine whether the three general drawing topics of objects (house, sun, face), simple emotions (happy, sad, neutral) and complex emotions (angry, scared, confused) would display different levels of accuracy, the mean composite accuracy scores for these three general drawing topics was calculated. These scores were then submitted to a 2 (Condition) x 3 (General Drawing Topic) mixed design ANOVA with General Drawing Topic (objects, simple emotions and complex emotions) entered as the repeated measure and Condition as the between-subjects measure. No significant main effect for Condition (named or unnamed) was found, F (1, 38) = 0.203, $p > .05$ $\eta^2 = .005$, $P = .072$. A main effect for General Drawing Topic was found, F (2, 76) = 11.77 $p < .01$, $\eta^2 = .24$, $P = .99$. Pairwise comparisons revealed that the object target drawings were drawn significantly ($p < .001$) less accurately than either the simple or complex emotion target drawings. There was no significant interaction effect of Condition on General Drawing Topic, F (2, 76) = .41 $p > .05$, $\eta^2 = .011$, $P = .12$. The means are displayed in Table 5.6.

Recoded named and unnamed groups. As the recoded groups were different for each of the drawings topics (i.e. some children had correctly named the happy face but not the sun for example) a one-way ANOVA was conducted on the composite accuracy scores of target drawings for all the images except the confused face (as the groups remained the same) and house (as the unnamed condition did not contain any participants). There was no significant effect of group upon composite accuracy score for happy, $F(1, 39) = .071, p > .05, \omega = .15$, neutral, $F(1, 39) = .003, p > .05, \omega = .16$, sad, $F(1, 39) = .26, p > .05, \omega = .14$, sun, $F(1, 39) = .001, p > .05, \omega = .16$, flower, $F(1, 39) = 1.65,\ p > .05, \omega = .13$, angry, $F(1, 39) = .01, p > .05, \omega = .16$ or scared, $F(1, 39) = 2.37, p > .05, \omega = .18$. These results do not differ from those gained using the original grouping criteria.

Table 5.6: *Total accuracy for both conditions (SD) across all drawing topics - the lower the score the more accurate the drawing*

Condition	Happy Face	Neutral Face	Sad Face	Total Simple Emotions	Sun	House	Flower	Total Objects	Angry Face	Scared Face	Confused Face	Total Complex emotions
Named ($n = 19$)	1.80 (0.89)	1.22 (0.31)	1.38 (0.72)	1.47 (1.14)	1.15 (0.39)	1.92 (1.26)	3.76 (1.52)	2.27 (0.80)	1.48 (2.04)	1.61 (1.55)	1.65 (1.79)	1.58 (1.50)
Unnamed ($n = 21$)	1.61 (1.49)	1.31 (1.23)	1.51 (1.74)	1.48 (1.11)	1.13 (0.36)	1.75 (1.42)	3.77 (1.80)	2.22 (0.95)	1.51 (1.69)	1.08 (1.08)	1.22 (1.35)	1.26 (1.07)
Total ($N = 40$)	1.71 (1.70)	1.26 (1.26)	1.45 (1.71)	1.47 (1.11)	1.14 (0.37)	1.84 (1.32)	3.76 (0.64)	2.25 (0.86)	1.49 (1.86)	1.34 (1.37)	1.45 (1.59)	1.43 (1.31)

5.3.4 Features in both target and free drawings. In order to examine whether naming affected the accuracy of children's target drawings, the percentage of features drawn that were present in both the free and target drawings was examined. The percentages are displayed in Table 5.7. On average children in the named condition had a higher percentage of features appearing in both drawings for the neutral and confused faces as well as the house, sun and flower. The children in the unnamed condition had a higher percentage appearing in both for the happy, sad, scared and angry faces.

The percentage of features that appeared in both the target and free drawings were submitted to a 2 (Condition) x 9 (Drawing Topic) mixed design ANOVA with Drawing Topic (happy face, neutral face, sad face, house, sun, flower, angry face, scared face and confused face) entered as the repeated measure and Condition (named or unnamed) as the between-subjects measure. Mauchly's Test of Sphericity indicated that the assumption of sphericity had been violated, χ^2 (35) = 98.41, $p < .0005$, therefore, a Greenhouse-Geisser correction was used. No significant main effect for Condition were found, F (1, 38) = .304 p >.05, η^2 = .008, P = .084. A main effect for drawing topic was found, F (4.72, 179.35) = 6.23 $p < .01$, η^2 = .14, P = .99. Pairwise comparisons revealed that the drawing of the sun had a significantly ($p < .001$) lower percentage of features appearing in both the target and free drawings than the house, happy, sad and angry faces, with the happy face having a significantly ($p < .001$) higher percentage of features appearing in both sets of drawings than the flower, neutral and angry faces. There was no significant interaction effect of Condition on Drawing Topic, F (4.72, 179.35) = 1.99 $p > .05$, η^2 = .05, P = .64.

Recoded Named and Unnamed groups. A one-way ANOVA was conducted on the percentage of features that appeared in both the target and free drawings for all the images except the confused face (as the groups remained the same) and house (as the unnamed condition did not contain any participants). There was no significant effect of condition (named or unnamed) upon number of features in both target and free drawings for happy, F (1, 39) = 1.81, $p > .05$, ω = .15, neutral, F (1, 39) = 1.45, $p > .05$, ω = .11, sad, F (1, 39) = .75, $p > .05$, ω = .08, sun, F (1, 39) = .17, $p > .05$, ω = .15, flower, F (1, 39) = 3.79, $p > .05$, ω = .26, angry, F (1, 39) = .001, $p > .05$, ω = .16 or scared, F

(1, 39) = .017, $p > .05$, $\omega = .16$. These results do not differ from those found using the original grouping criteria.

5.3.5 Time taken to complete drawings. The analysis of time taken to complete the drawings was carried out on the original groupings in order to examine the hypothesis that children in the named condition would take longer to complete their target drawings than those in the unnamed condition. The time taken in seconds to complete the target and free drawings are displayed in Table 5.8. On average, children in the named condition took longer to complete their target drawings than the children in the unnamed condition for all of the images.

A 2 (Condition) x 9 (Drawing Topic) mixed design ANOVA was carried out with Drawing Topic (happy face, neutral face, sad face, house, sun, flower, angry face, scared face, confused face) entered as the repeated measure and Condition (named or unnamed) as the between-subjects measure for the target drawing times. Mauchly's Test of Sphericity indicated that the assumption of sphericity had been violated, χ^2 (39) = 203.46, $p < .0005$, therefore, a Greenhouse-Geisser correction was used. No main effect for Condition was observed, F (1, 38) = 1.89 $p > .05$, η^2 =.05, $P = .27$. There was no significant interaction effect of Condition and Drawing Topic, F (3.31, 119.04) = .85, $p >.05$, $\eta^2 = .02$, $P = .24$. A significant main effect of drawing topic was found, F (3.31, 119.04) = 12.86 $p < .01$, $\eta^2 = .26$, $P = 1.00$. Contrasts showed that for the target drawings children took significantly longer to draw the sun ($p < .01$) than any of the other drawings except the house. They took significantly longer ($p < .05$) to draw the house than any of the six emotions. Children took significantly longer ($p < .05$) to draw the flower than any of the emotions with the exception of the scared face. Children also took significantly longer ($p < .05$) to draw the scared, confused and angry faces than the neutral face.

Children in the named condition also took longer to complete their free drawings (although not to a level of statistical significance), raising the possibility that they were simply slower drawers overall. In order to examine the possibility that this may have been due to a greater number of features being drawn by those in the named condition a 2 (Condition) x 9 (Drawing Topic) mixed design ANOVA with number of free drawing features for each Drawing Topic (happy face, neutral face, sad face, house, sun, flower, angry face, scared face, confused face) entered as the repeated measure and Condition (named or unnamed) as the between-subjects measure for the free drawing times was conducted. However, there was no main effect for Condition, F (1, 38) = .12 p > .05, η^2 =.003, P =.06. There was a significant main effect for topic, F (5.38, 204.58) = 77.35 p < .05, η^2 = .67, P = 1.00. *Post-hoc* Bonferroni adjusted pairwise comparisons showed that drawings of the sun had significantly (p < .05) fewer features than any of the other drawing topics. All of the complex emotion drawings had significantly (p < .05) more features than any of the other drawing topics and the neutral face had significantly (p < .05) fewer features than the house drawing. There was no significant interaction effect of Condition on Drawing Topic, F (5.38, 204.58) = .60 p > .05, η^2 = .02, P = .22.

5.3.6 The Animal Stroop test (AST). The relationship between time taken to complete the AST and composite accuracy scores in target drawings was examined in order to investigate the hypothesis that, regardless of condition, the better a child was at the AST task the more accurate their target drawings would be. The composite accuracy scores for all nine target drawings were combined to give a total target drawing composite accuracy score for each child. A bivariate correlation revealed that time taken to complete the AST was significantly related to overall drawing accuracy across both named and unnamed conditions, r (40) = .36, p < .05. This positive correlation indicated that the greater the time taken to complete the AST the higher the composite accuracy score was (i.e. the less accurate the drawings). Furthermore a simple regression showed that time taken on the AST significantly predicted total accuracy scores, b = .06, t (39) = 2.29, p < .05.

Table 5.7: *Percentage of total features (SD) that appeared in both target and free drawings*

Condition	Happy Face	Neutral Face	Sad Face	Sun	House	Flower	Angry Face	Scared Face	Confused Face
Named	42.66	33.53	30.87	13.89	45.86	28.97	22.70	28.12	27.30
(*n* =21)	(34.81)	(32.01)	(24.14)	(19.42)	(37.47)	(33.29)	(21.22)	(23.10)	(27.03)
Unnamed	49.56	24.56	38.59	13.16	27.02	9.66	31.40	28.95	26.05
(*n* = 19)	(32.14)	(29.72)	(37.50)	(18.70)	(24.98)	(18.48)	(20.76)	(25.85)	(24.30)
Total	45.94	29.27	34.54	13.54	36.91	19.79	26.83	28.51	26.71
(*N* = 40)	(33.32)	(30.89)	(31.03)	(18.84)	(33.15)	(28.66)	(21.20)	(24.13)	(25.45)

Table 5.8: *Time taken to complete the target and free drawings in seconds (SD)*

	Condition	Happy Face	Neutral Face	Sad Face	Sun	House	Flower	Angry Face	Scared Face	Confused Face
Target Drawings	Named ($n = 21$)	22.63 (27.44)	13.49 (9.18)	15.38 (10.18)	33.26 (14.57)	33.85 (32.72)	26.90 (25.76)	20.44 (17.00)	18.30 (12.01)	15.05 (6.00)
	Unnamed ($n = 19$)	12.62 (5.49)	10.15 (3.81)	11.91 (5.61)	33.20 (15.39)	23.42 (10.45)	19.96 (10.29)	16.81 (7.64)	16.00 (8.00)	13.83 (4.77)
Free Drawings	Named ($n = 21$)	33.31 (49.56)	35.95 (64.91)	32.33 (47.56)	31.07 (31.13)	40.57 (38.39)	45.66 (92.19)	35.28 (46.04)	36.29 (46.79)	36.76 (42.86)
	Unnamed ($n = 19$)	22.46 (27.49)	24.00 (17.56)	18.61 (12.02)	24.13 (16.83)	35.78 (25.39)	25.00 (9.39)	26.31 (15.15)	25.16 (19.41)	27.34 (14.44)

5.4 Discussion

The current study sought to examine the hypothesis that naming a target image will have an effect on children's drawings. Children were instructed to remember and then draw an ambiguous target image from memory as accurately as they could. Children were assigned to one of two conditions: named, in which the word label for the image (*house* for example) was provided at the time of presentation and recall of the target image, and unnamed in which the word label was not used to describe the target image. It was hypothesised that for children in the named condition the word label would trigger their typical representation (the use of the term typical representation here refers to how the child would usually draw a topic in the absence of any specific task demands) and that this would impact upon their ability to draw the target image accurately. This hypothesis will be discussed in relation to the four separate measures used to examine it:

(1) The accuracy of the target drawings, as measured through the composite accuracy score

(2) The number of similar features present in both the free and target drawings

(3) The time taken to complete the target drawings

(4) The relationship between composite accuracy and AST scores

Prior to the analyses of these measures three factors needed to be addressed: the reliability of the novel composite accuracy score developed specifically for this study; the validity of the unnamed condition; and the potential confound of short-term memory ability.

The composite accuracy score was developed so as to provide a detailed measure of the accuracy of each individual feature drawn as well as the overall accuracy of the target drawings. Overall it appeared that the composite accuracy score provided a reliable measure with which to analyse the drawings, and these provided a more detailed measure of accuracy than the Likert accuracy score based on the adults' ratings.

Internal naming of the target images by the children in the unnamed condition would have invalidated the results. The majority of children in the unnamed condition provided the correct name for the target images when asked. This suggested that they could have been internally naming the images at the time of presentation and recall. Children who had correctly identified the target images were subsequently placed into the named condition group. This allowed for the results of both the original groupings and these recoded groupings to be analysed.

The PST results were analysed in order to seek to control for the fact that better short term memory would result in greater accuracy in recall of the target images. No significant difference between named and unnamed conditions was found, therefore removing the possibility that any differences in accuracy between conditions would have been due to participants' short-term memory ability.

(1) Accuracy of target drawings. A content analysis was carried out on the children's target drawings in order to assess the levels of accuracy in terms of how closely the drawings resembled the target images. From the extensive inspection and coding of the drawings a composite accuracy score was created to provide an overall measure of accuracy. There was found to be no significant difference between the overall accuracy of the target drawings made by children in the named and unnamed conditions. The results from this measure therefore do not support the hypothesis that naming triggers a typical image that then attenuates the ability to accurately draw the target image, which would result in a less accurate target drawing.

One reason why no effect was observed between conditions may have been due to the fact that labelling in the unnamed condition had not been adequately suppressed because the drawings were not sufficiently ambiguous. The majority of the children (at least over 50%, $N = 19$) were able to correctly identify all the target images except for the complex emotions and therefore could be regarded as equivalent to being in the named condition. These children were reassigned to the named condition and the analyses rerun, but no significant group differences in accuracy were found indicating that the recoded groups still showed no difference between named and unnamed conditions.

Regardless of the condition (named or unnamed) however when the accuracy scores for the three drawing topics (objects, simple and complex emotions) were combined and analysed the object drawings were found to be significantly less accurate than the simple or complex emotions. The composite accuracy score may not have provided an entirely suitable measure of the more subtle measures of inaccuracy shown in children's target drawings.

(2) The number of similar features present in both the free and target drawings. It was hypothesised that, as naming would trigger the child's typical representation, the target drawings by children in the named group would contain a greater number of features from the free drawings than those made by children in the unnamed condition.

No significant difference between the conditions was observed. This suggests that the children in the named condition were not influenced to any greater extent than those in the unnamed condition by the typical representations that they held. It is interesting to note however that the drawings of a house and a flower, two objects that have been shown to have a well-established typical representation (Adi-Japha, Berberich-Artzi & Libnawi, 2010; Chapter 4; Karmiloff-Smith, 1992; Picard & Vinter, 2005), displayed the most notable concordance in terms of features in both the target and free drawings and the greatest difference in this measure between named and unnamed conditions. For children in the named condition 45.9% of features in the target house drawings also appeared in the free drawings, as opposed to only 27.% for the unnamed condition. The results for the named condition flower drawings showed that 29% of features were in both target and free drawings as opposed to just 9.7% for the unnamed condition. This would suggest that, although not significant, there may have been more interference from the typical representation when remembering the target images for these objects.

(3) The time taken to complete the target drawings. It was hypothesised that children in the named condition would take longer to produce their target drawings than those in the unnamed condition as they would have to work against (inhibit) the typical image that the word label would have activated. No significant difference between conditions was found. However, all children took significantly longer to draw the pictures of the target house and sun than any of the other images, with the target flower taking significantly longer than all of the emotions with the exception of the scared face. This again could indicate an increased difficulty that children may be experiencing in drawing these target images, as a stronger influence of more well-established typical representations for these objects may have been more difficult to inhibit.

The number of features contained within the images, and the difficulty which they posed in terms of drawing, must also be considered a factor in accounting for the time taken to complete the drawings. The faces contained shapes that the children would be much more familiar with and used to drawing. Thus they could reproduce them more quickly than some of the shapes of the features in the object drawings (offset square, oblique and diagonal lines etc. as opposed to circles and horizontal, parallel lines).

It was also observed that the children in the named condition were slower in their free drawings than those in the unnamed condition. To exclude the possibility that this was due to the children in the named condition drawing more features, and therefore were potentially *better* drawers than those in the unnamed condition, the number of features drawn by children in each condition was analysed. No significant difference was found, thus suggesting that the level of drawing ability did not impact on the results.

(4) The relationship between composite accuracy and AST scores. The AST was conducted as a distraction task. It was chosen so as to provide a measure of children's ability to inhibit a pre-potent response (which was, in the target drawing task, hypothesised to be their typical representation). It was therefore hypothesised that children who successfully completed the AST in the quickest times would draw more accurate target drawings as they would have a greater ability to inhibit their typical representation. There was a significant correlation between accuracy and AST scores, with regression analysis showing that the AST time was a significant predictor of accuracy in children's target drawings.

The AST results therefore suggest that greater inhibitory control is related to the ability to inhibit the potential interference of a typical representation, and thus enhance the ability to accurately recall and depict the target image. However, two important points need to be highlighted regarding these results. Firstly, the significant correlation does not provide definitive evidence that children were in fact inhibiting anything (such as a typical representation) at the time of drawing. Secondly, the AST does not provide any distinction between children's inhibitory strength and their inhibitory insight. Inhibitory insight involves understanding what needs to be inhibited and when. It is therefore primarily a top-down ability. Inhibitory strength is the amount or level of inhibition that can be brought to bear (Perner & Lang, 1999). However, as inhibitory strength may be linked to overall executive functioning ability and as such short-term memory, which had a weaker relationship to accuracy, it could be hypothesised that it was inhibitory insight that may have been related to overall accuracy. This would suggest that in order to inhibit a habitual response, the children realised that they had the tendency to make a particular response, in this case a typical representation for the objects or emotions examined. This further suggests that children may be aware of the typical representation they may hold for an object or emotion, and are more able to inhibit it than if it was more of an unconscious or automatic influence as has been suggested by Walker et al. (2006).

5.5 General Discussion

This section examines why the initial hypotheses were not supported before then introducing the motivation for the study reported in Chapter 6. The results gained from the current study did not support the main hypothesis that naming would influence children's drawings as no significant differences between the named and unnamed conditions were observed. The measures of *accuracy of the target drawings*, *number of matching features present in the children's free and target drawings* and *time taken to complete the target drawings* did not significantly differentiate the named and unnamed groups. When the potential confound of internal naming was accounted for the recoded groups still did not differ. The *Animal Stroop test (AST) score* did however provide some evidence to suggest that children's internal representations may be influencing the way they draw although such a conclusion is speculative and will be discussed briefly below. Following this discussion the extent to which the method used in the current study may have limited the results will be considered. In light of these considerations the rationale for the study reported in Chapter 6 will then be introduced.

The AST score provided some support for an influence that a child's typical representations may have over their ability to draw a non-typical version of an image. Those children who were better at completing the AST test showed a higher level of accuracy in their target drawings, regardless of the experimental group they were in. This could be argued to indicate that these children were thus better able to inhibit the pre-potent (Williams, Ponesse, Schachar, Logan & Tannock, 1999) response of their typical representation.

The influence of the child's typical representation in terms of the *number of matching features present in the children's free and target drawings* was not significantly different between named and unnamed groups. However, the results did indicate that for those drawing topics for which children have been shown to have a well-established typical representation (the objects and simple emotions - see Chapter 4) there was some evidence of those representations influencing the children's target drawings. This was shown in lower accuracy scores in the target object drawings, the target object drawings taking longer to be drawn and the higher number of features appearing in both the target and free drawings for the objects and happy and sad emotions. One possible explanation for this is considered below.

The drawing topic of objects produced less accurate target drawings and the drawings showed a greater number of similar features across the target and free drawings. Walker et al. (2006) provided a possible explanation for this. They note that the use of a word label results in a tendency to access a generic representation of an object as the names used most frequently to refer to objects are names for object categories and, as such, have privileged links with visual representations at an intermediate (basic) level of categorisation (Rosch, Mervis, Gray, Johnson & Boyes-Braem, 1976).

Thus visual representations at the basic level can be argued to be evoked by the presentation of a category label more frequently and more quickly than visual representations at other levels of categorisation (Cornoldi et al., 1989; De Beni & Pazzaglia, 1995; Gardini, De Beni & Cornoldi, 2004; Hoffmann, Denis, & Ziessler, 1983; Rosch et al., 1976). It could be argued therefore that the more complex emotions do not represent a category at a basic level, or that children do not have a basic representation of these more abstract concepts. It was also argued in Chapter 4 that the lower level of similarities observed in children's drawings of the complex emotions could indicate that children's internal representations of complex emotions may not be well established. However, once again it must be reiterated that the hypothesis that naming would influence the way in which children draw was not supported by the data reported here. There were trends, as described above that suggest this area merits further study. The study reported in Chapter 6 sought to build upon these findings and to again examine the influence that naming could have upon children's drawings. In order to do this the method used was adapted to account for some potential limitations discussed below.

The instruments used in the current study could be further refined. The current study sought to examine pre-existing typical representations held by children of regularly drawn topics. So it did not utilise novel objects (the use of novel objects would remove the possibility that children held pre-existing internal representations for such objects). Therefore the target images were developed. However, the consistency across the target images in terms of the extent to which they differed from typical representations could not be reliably standardised. The images used may have proved too similar in some instances, such as the simple emotions, to typical representations. The ability to detect interference from a typical representation may have been too difficult as it may have been too subtle to detect (the degree to which a smiling mouth was inclined for example). It also made internal naming by children in the unnamed group difficult to control. Other target images may have been too unfamiliar. The sun target images for example had a significantly ($p < .001$) lower percentage of features appearing in both the target and free drawings than the house and the happy, sad and angry faces, suggesting the extent to which it differed from the typical representation was greater than for the other images. The study reported in Chapter 6 addressed these methodological problems and employed a new target image.

Also, the composite accuracy score may not have provided the best measure of the influence of the word label. Therefore the study reported in Chapter 6 focused upon the number of features from typical drawings that were also found in target drawings as opposed to the overall composite accuracy score. This was hypothesised to provide clearer evidence of the influence of the word label and the typical representation it would be associated with.

A further limitation with the current study could be in the time lapse between the two experimental sessions (the free drawings and the target drawings). This was not entirely uniform for each child and therefore allowed for the possibility that children who had taken part in the second session could discuss the procedure with their peers which in turn could influence the way children then drew. This too was addressed in the study reported in Chapter 6.

Chapter 6

The influence of naming on children's drawings copied from a single model

6.1 Introduction

The study reported in this chapter was designed to build upon the findings presented in Chapters 4 and 5. The study had two principle areas of focus: similarities in children's drawings (building upon the results presented in Chapter 4) and the influence of naming upon children's drawings (based upon the results presented in Chapter 5). These two areas are discussed in turn below with the specific hypotheses relating to each area also stated.

6.1.1 Similarities in children's drawings. The current study built upon the results presented in Chapter 4. Similarities in the features used in children's drawings of a face, a house and a flower were evaluated in the present study. The choice of these three topics allowed for the results to be compared to those reported in Chapter 4. The extent to which different children represented the same features in their drawings of these topics could then be examined.

It was argued in Chapter 4 that the similar features that were displayed across children's drawings represented core conceptual features that made up the object category that the children held for these topics. In order to test this hypothesis the present study examined the sequence with which children drew these features. In describing the sequence with which children draw features Van Sommers (1984) suggested that children may draw according to a core-to-periphery progression principle (see Chapter 1, Section 1.2.3.4). This principle states that features which might be thought to be a central characteristic of an object category tend to be drawn first (Picard & Vinter, 2005; Van Sommers, 1984). The examination of the core-to-periphery progression principle therefore provided a measure of the extent to which certain features are similar across children's drawings because they are core to the concept of that object category.

There are very few developmental studies that have sought to examine the sequence with which children draw features using Van Sommer's (1984) model. Picard and Vinter (2005) have reported results regarding children's drawings of a house and a television to support children's use of the core-to-periphery progression principle. The current study sought to expand upon Picard and Vinter's (2005) findings through the examination of children's drawings of a house, a face and a flower thus responding to the concern raised by the authors themselves over the limited range of objects examined in their 2005 study (Picard & Vinter, 2005). Following Picard and Vinter's (2005) design, the core-to-periphery progression principle was examined through an examination of the relationship between the frequency of occurrence of features (across all children's drawings) and their mean order of appearance in children's drawing sequences. The age group examined in the present study (5- to 6-year-olds) was chosen as Picard and Vinter (2005) had found that this age group more clearly displayed the core-to-periphery progression principle than older children.

The specific hypotheses examined in relation to similarities in children's drawings were therefore:

(1) Similarities in typical representations:
(a) A high level of consistency in terms of features drawn across all the children's house, face and flower drawings would be observed. These would be in keeping with those features that were frequently identified in previous research (Chapter 4; Picard & Vinter, 2005).

(b) The sequence with which drawings were made would follow the core-to-periphery progression principle. Thus those features that displayed a high frequency of occurrence would be drawn earlier than those that were not so common.

6.1.2 The influence of naming. The results reported in Chapter 5 did not indicate that naming had any significant influence upon children's drawing of a model. However, some limitations were raised regarding the study. The extent to which each of the nine target images, described in Chapter 5, differed from a typical representation varied. The range of objects and emotions examined made it difficult to standardise the extent to which the target images were unfamiliar representations for the children. The task requirements for each of the topics may therefore have differed in difficulty with some target images being perceived by the children as more of a familiar representation than others. Furthermore the unnamed condition was undermined by the high proportion of children in that condition who correctly identified the target images. This allowed for the possibility that children were internally naming the image, thus were not taking part in a strictly unnamed condition. The current study was designed to examine the influence of naming on children's drawing from a model and address these limitations.

The target image used in the current study was therefore designed to control for the potential effect of internal naming and the difficulties faced in trying to standardise the ambiguity of the target images across nine drawing topics. Thus a single target image was used that could be equally described as either a *house* or a *face* (see Figure 6.1). The target image included the features of houses and faces that were consistently drawn by children (based upon data reported in Chapter 4, Tables 4.1 and 4.2). Therefore the image included a *face/body*, *eyes/windows* and *mouth/door*. The roof of the target image was displayed in such a way as it could also be interpreted as a *hat* on top of a face (see Figure 6.1). Whilst a hat was not frequently drawn in children's typical representations of faces it was thought that the presence of a hat upon a face was less extraordinary than a house with no roof: A roof was a feature drawn in all the children's free drawings of houses examined in Chapter 4.

Rather than dividing children into two conditions, named and unnamed, as in the study reported in Chapter 5, children in the current study were divided into three experimental conditions: house, face and picture. The target image was then named at both the time of presentation and recall as either a house, a face or simply as a picture. The influence of naming, rather than relying upon the comparison of unnamed and named conditions, was therefore examined primarily through the comparison of two named conditions, the house and face conditions. The picture condition was included to provide an indication of the extent to which children might interpret the target image as either a house or face. Thus following completion of the experimental tasks, the participants in the picture condition were asked to name what they thought the target image represented.

A similar procedure to that used in the study reported in Chapter 5 was used in the current study. The influence of a word label was measured through the comparison of the children's target drawings to the target image. The composite accuracy score already developed and tested (Chapter 5) was used to measure accuracy of the target drawings. Furthermore, free drawings of a house and face were also collected so as to examine the specific types of inaccuracy found in the target drawings. Unlike Chapter 5, the overall composite accuracy score was not of primary interest. A measure of *inaccurate variation* of a target feature was of greater relevance. The inclusion of a frown rather than a straight line mouth for the sad face target drawing in Chapter 4 was an example of what would be classed as an *inaccurate variation* of a target feature for while the general feature of a mouth was included the specific variation of that feature (downturned single line mouth) was inaccurate.

The measure of *inaccurate variation* allowed for the evaluation of the hypothesis that naming the target picture increases the probability of children making use of their typical representation of the target image in their drawings. It was therefore hypothesised that children's target drawings would include features which form part of their typical representations of either a house or a face (depending upon how the target image was named). For example, for children who were asked to draw a face, the eyes/windows would be drawn in a more circular manner (in keeping with the most prevalent form of eyes, round, seen in typical representations of faces examined in Chapter 4). The target drawings made by those in the house condition would show eyes/windows that were squarer (again in keeping with the free drawings analysed in Chapter 4). For the mouth/door the children in the face condition would be hypothesised to draw this feature more circular (akin to the 'O' shaped mouths coded in Chapter 4) or even tending more towards smile. Those in the house condition would draw this feature more rectangular (in keeping with the prevalent shape of doors seen in the free drawings examined in Chapter 4).

In order to optimise experimental conditions in which the influence that naming would have upon children's drawings it was decided that drawings of the target images would be produced after two different lengths of delay: a longer (24 hours in line with the longer time period used by Walker et al. (2008)) and a shorter (four minutes) period. The drawings that children produced after the shorter and longer delays are subsequently referred to as *STR* and *LTR* target drawings. Walker et al., (2008) found that children were more likely to draw according to a preferred generic representation, and less closely represent what they had in fact been shown, when they were drawing from long-term memory. Walker et al. (2008) suggested that images stored in short-term memory are more object specific and are likely to capture all the visible features of an object that make it distinct from a generic exemplar (its colour for example). Longer-term recall is more likely to focus upon the recall of general category-relevant object features rather than the specific material properties of an individual member of that category. Walker et al. (2008) stated that where an individual object belongs to a familiar category, a category representation will be available in long-term memory to provide information about all its category-relevant parts, and to support the portrayal of these, regardless of whether they have previously been seen by the drawer. This general category-relevant information would be thought to be present in children's typical free drawings of objects made from memory. Therefore the drawings after a longer time delay would be hypothesised to bear a closer resemblance to a child's free drawing than the drawing made after a shorter time delay.

The specific hypotheses examined in relation to the influence of naming on children's drawings were:

(2) The influence of the word label:

(a) STR target drawings would be more accurate than LTR target drawings.

(b) Children's inaccuracy in copying the target image would be most clearly displayed in their *inaccurate variation* of features. Children in the face condition would draw rounder eyes/windows and a more *mouth-like* (smile or 'O'-shape) mouth/door, those in the house condition would draw squarer eyes/windows and a more rectangular mouth/door.

6.2 Method

6.2.1 Participants. Forty-five children (25 male and 20 female) aged between 5 years 8 months and 6 years 8 months (*M* = 6 years 2 months, *SD* = 0.53) took part in this study. They had not participated in any of the previous studies reported in this thesis and they all attended a mainstream primary school in South-West London. Children were assigned randomly to one of three groups (house, face and picture) with the constraint that the groups were roughly matched for age and gender.

6.2.2 Materials. Children were provided with A5 plain white paper (presented in portrait) and HB pencils. The target image was printed onto a 6cm x 6cm square of white paper (see Figure 6.1).

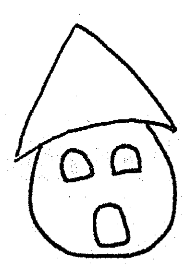


Figure 6.1: The face/house target image used

6.2.3 Procedure. All children completed two test sessions separated by 1 day. All children completed Session 1 prior to Session 2. Children were seen individually in a quiet area of their school for both sessions.

Session 1. Children were presented with an A5 piece of paper in portrait and an HB pencil and given the following instructions:

We are going to draw some pictures today, just for fun. I would like you draw the pictures as you would normally draw them.

In counter-balanced order all the children were then asked to draw:

A free drawing of a house

I would like you to draw me a picture of a house however you would normally draw a house.

A free drawing of a face

I would like you to draw me a picture of a face however you would normally draw a face.

Upon completion of the first two drawings children were then shown the target image (as shown in Figure 6.1) and given the following instructions according to the naming condition they were placed in. Children in the face condition had the target image described to them as a face, those in house condition had the target image described as a house, and children in picture condition had the target image simply referred to as a picture:

Exposure to target image

I have a [picture/of a house/of a face] *here that I am going to show you and I would like you to remember this* [picture/of a house/of a face] *as best you can because we are going to draw* [the picture/of a house/of a face] *later. Ok?*

Children were shown the target image for two seconds. Following this the image was removed and children were then given the following instructions for the drawing of a flower:

Free drawing of a flower

Before we draw the [picture/of a house/of a face] *I would like you to draw me a flower however you would normally draw a flower.*

Children were asked to stop their flower drawing after four minutes in order to standardise the time taken between the presentation of the target image and the child being asked to recall and draw the target image. For those that finished the drawing within the three minutes a brief conversation was had with the child on an unrelated topic (the new playground equipment the school had built) in order to fill any time remaining. Data that had been gathered in Chapter 5 (see Section 5.3) indicated that the average time children took to draw a flower was 38 seconds, with the longest taking 3 minutes 34 seconds. Four minutes was therefore chosen as it would provide adequate time for all children to draw a flower.

Following completion of the flower drawing children were then given the following instruction:

Target image drawing

I would now like you to draw the [picture/of a house/of a face] *that I showed you remembering the* [picture/of a house/of a face] *as best you can.*

Children were then finally given the following instruction. The target image was not shown to them again during this process:

Long term recall instruction

Now I wonder if you can try to remember the [picture/of a house/of a face] *for me so that we can draw it again tomorrow.*

For all the free drawings any queries as to what they could and could not draw we met with the same response:

You can draw it however you would normally draw it.

Session 2. Children were asked to draw from memory the image they were shown in Session 1. They were given the following instruction, the same as they had received in Session1:

Target image drawing

I would like to draw the [picture/of a house/of a face] *that I showed you yesterday. Try to remember the* [picture/of a house/of a face] *and draw it as best you can.*

Any questions about what they should do if they could not remember the image were met with the same response:

Try to remember it as best you can.

Finally all children in the picture condition were shown the target image again and asked what they felt the image most closely resembled. Their responses were noted by the investigator.

6.2.4 Validity of the target image. Following completion of the experimental tasks children in the picture condition were asked to name what they felt the target image represented. Of the fifteen children in the picture condition, seven (46.7%) thought the image represented a face (or explicitly a face with a hat, $n = 4$) with eight children (53.3%) identifying it as a house. No other responses were given. These results suggest that children could equally interpret the target image as either a house or face. Children in the picture condition were re-coded into either the face or house condition on the basis that internal naming may have taken place (indeed the specific inaccuracies children drew confirmed this may have been the case). Thus those that identified the target image as a house were re-coded to the house condition and those that identified it as a face were re-coded to the face condition. These were subsequently referred to as the *recoded conditions*.

6.2.5 Data analysis

This section first details how the content analysis was carried out. Following which an explanation of how the accuracy score was calculated. Finally the way in which the sequence with which children drew the features in their drawings was coded is explained.

Content analysis. As in Chapter 5 the children's target drawings were compared for accuracy to the target images through analysis of the similarity between the features in their target drawings and those in the target images (referred to as the *target features*). Furthermore the content analysis enabled the frequency of occurrence of features to be examined.

An exhaustive content analysis of all the children's target and free drawings was made. Every single feature was noted by the principal investigator and these were grouped into general categories of features (see Appendix I for examples of the children's free and target drawings).

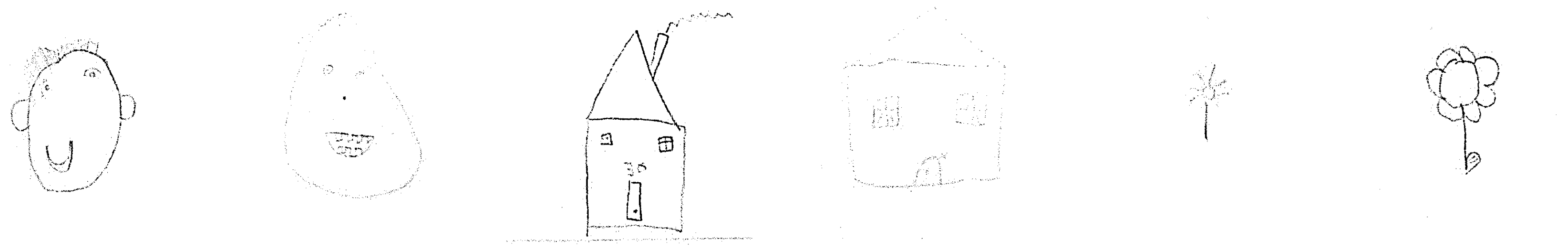
Free drawing of a house. From these drawings, 15 general categories of features were identified: body (bo), roof (ro), windows (wi), window panes (wip), window curtains (ct), door (do), door knob (dk), chimney (ch), smoke (sm), aerial (ae), roof tiles (rt), letterbox (lb), house number (hn), path (ph) and sun (sun). Within these general features there were variations in the specific way in which they were drawn and to account for this variation a more detailed level of content analysis was carried out. This identified three variations of roof (triangular, incomplete triangular and rectangular), six variations of window (that took into account specific number of windows, ranging from 1 to 8 and the positions of those windows) and four variations of door (that accounted for shape and position of the door).

Free drawing of a flower. Seven general features were identified in the flower drawings: face (fa), petals (pet), stem (st), leaves (lea), roots (rt), ground (grd) and pot (pot). Again to enable a more detailed analysis the specific variations of general features were also noted. As a result four variations of face were found (round, 'tulip' style, speckled and round with a circle inside), five variations of petals (curved continuous, curved separate, pointed separate, petals with partially occluded petals behind them and single line petals), four variations of stem (single line, thick line, curved single line, curved thick line) and five variations of leaves (accounting for the number and position of the leaves).

Free drawing of a face. Twelve general features were produced by the children in the face condition: face (fa), mouth (mo), teeth (te), cheeks (ch), eyes (e), eyebrows (eb), eyelashes (el), nose (no), nostrils (nst), hair (ha), ears (ea) and hat (hat). Four variations of face were noted (round, oval, heart and 'potato' shaped), five variations of mouth (upturned single line, upturned with central lip line, upturned hollow, undulating single line, 'o' shaped), two types of teeth (square and scribbled), eleven variations of eye (solid round, hollow round, hollow triangular, hollow oval, square, winking, 'n' shaped, solid round pupils centre of eye, solid round pupils right sided and horizontal line pupils), two variations of eyebrows (up curved and rectangular), two types of eyelashes (at the top and bottom of the eye), eight variations of nose (solid round, hollow round, 'L' shaped, reverse 'L' shaped, vertical line, 'u' shaped, 'upside down heart' shaped and two curved lines) and three variations of hair (long single strands, thick scribble, hair standing on end). Figure 6.2 provides examples of how the free drawings were coded.

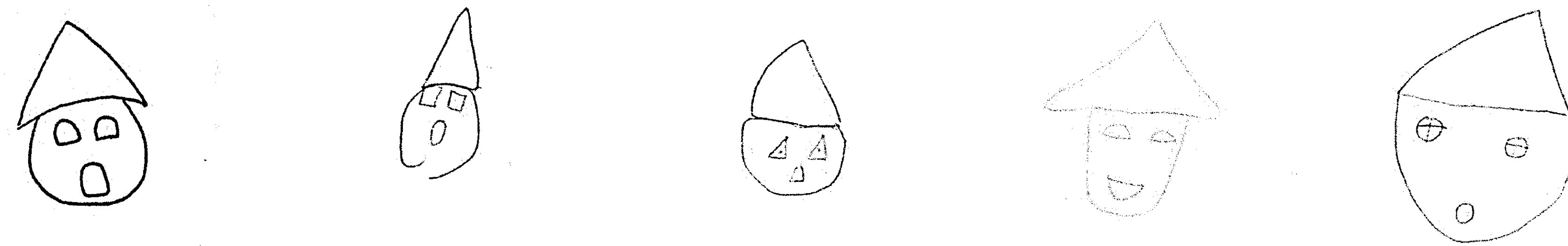
Target Drawings. Sixteen features were observed in the children's target drawings across all the naming conditions (see Appendix H for a full list of features). Figure 6.3 provides illustrations of how the target image itself and the children's target drawings were coded. For a full list of features that were coded for both the free and target drawings see Appendix H.

This content analysis provided an exhaustive, mutually exclusive, list of all the features used. The children's free and target drawings were then coded using this list with the target drawings also coded as either having a target feature present or absent. A random sample of 20% of the drawings was coded by a second rater (naive to the aims of the study). The inter-rater agreement was high, 97.5%, and Kappa coefficient for inter-rater reliability was .98, $p < .01$. A consensus was reached by discussion when any differences were found in the sample examined.



Face	Face	House	House	Flower	Flower
Oval Face	Potato Shaped Face	Square body	Square body	Round face	Round face
Upturned hollow mouth	Upturned hollow mouth	Triangular roof	Triangular roof	Single line petals	Curved continuous petals
Solid round eyes	Square teeth	Chimney	Square windows (x2 ULH, URH)	Vertical single line stem	Vertical single line stem
Eyebrows ^ ^	Hollow round eyes	Smoke	Window panes		Leaves from base x 1
No nose	Solid round pupils –centre of eyes	Square windows (x2 ULH, URH)	Curtains		Leaf with veins
Thick scribble hair	Round solid nose	Window panes	Curved door in bottom centre		
Ears	Thick scribble hair	Rectangular door in bottom centre	Door knob		
		Door knob	Door bell		
		Door number			

Figure 6.2: Examples of the features coded in children's free drawings



Target Image	Target drawing	Target drawing	Target drawing	Target drawing
U shaped body	Round Face	U shaped body	U shaped body	U shaped body
Triangle roof with concave bottom curve overhanging body	Roof not covering whole house (*like small party hat*)	Roof not covering whole house (*like small party hat*)	Triangular roof overhanging body	Triangular roof
Doorway shaped windows (n) (ULH, URH)	Square windows (x2 ULH, URH)	Triangular eyes	Doorway shaped windows (n) (ULH, URH)	Hollow round eyes
Curved rectangular door, not part of base of house 'n'	'O' shaped mouth	Solid round pupils –centre of eyes	Upturned hollow mouth	Window panes
		Triangular mouth		'O' shaped mouth

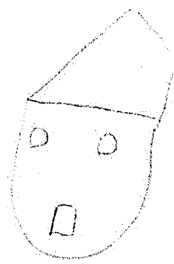
Figure 6.3: Target image and target features and examples of features coded in the children's target drawings

Accuracy of target drawings. In order to obtain an overall measure of accuracy children were given a composite accuracy score using the accuracy measure developed and tested in Chapter 5. For a full explanation and justification of the composite accuracy score see Chapter 5, Section 5.2.3. A brief summary is described here. All children were assigned an arbitrary score of 1; the scale was designed so that a score of 0 represented a perfect copy of the target image. The score was therefore reduced by the decimal expression of the percentage of correct features included (for example the target image contained four features therefore the score was reduced by 0.25 if a child only included one target feature and by 1 if they included all four). However, as stated in the introduction to this chapter, the primary measure that was examined was *inaccurate variation of feature.*

The inaccurate variation score was increased to reflect the extent of the inaccuracy of the image drawn. For inaccurate variations of a target feature 0.1 was added to the children's score as this was the smallest possible mistake. As adding a feature to a drawing constituted an important error when this occurred 1 was added to the child's score. Finally for each missing target feature 2 was added to their score as this constituted the highest level of inaccuracy. These scores reflecting the scale of error produced ranging from minor (0.1 added) to major (2 added). Figure 6.4 provides examples of the how target drawings were coded for accuracy.

Target Image

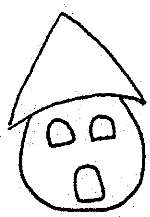
Target drawing A



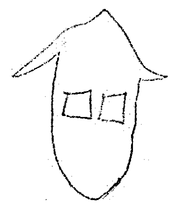
Target drawing A was scored at 0.35

0.75 was removed from the initial score of 1 as three target features were coded as being accurately represented (windows/eyes, door/mouth and body/face). A score of 0.1 was added for an inaccurate variation of a target variable (roof/hat)

Target Image



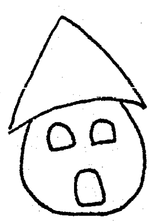
Target drawing B



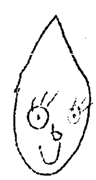
Target drawing B was scored at 2.95

0.25 was removed from the initial score as the target variable of body was coded as being accurately represented. 0.2 was added for inaccurate variations of two target variables (roof/hat and eyes/windows). A score of 2 was added as one of the target features (mouth/door) was coded as missing

Target Image



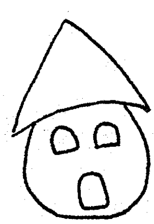
Target drawing C



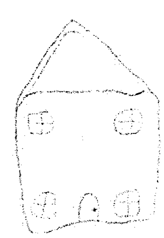
Target drawing C was scored at 4.05

0.25 was removed from the initial score as the target variable of body was coded as accurately represented. 0.3 was added for inaccurate variations of three target variables. A score of 3 was added for the inclusion of three additional features (eyelashes, nose and pupils).

Target Image



Target drawing D



Target drawing D was scored at 5.40

The score of 1 remained as no target features were coded as accurately represented. A score of 0.4 was added for inaccurate variations of all four target variables. A score of 4 was added for the inclusion of four additional features (windows x 2, window panes and doorknob)

Figure 6.4: Examples of the accuracy coding scheme

Core-to-periphery progression principle. The sequential order with which features were drawn was noted by the investigator for both target drawings and all three free drawings. In keeping with the method adopted by Picard and Vinter (2005) individual drawing syntax was encoded in terms of a feature order list, i.e., a feature was coded according to when it was drawn, 1 – face, 2 – left eye, 3 – right eye etc. A feature was assigned its sequential positions as soon as the child began to draw it. Picard and Vinter (2005) had noted that once a child engaged in drawing one feature the majority then completed it in its entirety before moving on to another. What constituted a *feature* was based upon the features coded for these objects in Chapter 4. As the equipment and ethical approval required to film the children drawing was not sought no secondary coding of the sequencing of drawings was possible.

The ordinal placement of a feature was also examined in relation to the frequency with which it was represented (*the percentage of occurrence*). The percentages of occurrence of all the main features across the three types of drawing were used to provide an indication of semantic importance. In line with previous research (Picard & Vinter, 2005) these percentages were then used to inform the extent to which a feature could be classified as a *core* feature (a high level of semantic importance). Also like Picard and Vinter (2005) a feature was deemed a core feature if it was included by over 80% of children; a *periphery I* feature if it was included by 60-79% of children; a *periphery II* feature if it was included by 20-59% of children and a *periphery III* feature if it was included by 0-19% of children.

6.3 Results

The results regarding the influence of the use of a word label on children's drawings will be presented first. The similarities between children's drawings in terms of the features drawn will then be examined. Finally the results regarding the use of the core-to-periphery progression principle will be presented.

6.3.1 Influence of the word label. The accuracy across the conditions of face, house and picture was not hypothesised to show any significant difference as for each group some form of labelling (explicit or internal) appeared to have occurred. However, the accuracy of the target drawings was analysed below in order to examine differences between the LTR and STR images. It was hypothesised that the LTR images would be less accurate than the STR.

Accuracy of target drawings. The mean composite accuracy scores for each condition (face, house and picture) are displayed in Table 6.1 (for these analyses the children in the picture condition were not reassigned to the face or house conditions). The mean composite accuracy scores for the target images in the two sessions (shorter-term and longer-term recall) were submitted to a mixed design ANOVA with mean composite drawing accuracy score for LTR and STR target drawings (Time) entered as the repeated measure and Condition (face, house, picture) as the between-subjects measure. No significant main effects for Condition, $F\ (1, 42) = .02\ p = .87, \eta^2 = .001, P = .05$ or Time, $F\ (2, 42) = 1.93\ p = .16, \eta^2 = .14, P = .61$ were found. There was no significant interaction effect, $F\ (2, 42) = 1.36\ p = .27, \eta^2 = .06, P = .28$. This indicates that overall the children had similar accuracy across the three conditions and across the two time points (LTR, STR).

Specific measures of accuracy. In order to examine the exact nature of the inaccuracy in target drawings the means of the four accuracy criteria (correct features, incorrect variations of features, additional features and missing features) for both LTR and STR target drawings were examined. The means are also displayed in Table 6.1.

A mixed design ANOVA was carried out with the four specific drawing accuracy scores for Time (LTR and STR) entered as the repeated measure and Condition (face, house and picture) as the between-subjects measure. A significant main effect for Time was found, $F\ (7, 294) = 9.02\ p < .001, \eta^2 = .17, P = 1.00$. No significant main effect for Condition, $F\ (2, 42) = 2.28\ p = 0.12, \eta^2 = .10, P = .44$ or interaction effect, $F\ (14, 294) = .85\ p = .61, \eta^2 = .04, P = .54$ were found. Examination of the total scores indicated that the LTR target drawings had significantly lower *correct feature* scores (thus indicating that they included more correct features) than STR target drawings.

Incorrect variation of target feature. For the purposes of these analyses the recoded conditions were used. A specific measure of *incorrect variation* of a target feature was used to explore the hypothesis that the children in the recoded house condition would be more likely to draw the target eyes/windows as square and the target mouth/door as rectangular than those in the recoded face condition who would be more likely to draw the target eyes/windows as round and the target mouth/door as round or *smiling*.

The quality and quantity of incorrect variations of target features that were drawn are displayed in Table 6.2. The frequencies indicate that the majority of children in the recoded house condition (54.2%) drew the windows square in their LTR target drawings and the majority of children in the face condition drew the eyes circular in both their STR (52.4%) and LTR (52%) target drawings. Chi-square tests were carried out to examine the significance of the relationship between recoded conditions (house or face) and the correct or incorrect variation of features drawn, with incorrect variations of features coded as present or absent.

Table 6.1: *Total and specific accuracy scores (SD) for STR and LTR target drawings –The lower the score the more accurate the target drawing*

Condition	Session	Correct Features	Inaccurate Variation of Feature	Additional Feature	Missing Feature	Total accuracy scores
House	STR	0.77 (0.23)	0.29 (0.09)	0.75 (0.87)	0.38 (0.81)	2.17 (1.23)
(n = 16)	LTR	0.48 (0.37)	0.31 (0.08)	0.94 (0.85)	0.38 (0.81)	2.20 (0.86)
Face	STR	0.68 (0.28)	0.29 (0.07)	0.64 (0.75)	0.14 (0.54)	1.75 (0.99)
(n = 14)	LTR	0.54 (0.32)	0.29 (0.06)	0.86 (0.95)	0.29 (0.73)	1.98 (1.32)
Picture	STR	0.80 (0.24)	0.27 (0.11)	1.06 (0.96)	0.80 (1.01)	2.93 (1.69)
(n = 15)	LTR	0.42 (0.37)	0.29 (0.08)	1.33 (1.24)	0.67 (0.98)	2.61 (1.74)
Total	STR	0.75 (0.24)	0.28 (0.09)	0.82 (0.86)	0.44 (0.84)	2.29 (1.40)
(N = 45)	LTR	0.48 (0.35)	0.30 (0.08)	1.04 (1.02)	0.45 (0.82)	2.27 (1.34)

Table 6.2: *Number of children (%) who drew incorrect variations of a target feature by condition and session*

		Incorrect variation of feature						
Condition	Session	Square windows	Rectangular mo/door	Round eye/ wins	Round mo/ door	Smile	Triangular eye/wins	Inverted eye/win s
House (n = 24)	STR	11 (45.8)	4 (16.7)	3 (12.5)	0	3 (12.5)	1 (4.2)	3 (12.5)
	LTR	13 (54.2)	5 (20.8)	0	1 (4.2)	3 (12.5)	1 (4.2)	3 (12.5)
Face (n = 21)	STR	0	0	11 (52.4)	5 (20.8)	9 (42.9)	1 (4.8)	3 (14.3)
	LTR	0	0	11 (52.4)	6 (28.6)	9 (42.9)	1 (4.8)	3 (14.3)

Recoded house condition. The relationship between recoded conditions and square windows being drawn/or absent was significant for both STR, χ^2 (1) = 12.74, $p < .005$, $\phi = .53$ and LTR, χ^2 (1) = 16.00, $p < .005$, $\phi = .60$. The relationship was significant for rectangular door being drawn/or absent in STR, χ^2 (1) = 3.84, $p < .05$, $\phi = .29$ and LTR, χ^2 (1) = 4.92, $p < .05$, $\phi = .33$.

Recoded face condition. The relationship between recoded conditions and round eyes being drawn/or absent in STR (χ^2 (1) = 8.31, $p < .005$, $\phi = .43$) and LTR (χ^2 (1) = 8.31, $p < .005$, $\phi = .43$) was also significant. The relationship between round mouth being drawn in STR (χ^2 (1) = 6.43, $p < .05$, $\phi = .38$) and LTR (χ^2 (1) = 5.08, $p < .05$, $\phi = .34$) and smile being drawn in STR (χ^2 (1) = 5.28, $p < .05$, $\phi = .34$) and LTR (χ^2 (1) = 5.28, $p < .05$, $\phi = .34$) was also significant.

6.3.2 Similarities in Free Drawings

Frequency of occurrence of features. The frequency with which features were drawn by all participants was examined. The more frequently a feature was drawn the more it was hypothesised to be a highly salient feature for a given object. The features were grouped according to the four ranges of occurrence described by Picard and Vinter (2005) (described in detail above, p.190) of core, periphery I, periphery II and periphery III. The frequency of occurrence with which features (target and additional) were drawn for the target images was also analysed.

The frequencies of occurrence for the free drawings are displayed in Table 6.3. The free drawings of a house contained six core features: body (bo); triangular roof (tro); windows (lwi, rwi); door (do) and door knob (dkb). For the face drawings four core features were identified: face (fa); smile (sm); nose (no) and eyes (ley, rey). For the flower drawing four core features were identified: face (fa); petals (pet); straight stem (sst) and leaves (lf).

The data regarding the frequency of occurrence of features in the target drawings were split into two sets comprising those from the recoded face condition and those from the recoded house condition. The frequencies for the representation of features drawn for the target image across the two sessions are displayed in Table 6.4. Table 6.4 demonstrates that the majority of STR and LTR drawings included the five core features found in the target drawing (bo/fa, ro/ht, lwi/ley, rwi/rey, mo/do) and all the most frequently drawn additional features (those in periphery II) were found to be either core or periphery I features in the children's free drawings.

Table 6.3: *Distributions of the features in the house, face and flower free drawings across four ranges of occurrence*

	Core 80–100%	Periphery I 60-79%	Periphery II 20-59%	Periphery III 0-19%
House ($N = 45$)	Body (bo), Triangle roof (tro), Left window (lwi), Right window (rwi), Door (do), Doorknob (dkb)	Window panes (wip)	Second left window (lwi2), Second right window (rwi2), Chimney (chi), Smoke (sm)	Tiles (ti), Curtains (crt), Door bell (dbl), Path (pth), Sun (sn), Letterbox (lbx), House number (num), Further windows (wi+)
Face ($N = 45$)	Face (fa), Mouth(mo), Nose (no), Left eye (ley), Right eye (rey)	Pupils (pls)	Eyelashes (eyl), Hair (hr)	Teeth (te), Cheeks (chk), Eyebrows (eyb), Nostrils (nos), Ears (ea)
Flower ($N = 45$)	Face (fa), Petals (pet), Straight stem (sst), Leaf (lf)	-	-	Undulating stem (ust), Roots (rts), Ground (grd), Pot (pt)

Table 6.4: *Distributions of the features in the target drawings according to condition across four ranges of occurrence*

		Core 80–100%	Periphery I 60-79%	Periphery II 20-59%	Periphery III 0-19%
Session 1 (STR)	House ($n = 24$)	bo, tro, lwi, rwi, do,	-	dkb	lwi2, rwi2, wip,
	Face ($n = 21$)	fa, ley, rey, ht, mo	-	no, pls	eyb, nos
Session 2 (LTR)	House ($n = 24$)	bo, tro, lwi, rwi, do	-	wip, dkb,	chi, lwi2, rwi2, crt,
	Face ($n = 21$)	fa, ley, rey, mo, ht	-	no, pls	nos

Core-to-periphery progression principle. The relationship between mean order of production and frequency of occurrence of a feature was examined in order to provide evidence for the core-to-periphery progression principle motivating the sequence with which children drew features in their drawings. Figure 6.5 displays this relationship for the free drawings.

Figure 6.5 illustrates that for all three free drawings a reasonably systematic relationship was observed between the frequency with which a feature was drawn and how early it was drawn: the more frequent a feature was, in terms of how many participants included it, the earlier it was drawn. This was the case for all three topics. The pattern of results for the flower drawing is globally more spaced out than that of the face or house due to a lower number of total features.

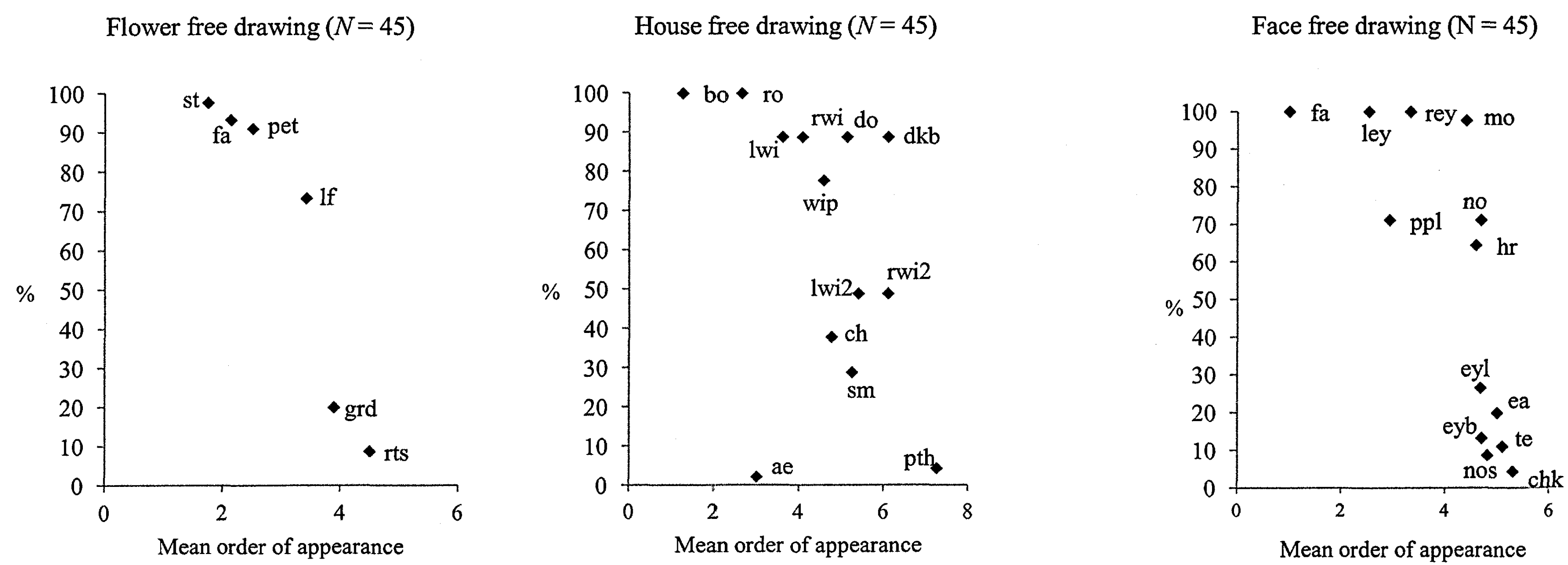


Figure 6.5: Relation between frequency of occurrence (%) of free drawing features and their mean order of appearance (a key for the features can be found in Table 6.3)

Further analysis of the sequence with which features were drawn in the free drawing task showed that for all three topics a minimal version of the topic is drawn first and then additional features are added. In the house free drawings (as Picard & Vinter, 2005 also observed) this recurrent sequence was 'body → roof → windows → door'. For the face the sequence was 'face → eyes → mouth → nose', and the flower 'stem → face → petals'. Again as reported by Picard and Vinter (2005), though here with a younger age group, subsystems were also seen in the house drawings with a window subsystem for the order in which windows were drawn 'lwi → rwi→ lwi2 → rwi2', a door subsystem 'do → dkb' and a chimney subsystem 'ch → sm'. These subsystems accounted for the fact that some features identified as peripheral in terms of their frequency of occurrence were sometimes produced prior to more core features, window panes being drawn prior to doors for example.

In order to examine the consistency with which children drew features across both the target and free drawings the relationship between frequency of occurrence and mean order of appearance was examined for the STR and LTR house and face drawings alongside the free drawings of houses and faces. Figures 6.6 and 6.7 display the relationship between frequency of occurrence and mean order of appearance for the STR and LTR target drawings alongside the free drawings (with the features removed that were not drawn in either the STR or LTR target drawings) for the house drawings and the face drawings respectively. Again the recoded condition groups were used.

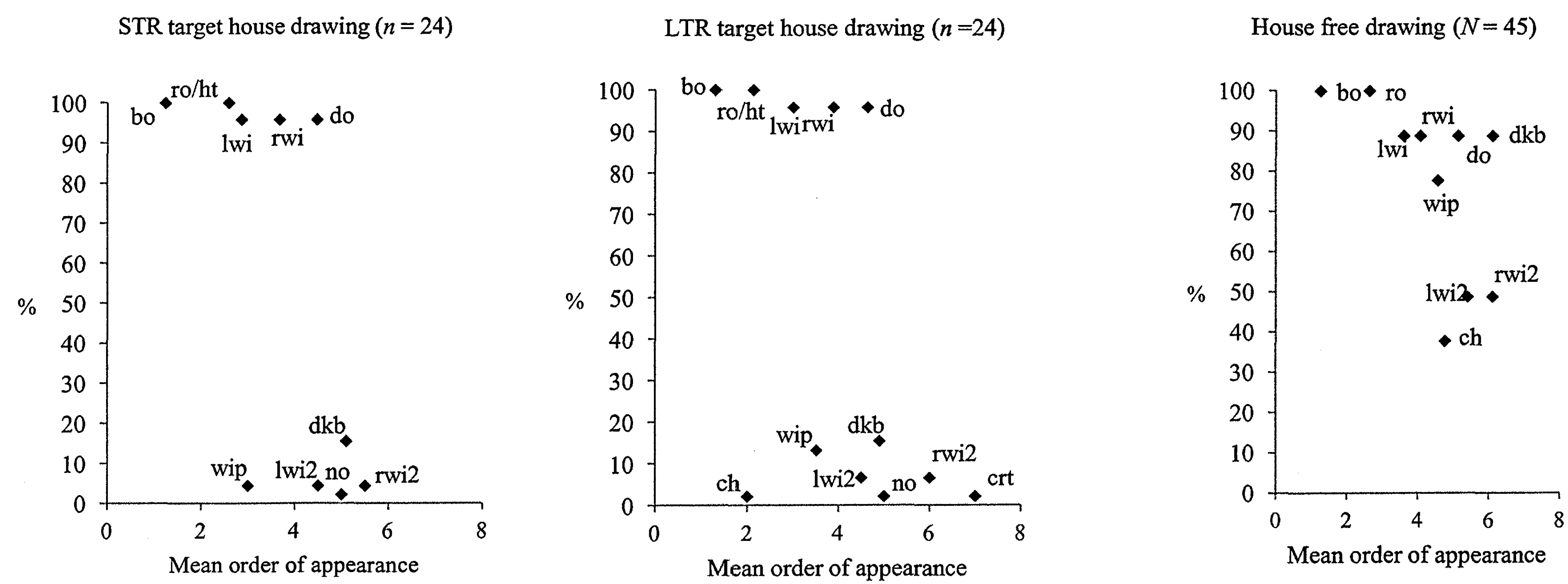


Figure 6.6: Relation between frequency of occurrence (%) and mean order of appearance of features for the house free drawing and STR and LTR target drawings by those in the recoded house condition (a key for the features can be found in Table 6.3)

Note: In the target drawings the additional features (such as window panes, additional windows, doorknob, curtains and nose) were all drawn infrequently as they were not part of the target image.

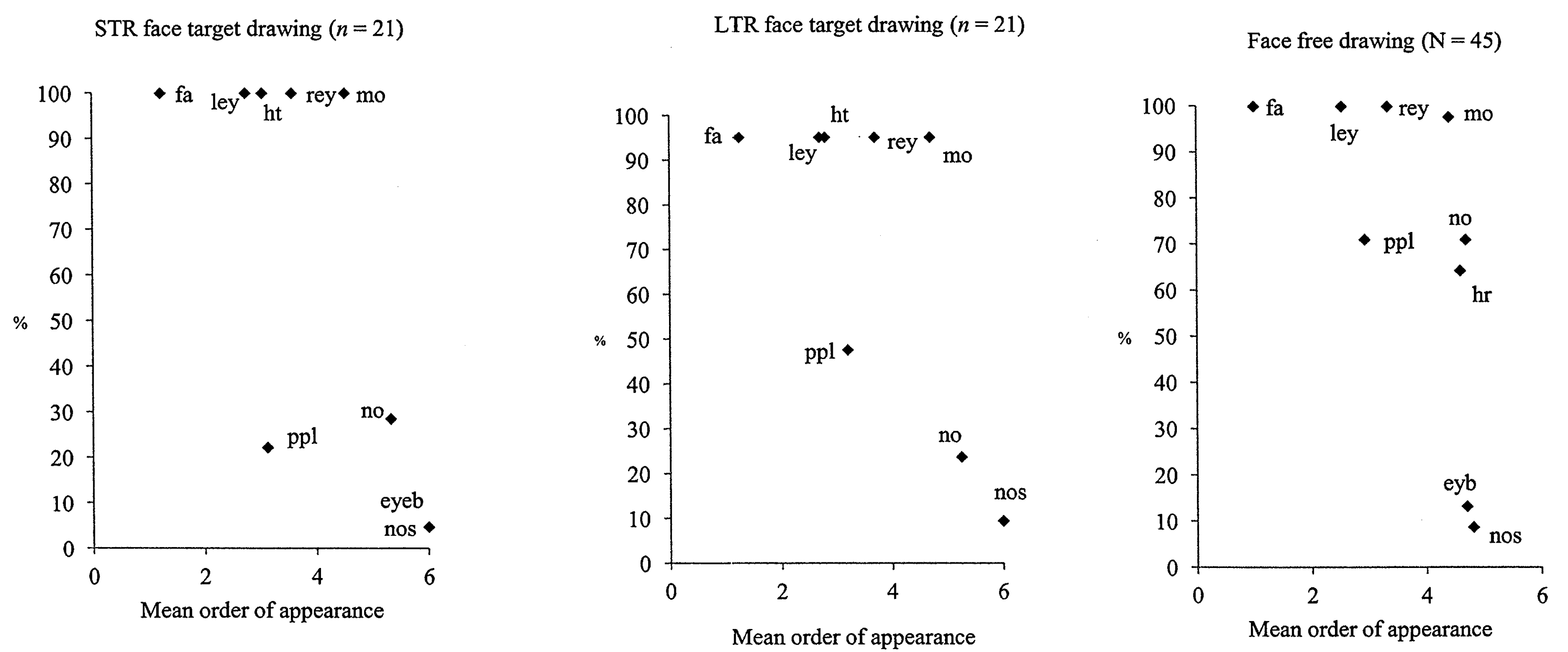


Figure 6.7: Relationship between frequency of occurrence (%) and mean order of appearance of features for the face free drawing, STR and LTR target drawings by those in the recoded face condition

Note: As in Figure 6.6 the additional features of pupils, nose, eyebrows and nostrils were all drawn infrequently as they were not part of the target image.

Figure 6.6 illustrates that the STR and LTR target drawings for the house condition followed a similar sequence in terms of when features were drawn to that of the free drawings of a house. Specifically the hat/roof was drawn at a similar point to the roof in free drawings. Figure 6.7 shows that for the STR and LTR drawings of a face the features again followed a similar sequence to that of the free drawing. However, what is worth noting is that the hat/roof feature in the target drawings was drawn relatively early in the sequence (an average order of appearance of 3 in STR and 2.8 in LTR) meaning it was drawn prior to the core feature of mouth (mo) and significantly earlier in the sequence than the comparable feature, in terms of geometric location, of hair (4.59) in children's free drawings.

A hat was not a feature drawn frequently enough in the free drawings to provide a direct comparison. However, the early inclusion of the hat suggests that salience may be dictating the order with which this feature was drawn. The hat is what would distinguish the target image from a typical representation of a face (as supported by the absence of hats in the children's free drawings). The early inclusion of this feature could be argued to further support the core-to-periphery progression principle motivating the order with which features are drawn. This point is discussed further below in Section 6.4.

6.4 Discussion

The current study was designed to address two areas of interest that extended findings reported in previous chapters: firstly, the similarity of features drawn in children's free drawings and, secondly the influence of labeling on children's drawings. There was a high level of similarity in the features used by children in their free drawings of a face, house and flower. The data regarding the core-to-periphery progression principle indicated that these similar features could be considered core features for these topics. The data therefore support the argument put forward in Chapter 4, Section 4.5 that the similar features drawn by children for these topics indicated that they were core features in the concept of these object categories held by the child.

Naming was shown to influence the way in which children draw. When drawing a target image from memory children would show similarities between their target drawings and their typical representations for that image (for example, children who had the target image labelled as a face drew features that were similar to those in their free face drawings rather than their free house drawings). The results will be discussed with respect to the hypotheses for each of these two main areas of interest in turn.

6.4.1 Similarities in children's drawings. Building upon the results reported in Chapter 4, the current study sought to provide further evidence of what features constitute a child's typical representation of certain objects and the extent to which these are similar across individuals. It was argued in Chapter 4 that certain features were similar across children's drawings because they formed the core features for the concept of that object category. For both the flower and house drawings the similar features that children drew corresponded to the data reported in Chapter 4. The same core features were included in the children's free drawings of these objects; for the house these were a square body, triangular roof, left and right windows and door. For the flower a round face, petals and stem were all included in the majority of children's drawings (included by over 80% of participants in both the current chapter and Chapter 4).

The face drawing also supported these results when compared to the neutral face drawings collected in Chapter 4. Children drew the features of an enclosed face, a mouth and eyes in their face drawings. The current study therefore supports the observation that children show a high level of consistency in terms of what features they use to portray certain objects. The data gained for the house drawings can also be added to those found by Picard and Vinter (2005) to provide even more compelling evidence for the consistency with which certain features are used to represent a house across two linguistically distinct groups (Picard & Vinter's sample were French speaking children). This high level of frequency of occurrence could support Picard and Vinter's (2005) proposition that these features represent the most salient features the child holds regarding each object category. Indeed the data from the analysis of the sequence with which features were drawn further supported this.

The core-to-periphery progression principle posits that the order with which features are drawn is motivated by their respective salience (Picard & Vinter, 2005; Van Sommers, 1984). Thus the most salient features were drawn first followed by the less salient. The sequence with which children drew the features in their drawings showed a high level of consistency across participants for the house, flower and face drawings. The data also supported the findings of Picard and Vinter (2005) regarding drawings of a house. Analysis of the order in which features were drawn and their frequency of occurrence across participants supported the core-to-periphery progression principle. Those features that were identified as core features (included by over 80% of the participants) tended to be drawn earlier in the composition than more peripheral features (drawn by less than 80% of participants).

Whilst the core-to-periphery progression model was supported by the data here a further consideration regarding the sequence with which features are drawn, raised by Picard and Vinter (2005), could be that the sequence may simply be a result of a systematic working through the drawing of features that is positionally dictated, the accretion principle (see Chapter 1, Section 1.2.3.4). However, the mean order of appearance of the hat/roof in the target drawings made by children in the face condition provides evidence to counter this notion. If the sequence was determined by factors such as cue dependency or ease of representation due to drawing by accretion then it would be hypothesised that hair and hat would be drawn at a similar stage of a drawing sequence as they occupy similar positions in the composition (the top of the head). The hat was in fact drawn early in the child's sequence and earlier than the feature of hair (that has a similar geometric location to the hat) appeared in their free drawings. The hat could be considered to be a highly salient feature in terms of differentiating the target face (see Figure 6.1) from a typical face (in which hats are not frequently displayed – as evidenced from the drawings examined in Chapter 4 and the current chapter). Thus the early appearance of the hat in the target drawings (prior to the geometric equivalent feature of hair) could be argued to reinforce the notion that as it had a high level of semantic content it was drawn early in the sequence for the target drawings. This early drawing to the hat thus provides further evidence for the core-to-periphery progression principle.

The results from the sequencing data also indicated that whilst children were drawing according to the core-to-periphery progression principle they also drew certain features according to subsystems (such as the door subsystem, 'do → dkb'). These subsystems explain why certain peripheral features were drawn prior to more core features, window panes prior to doors for example. Picard and Vinter (2005) did not find the use of subsystems to be prevalent in the house drawings made by younger children in their sample (5- to 7-year-olds) whereas they were more prevalent in the drawings made by older children (9-year-olds). They hypothesised that this difference could be explained by the fact that the older children are showing a greater influence of the accretion principle whereby drawings are made according to geometrically organised subsystems as opposed to being organised based upon the semantic weight of each feature (Picard & Vinter, 2005).

Picard and Vinter (2005) maintained that there is a conflict between the core-to-periphery progression principle (semantic influence) and the principle of accretion (geometrical proximity) with the younger children more influenced by the semantic weight of features and older children less influenced by the direct need to immediately draw the core features and instead drawing according to the accretion principle. The current study however shows that younger children were also drawing according to the accretion principle (as evidenced through the use of sub-systems). It is argued here that those peripheral features that are drawn prior to core features (such as window panes drawn prior to doors) should not be viewed as distinct features, instead they could be argued to comprise part of the overall core feature in the child's conceptual system (windows necessarily *have* window panes, doors necessarily *have* doorknobs). These peripheral features being well-established at this younger age (as evidenced through their proliferation across children's drawings) would support the fact that they form an inseparable part of core features (that doors have doorknobs). Thus the older children in Picard and Vinter's (2005) study may indeed have still been drawing according to the core-to-periphery progression principle.

The data reported here supports the core-to-periphery progression principle and indicates that features that are more central to a child's representation of an object category are drawn prior to less relevant features. Previous research that has examined the influence of a word label in causing children to include hidden features (Walker et al. 2006) made the *assumption* that children included hidden parts because the children regarded the hidden feature to be category relevant. Walker et al. (2006) using novel objects demonstrated that children could indeed be induced to include a hidden feature in a drawing of an object if it was highlighted as being category relevant. The relationship between the categorical concept of an object the child holds and the way in which they draw is lent empirical support through the core-to-periphery progression principle. The similarity between the features that children choose to represent (reported both here and in Chapter 4) could therefore be argued to support the notion that children hold similar category representations for the topics being drawn (face, house and flower). Furthermore it could be argued that features come to form part of a child's category representation due to their functional significance.

When children were informed of the functional importance of a particular feature of an object, they were more likely to include it in their drawing of that object, despite it not being visible in the model they were shown (Krascum, Tregenza & Whitehead, 1996). The motivation for the inclusion of functionally important features may be due to the desire for the drawing to be communicative. In light of Willats' (2005) definition of an effective representation "...something specific can be seen and recognised clearly and unambiguously" (p.14) it could be argued that the features children chose to represent in their typical drawings are those that are salient categorical features due to their functional significance and therefore facilitate others' understanding of what the drawing represents. Indeed the functional importance of these features may not simply be in terms of being crucial to the physical functioning of an object (e.g. a bicycle needing wheels) but in terms of the function of the drawing – to be recognized. The early representation of the hat/roof feature discussed above provides an example of this. This speculation regarding the communicative ability (in terms of aiding recognition of a drawing) that certain core features may hold is examined in more detail in Chapter 8.

6.4.2 The influence of the word label. The target image was designed so it could be interpreted by children as either a drawing of a house or a face. The picture condition in the current study provided *post hoc* validation that dual likeness in the image had been achieved. However, outside of the picture condition it must be acknowledged that in two cases children drew features in their target drawings that were inconsistent with the label the target image had been given, for example drawing eyes with pupils when the target image had been labeled a house. This suggested that the validity of the naming conditions was not absolute. As this only occurred in two cases and did not have any significant impact on the results, the reliability of the conditions and the target image were deemed effective enough for the aims of the study.

It was hypothesised, based upon the results reported by Walker et al. (2008), that children's drawings from LTR would be less accurate and in this respect show more influence of naming than the STR drawings. A content analysis was carried out on children's STR and LTR target drawings in order to assess their levels of accuracy, in terms of how closely they resembled the target image. The composite accuracy score analysis revealed no significant difference between the STR and LTR target drawings and therefore no clearer indication of a naming influence. However, the lack of complexity of the image may have contributed to the fact that the length of time between exposure to the image and recall did not significantly impact on the composite accuracy score. Walker et al. (2008) maintained that naming interference, manifested through a tendency towards a generic, typical representation of the named object, is more pronounced in longer-term recall. This is due to the fact that longer-term recall is more reliant upon simple structural descriptions that simply represent object categories whilst short-term recall relies on more detailed image-like representations (Walker et al. 2008). The target image was itself a simple structural description, so LTR, according to the argument put forward by Walker et al. (2008), would lead to better recall of the simple structural target image thus resulting in *more* as opposed to *less* accurate target drawings. Indeed the fact that there were a greater number of correct target features in the LTR than STR target drawings supports this explanation. The target image was however necessarily simplistic so as to achieve its primary aim of addressing the methodological concerns surrounding the target images used in Chapter 5. The overall measure of accuracy was also not hypothesised to be a significant measure of naming influence. Rather, specific subtle differences in the way specific features were drawn were hypothesised to be more indicative of any naming influence. This hypothesis was supported.

One specific area of interest with regard to the influence of naming upon children's drawings was in the children's representation of the eyes/windows and mouth/door in their target drawings. These features in the target drawing were considered to be an area where the influence of naming and the typical image it may trigger would have the clearest influence. Specifically, those children in the house condition were hypothesised to draw the target features of windows/eyes and the door/mouth more angular, in keeping with the style of windows and doors seen in previous examinations of children's free drawings of a house (see Chapter 4, Section 4.3). Children in the face condition would have been expected to draw the windows/eyes and mouth/door more rounded in keeping with the examples of eyes and open mouths seen in children's free drawings analysed in Chapter 4. These were indeed found to be the most common type of inaccurate variations of these target features. Further to these the influence of naming was also seen in the displaying of a smile in target drawings in the face condition.

There was a significant relationship between naming condition and the types of inaccuracy recorded (rounding for eyes/windows, mouth/door and use of smile for face condition and squaring of eyes/windows and mouth/door for the house condition). These results suggest that the children's typical representation, triggered by the word label or internal naming, was subtly impacting on how they drew the target image. Further evidence of this influence came from the children's drawing of additional features in the target drawings. The most frequently included additional features drawn by the children were found to be coded as either core or periphery I features in the children's free drawings, underlining their potential importance in the child's typical portrayal of a face or house and also the strength of association they may hold with those objects and as such the difficultly with which children may find in inhibiting their use.

Overall the data reported in the current chapter supports previous results reported in this thesis regarding similarities in children's drawings. Children appear to display similarities in terms of the features they draw for certain objects. Furthermore the core-to-periphery progression principle sequencing data supports the content analysis data. It indicates that those features that are included by the majority of children in their drawings are core features for the drawn topic. It could be argued therefore that children's drawings display information regarding their concept of the object category drawn. Determining what may influence the formation of similar internal representations (iconicity, symbolism or a combination of these factors) that then influence the use of similar features is beyond the scope of the research presented here. However, as briefly discussed above, children may be displaying features that are important due to their functionality (a door so you can get in and out of a house, for example).

Chapter 8 reports the results of a semi-structured interview with children in which they were asked what they thought were the most important features in a drawing of a range of objects and why they thought this. The interview sought to provide support for the argument that core features were drawn due to their functional necessity. Before the interviews are examined the next chapter reports data collected regarding similarities in children's drawings of a house, a flower, a person, a nice person and a nasty person. The results from the studies presented in Chapters 4 to 6 have indicated that children show similarities in their drawings. It was therefore decided to return to the topic of affectively characterised people (the subject of the studies reported in Chapters 2 and 3). The study reported in Chapter 7 examined drawings of nice and nasty people in the absence of a model and sought to establish if any core features could be identified and if children showed any similarities in their drawings (including size) in the less concrete and more descriptive topic of nice and nasty people. The inclusion of these topics also allowed for the examination of the argument put forward in Chapter 4 that children's drawings of the more complex emotional faces did not show a high level of similarity as children were not aware of or had not associated any specific core features with these topics.

Chapter 7

Similarities in the core features used by children to represent a house, a flower, a nice person, a nasty person and an uncharacterised person

7.1 Introduction

The study presented in the current chapter was designed to extend the research reported in Chapters 4 and 6 and re-examined children's drawings of affectively characterised human figures (the drawing topics examined in Chapters 2 and 3). Three primary issues were addressed. Firstly the study sought to test the reliability of previous results regarding the similarity of features found in children's drawings of objects (see Chapters 4 and 6). A content analysis of children's free drawings of a house and a flower was carried out in order to establish those features that were included across children's drawings. Secondly, the current study extended the range of topics in which the similarity of features in children's free drawings was examined and included affectively characterised (nice and nasty) human figures and an uncharacterised figure (drawn in the absence of a model). Thirdly in order to evaluate what features could be argued to be core features in nice and nasty human figures drawings, as well as support previous results regarding a house and a flower, the core-to-periphery progression principle was examined.

The topics that were investigated allowed for the reliability of the results reported in Chapter 6, supporting the core-to-periphery progression principle, to be tested. It also provided the opportunity to examine those features that may be viewed as core features in children's drawings of nice and nasty human figures. Any similarities in terms of the features used in the nice and nasty drawings could be argued to support the existence of a convention in terms of how these figures are represented. The data reported in Chapters 2 and 3 indicated that, at least in terms of height, children did not show any conventional form of representing nice and nasty human figures. Furthermore the data reported in

Chapter 4 would further suggest that, in terms of features drawn, children also did not show any conventional form of representation for complex emotions (angry, scared and confused). It could therefore be argued that for less concrete and more descriptive or specific exemplars of object categories children do not show similarities in their drawings. The current study therefore moves on from examining the effect that the use of a word label has upon the features that children include in a drawing. It focuses instead primarily upon the effect that differing levels of concreteness (more or less descriptive word labels) of a drawing topic has upon the presence of similar features across children's drawings.

Chapter 6 provided evidence that children tend to draw a named object (face or house) in accordance with their typical representation (as seen in their free drawing), and so they included features in their target drawings that were not present in the target image. Chapters 4 and 6 provided further evidence to suggest that children display a high level of similarity, in terms of the features drawn, in their typical drawings of named objects and, to a lesser extent, named simple emotions. Children showed, however, diversity in the features produced for less concrete named topics such as the affective states of scared, angry and confused (see Chapter 4). This led to the hypothesis discussed in Chapter 4 (Sections 4.4. and 4.5) that the internal representations that children were using to inform their drawings may not have been as clearly specified for the less concrete topics than for the more concrete topics. Children were hypothesised to be less able to call upon clear, core features that would specify a face as angry, scared or confused as evidenced by the lack of similarity across children's drawings in the features used to represent them. This was in contrast to, for example, a happy face when a smile was shown to be a core feature or a house in which a roof was a core feature with these features included in all children's drawings of these topics. The current study was therefore designed to test the hypothesis that children's drawings of less concrete, more descriptive topics (nice and nasty people) would not have as clearly established core features as more concrete topics (house and flower). This would be evidenced in both the lower frequency of occurrence of features across children's drawings for these topics as well as a less clearly defined sequence in which these features were drawn (the core-to-periphery progression principle).

The data analysis in Chapter 6 provided evidence to support the existence of core features in children's drawings of a face, a house and a flower as predicted by the core-to-periphery progression principle. The core-to-periphery progression principle posits that children draw the most salient features of an object before less salient features (Van Sommers 1984; Picard & Vinter, 2005). In other words the child's conceptual organisation of the object's features, in terms of semantic weight (i.e. the extent to which they define an object) plays a role in the sequence in which the features are drawn. The study reported in Chapter 6 provided support for the core-to-periphery progression principle, also replicating the findings of Picard and Vinter (2005). Using the same measures as those used in Chapter 6 and by Picard and Vinter (2005) the current study extended the range of topics examined using the core-to-periphery progression principle so as to include the less concrete topics of nice and nasty people. Based upon the argument first put forward in Chapter 4 it was hypothesised in the current study that for less concrete, more descriptive topics the children would not draw features in an order consistent with the core-to-periphery progression principle as they would not have well established core features for these topics. Therefore not only would there be a lack of similarity shown in terms of the features used across children to represent the more descriptive topics of nice and nasty figures but also this would be shown by the absence of evidence to support the core-to-periphery progression principle in these drawings.

As well as addressing the three issues described above the current study also concerned the examination of two points raised by Picard and Vinter (2005). They had noted that the sequence with which features for house drawings were made, although supporting the core-to-periphery progression principle, could be seen to simply reflect the size of the features. Thus the house sequence of body → roof → door, rather than reflecting the respective salience of features, may simply occur due to children drawing the larger features prior to the smaller. Furthermore Picard and Vinter (2005) reported that older children (9-years-old) were less likely to draw according to a core-to-periphery progression principle than the younger children in their sample. Picard and Vinter (2005) argued that the older children in their study were drawing more in accordance with an accretion principle whereby a new part tends to be drawn (accreted) on the basis of an already drawn one (Van Sommers, 1984). This principle reflects Freeman's (1977, 1980) cue dependency model of drawing in which marks already made on the drawing surface dictate where subsequent marks are to be made. The accretion principle was considered in the previous chapter and evidence for it was not viewed as particularly strong. In the current study two age groups were therefore examined (6- to 7-year-olds and 11- to 12-year-olds) so as to examine the possibility that older children may be drawing more according to the accretion principle than the core-to-periphery progression principle.

The inclusion of the human figures also enabled the type of features examined to be extended to include gender and size. Chapters 2 and 3 identified a number of studies that had not found any evidence to support children's consistent use of size to display affective characterisations. The current study set out with a hypothesis that children's nice and nasty human figures will not show a high degree of similarity in terms of the features they contain nor in the sequence with which those features are drawn. Therefore it was not anticipated in the present study that children would show a large degree of similarity in their drawings in terms of the height of their nice and nasty figures.

The three primary hypotheses put forward were:

Children will share a number of general features in common with each other in their free drawings of concrete objects such as a house, a flower and a person, supporting previous data regarding houses and flowers (Picard & Vinter, 2005; Chapters 4 and 6)

The drawings of the more descriptive topics of nice and nasty people will have fewer features in common than those of a neutral person and the objects

Children's drawings of the house, flower and neutral person will follow the core-to-periphery progression principle, and this will be less evident in children's nice and nasty drawings

The study reported in this chapter formed part of larger study, the second part of which is reported in Chapter 8. Session 1 concerns the hypotheses described above. The materials used for both sessions as well as the specific method for the first session that children completed are reported here. The method for Session 2 is reported in Chapter 8.

7.2 Method

7.2.1 Participants. 41 children (21 girls and 20 boys) aged between 6- and 12-years (M = 10.1 years, SD = 4.11 years) took part in the study. The children were divided into two age groups 6- to 7-years (n = 17, M = 6.8 years, SD = 5 months) and 11- to 12-years (n = 24, M = 11.6 years SD = 5 months). All the participants went to a mainstream primary school in London, UK.

7.2.2 Materials. Children drew onto A4 white paper using an HB pencil. Two A3 drawing perception cards (Card A and Card B – see Appendix B) upon which two human stick figures were drawn, with one 40% larger than the other were used in the perception task in Session 2, further details of which are reported in Chapter 8. On Card A the larger figure was on the left when presented to the child and on Card B the positions were reversed. A seven-point smiley-face Likert scale (see Figure 2.4 in Chapter 2, p.67) was used to gather affect ratings towards each of the pictures drawn by the child as well as the figures in the drawing perception task. An Olympus VN-8500PC digital voice recorder was used to record the semi-structured interviews with the children in Session 2.

7.2.3 Procedure. All children completed two test sessions. In Session 1 children completed a drawing of a house, a flower, a person, a nice person and a nasty person as well as a drawing perception task. The results of the Perception task are discussed in Chapter 8. In Session 2 children took part in a semi-structured interview. Children were seen individually in a quiet area of their school for both sessions. Session 2 took place immediately following the completion of Session 1. Prior to the commencement of Session 2 children were familiarised with the audio recording device and allowed to ask any questions they liked regarding the equipment. If asked what the purpose of the tasks were the experimenter would reply that children were helping him to understand how we draw things and to have some fun drawing. The details regarding the exact procedure for Session 2 are reported in Chapter 8.

Session 1. Children were presented with an A4 piece of paper (in portrait), and an HB pencil and given the following instructions:

We are going to draw some pictures today. I would like you draw the pictures as you would normally draw them.

In counter-balanced order the children were asked to draw:

A house. Children were given the following instruction:
I would like you to draw me a picture of a house however you would normally draw a house.

A flower. Children were given the following instruction:
I would like you to draw me a picture of a flower however you would normally draw a flower.

A person. Children were given the following instruction:
I would like you to draw me a picture of a person however you would normally draw a person.

A nasty person. Children were given the following instruction:

I would like you to draw me a picture of a nasty person. Now think of the person as very horrible and mean, and they are very unfriendly to everyone. Draw the whole person as well as you can remembering how nasty they are.

A nice person. Children were given the following instruction:
I would like you to draw me a picture of a nice person. Now think of the person as very kind and nice, and they are very pleasant and friendly to everyone. Draw the whole person as well as you can remembering how nice they are.

Once completed the drawing was removed from the child's view and a new piece of A4 paper was presented (in portrait) upon which the next picture was to be drawn. However, upon completion of both the nice and the nasty people the drawing was left in place, and the children were asked to rate their affect towards the subject of the drawing using the seven-point Likert scale. They were instructed as follows:

What I'd like you to do is point to the face that best shows how you feel about this person. Here are the faces we are going to be looking at [pointing to each face]. *The first one is a very happy face; the next is a happy face; the next is a quite happy face; the middle one is a neither happy nor unhappy face; the next is a quite unhappy face; the next one is an unhappy face and this one is a very unhappy face. I'd like you to point to the face that describes how you feel about this person.*

Instructions were repeated in full if a child did not understand. If a child asked how they should draw the picture they were simply told *however you would normally draw it.* The experimenter did not directly influence the way in which the picture was drawn by offering help, any request for help was simply responded to with *do you think you could try to draw it as best you can on your own?*

7.2.4 Data analysis.

Content analysis. As in Chapters 4 and 6 an exhaustive content analysis of all the drawings was made. Firstly the experimenter examined all the drawings and noted down all the features included. Following this the experimenter identified general categories of features under which specific examples of those features could be listed.

House drawings. For the house drawings, 5 general categories of features were identified: *body* (bo), *roof* (ro), *windows* (wi), *door* (do) and *other* (ot). Within these general categories of features there were variations in the specific way in which they were drawn and detail that was added. A more detailed level of content analysis was carried out that provided five sub categories of roof that accounted for the shape and level of detail of the roof, eight sub categories of window that took into account specific number of windows and the detail on the windows and four sub categories of door that accounted for shape and level of detail of the door with eleven specific features (such as fence and path) in the *other* category. A total of 31 different variations of features across the five general categories were identified for the house drawings.

Flower drawings. Five general categories of features were identified in the flower condition: *face* (fa), *petals* (pet), *stem* (st), *leaves* (lea) and *other* (ot). Again to enable a more detailed analysis the specific variations of general features were also noted. As a result five sub categories of face were found, three variations of petals, four variations of stem, six variations of leaves, accounting for the number, position and level of detail of the leaves and four specific features in the *other* category. A total of 24 different variations of features across the five general categories were identified for the flower drawings.

Human figure drawings. Twelve general features were produced in the nice, nasty and neutral human figure drawings: *face* (fa), *mouth* (mo), *eyes* (e), *nose* (no), *hair* (ha), *body* (bo), *arms* (arm), *hands* (hd), *legs* (lg), *feet* (ft), *clothes* (cth) and *other* (ot). The category *other* contained details that were extraneous to the body, such as presents, toys and speech or were embellishments to other general categories of feature, such as images on clothing or jewellery on hands and ears. Four variations of face were noted, nineteen sub categories of mouth that accounted for the shape and level of detail of the mouth, twenty-two sub categories of eyes that accounted for the shape and level of detail of the eyes, eight sub categories of nose accounting for shape and level of detail, nine sub categories of hairstyles, four variations of body, seven types of arms, four variations of hands, four variations of legs, six variations of feet, thirteen variations of clothes and thirty-six specific features in the *other* category. A total of 128 different variations of features across the twelve general categories were identified for the nice, nasty and neutral human figure drawings.

This content analysis provided an exhaustive, mutually exclusive list of all the features used. The children's drawings were then coded using this list for a feature being either present or absent. The gender of the neutral, nice and nasty drawings was also noted. A random sample of 20% of the drawings was coded by a second rater with previous experience of conducting content analysis on children's drawings in order to check that the initial coding had accounted for all features and that features were similarly identified and coded by a second rater. The inter-rater agreement was high, 92.5%, and Kappa coefficient for inter-rater reliability was .96, $p < .01$. A consensus was reached by discussion when any differences were found in coding; no differences were found in gender identification where inter-judge agreement was 100%. For a full list of the features coded see Appendix J. For examples of drawings see Appendix K.

Height for the human figure drawings was measured in cm from the highest to the lowest point of the drawing.

Core-to-periphery progression principle. The sequential order with which features were drawn was noted by the experimenter for all five drawings. In keeping with the method adopted by Picard and

Vinter (2005) and used in the study reported in Chapter 6, individual drawing syntax was encoded in terms of a feature order list, i.e. a feature was coded according to when it was drawn, 1 – face, 2 – left eye, 3 – right eye etc. A feature was assigned its sequential positions as soon as the child began to draw it. Picard and Vinter (2005) had noted that once a child engaged in drawing one feature the majority then completed it in its entirety before moving on to another, this was also found to be the case during the recording of the sequence with which features were drawn as reported in Chapter 6. What constituted a *feature* was based upon the features coded for the topics in Chapters 4 and 6. No secondary coding of the sequencing of drawings based upon video recordings of the children drawing was possible as the equipment and ethical approval required to film the children drawing was not sought.

The ordinal placement of a feature was also examined in relation to the frequency with which it was represented (*the frequency of occurrence*). The frequencies of occurrence of all the main features across the three types of drawing were calculated as percentages. In line with previous research (Chapter 6; Picard & Vinter, 2005) these percentages were then used to inform the extent to which a feature could be classified as a *core* feature. Following the rates of occurrence reported by Picard and Vinter (2005) a feature was deemed to be a core feature if it was included by over 80% of children; a *periphery I* feature if it was included by 60-79% of children; a *periphery II* feature if it was included by 20-59% of children and a *periphery III* feature if it was included by 0-19% of children.

7.3 Results

7.3.1 Similarities in Free Drawings. In order to examine the similarities found in children's typical drawings the frequency of occurrence of features across all the children's drawings was calculated, for general categories of features (for example *hair*) as well as specific variations of the features (*spiky hair* for example) to examine what features made up children's typical free drawings.

Gender and height were also examined to determine if there was any similarity across children in terms of the use of these two features for the human figure drawings.

Likert ratings. In order to establish if the appropriate affect had been felt towards the drawings of the neutral, nice and nasty human figures drawn by the children the Likert scores given to each drawing were examined The mean Likert ratings for the neutral, nice and nasty human figure drawings are displayed below in Figure 7.1. The scores given ranged from 1 (*very nice*) to 7 (*very nasty*).
The Likert ratings for responses to each drawing were submitted to a 2 (age group) x 3 (drawing type) mixed design ANOVA with figure type (neutral, nice and nasty) entered as the repeated measure and age as the between subjects measure. Mauchly's test indicated that the assumption of sphericity had been violated, χ^2 (2) = 7.69, $p < .05$, therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\varepsilon = 0.85$).

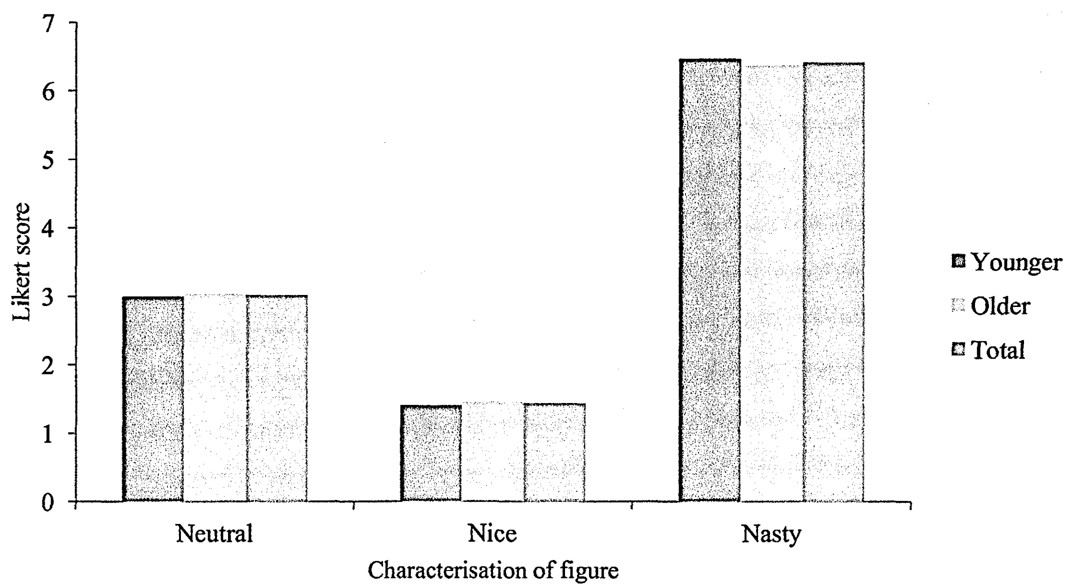


Figure 7.1: The Mean Likert ratings for neutral, nice and nasty human figure drawings for the younger (n = 17) and older (n = 24) age groups and in total (N = 41)

A main effect for figure type, F (1.69, 66.08 = 305.99, $p < .001$, $\eta^2 = 0.89$, observed power = 1.00, was found. Inspection of the means in Figure 7.1 showed that nice drawings received lower and thus more positive ratings than both the neutral and nasty human figure drawings. Nasty drawings were rated higher and therefore more negatively than both neutral and nice drawings. Bonferroni adjusted paired *t*-tests showed that nice drawings ($M = 1.41$, $SD = 0.51$) were rated significantly *nicer* ($p < .001$) than neutral ($M = 3.02$, $SD = 1.29$) and nasty ($M = 6.44$, $SD = 0.71$) drawings. Nasty drawings were rated significantly *nastier* ($p < .001$) than the neutral and nice drawings. Neutral drawings were rated significantly nicer ($p < .001$) than nasty drawings and significantly nastier ($p < .001$) than nice drawings. There was no significant main effect for age, F (1, 39) = .009, $p > .05$, $\eta^2 = .009$, observed power = .05, or significant interaction effect between age and affect, F (1.69, 66.08) = .125, $p > .05$, $\eta^2 = .003$, observed power = .07. These results confirm that the appropriate rating of affect was given by the children towards the figures they had drawn.

7.3.2 Frequency of Occurrence of Features. ***General categories of features drawn.*** The frequency of occurrence of the general categories of features across all participants was examined. It was hypothesised that the general categories of features used in the depiction of houses, flowers and neutral people, would show a high level of similarity (high frequency of occurrence) across all children in keeping with the data reported in Chapters 4 and 6. It was also hypothesised that the features used to represent the affectively characterised human figures would show a lower frequency of occurrence across all children. Age related differences between the frequencies of occurrence of the general categories of features drawn were also examined.

The frequencies with which the general categories of features were represented by the children are displayed below in Tables 7.1 (house), 7.2 (flower) and 7.3 (neutral, nice and nasty people) as an overall total as well as by age. In line with previous research there was a high level of similarity in terms of the general category of features included in the house and flower drawings. The drawings of a house contained the same four core (included by over 80% of children) general features of body (bo), roof (ro), windows (wi, left [lwi] and right [rwi]) and door (do) that had been reported in previous studies (see Chapters 4, 6 and Picard & Vinter, 2005). This was the case across both age groups. For the flower drawing the same four general core features that were reported in Chapters 4 and 6 were again found. These features were face (fa), petals (pet), stem (st) and leaves (le). Again these four features were included by over 80% of children across both age groups.

Table 7.1: *The frequencies, in percent, with which children included a general category of feature in their house drawings*

	Body (bo)	Roof (ro)	Windows (wi)	Door (do)	Other (ot)
Younger (n = 17)	100	100	100	100	64.7
Older (n = 24)	100	100	95.8	95.8	58.3
Total (N = 41)	100	100	97.6	97.6	61

Table 7.2: *The frequencies, in percent, with which children included a general category of feature in their flower drawings*

	Face (fa)	Petals (pet)	Stem (st)	Leaf (le)	Other (ot)
Younger (n = 17)	100	94.1	100	94.1	35.3
Older (n = 24)	100	95.8	95.8	83.3	16.6
Total (N = 41)	100	95.1	97.6	87.8	24.4

For all the human figure drawings nine general categories of features were classified as core: head (he), mouth (mo), eyes (ey, left [ley] and right [rey]), body (bo), arms (ar, left [lar] and right [rar]), legs (lg, left [llg] and right [rlg]) feet (ft, left [lft] and right [rft]) hair (ha) and clothes (cth).

Table 7.3: *The frequencies, in percent, with which children included a general category of feature in their drawings of neutral, nice and nasty people*

		Head (he)	Mouth (mo)	Eyes (ey)	Nose (no)	Hair (ha)	Body (bo)	Arms (ar)	Hands (hd)	Legs (lg)	Feet (ft)	Clothes (cth)	Other (ot)
Neutral	Younger ($n = 17$)	100	100	100	70.6	100	94.1	94.1	82.4	94.1	94.1	82.4	17.6
	Older ($n = 24$)	100	95.8	95.8	79.2	91.6	95.8	95.8	75	83.3	83.3	91.6	25
	Total ($N = 41$)	100	97.6	97.6	75.6	95.1	95.1	95.1	78	87.8	87.8	87.8	21.9
Nice	Younger ($n = 17$)	100	100	100	76.5	88.2	94.1	94.1	82.4	94.1	82.4	88.2	47.1
	Older ($n = 24$)	100	100	100	70.8	83.3	95.8	95.8	75	91.6	83.3	91.6	91.6
	Total ($N = 41$)	100	100	100	73.1	85.4	95.1	95.1	78	92.7	82.9	90.2	73.1
Nasty	Younger ($n = 17$)	100	100	100	70.6	94.1	94.1	94.1	82.4	94.1	88.2	88.2	70.6
	Older ($n = 24$)	100	95.8	100	62.5	100	95.8	95.8	83.3	91.6	79.2	91.6	95.8
	Total ($N = 41$)	100	97.6	100	65.9	97.6	95.1	95.1	82.9	92.7	82.9	90.2	85.4

For the people characterised as nice no further general categories of feature were defined as core. However, for the younger children the category of hands also reached the level of frequency of occurrence required to be reported as a core feature with 82.4% of children including them and the category of *other* was a core feature for the older children.

For the people characterised as nasty three additional core general features were identified, hair, hands and *other*. For the younger group however the general category of *other* did not achieve the level of core feature with a frequency of occurrence of 70.6%. For the older children feet did not reach the level required to be deemed a core feature with 79.2% including them.

In terms of age related differences for the human figure drawings, there was a greater use of detail (as evidenced in the general categories of clothes and *other*) in the older as opposed to the younger children's drawings.

In line with the hypotheses put forward in the introduction, children, in terms of the general category of features drawn, showed a high level of similarity in their drawings of a house, a flower and a person. All the human figure drawings showed similarities in the general core features included; however, the nasty people drawings also included the general category of *other* as a core feature suggesting that children displayed a variety of specific variations of features in their nasty drawings that could not be classified into a single category (such as hair or clothes for example). This could provide an indication that across children's drawings there is not a single core feature that could specify nastiness. In order to examine the exact nature of the features included in the *other* category and in order to examine the level of detail with which children showed similarities in their drawings the specific variation of features were examined.

Specific Variations of Features. In order to examine the level of detail with which general categories of features are common to all the drawings the specific variations of features (SVFs) within the general categories were examined. Only those SVFs that had been drawn by over 50% of participants were included. However, if a SVF was used by more than 50% of a specific age group, though not by the children overall (both age groups combined), it was still included as it provided information regarding age related differences between the drawings. The frequencies of SVFs used by more than 50% of participants for the house drawings are displayed in Table 7.4, the flower drawings are displayed in Table 7.5 and those of the human figure drawings in Table 7.6.

Table 7.4: *The frequencies, in percent, with which children included a specific variation of a feature in their house drawings*

		Square body	Triangular roof	Square Windows 2+	Window panes	Rectangular door, bottom centre	Door knob
Age	Younger (n = 17)	100	88.2	94.1	100	88.2	100
	Older (n = 24)	62.5	66.6	91.6	95.8	79.1	91.6
	Total (N = 41)	78	75.6	92.7	97.6	82.9	90.2

Table 7.5: *The frequencies, in percent, with which children included a specific variation of a feature in their flower drawings*

		Round face	Vertical line stem	Curved continuous petals	Curved separate petals	2 Leaves on stem	Leaves with veins
Age	Younger (n =17)	94.1	94.1	52.9	41.2	52.9	52.9
	Older (n = 24)	95.8	70.8	20.8	75	58.3	47.7
	Total (N = 41)	95.1	80.5	34.2	61	56.1	46.3

Table 7.6: *The frequencies, in percent, with which children included a specific variation of a feature in their human figure drawings*

	Age	Round face/head	Upturned mouth	Long hair single strands	Spiky hair	Threaded body	Threaded arms by side	Threaded open hands	Threaded hollow legs straight down	Separate shoes	Threaded shoes*	T-shirt	Trousers
Neutral	Younger (*n* = 17)	82.4	100			70.6	52.9	41.2	52.9		58.8	35.3	41.2
	Older (*n* = 24)	91.7	83.3			91.7	75	70.8	79.2		37.5	54.2	58.3
	Total (*N* = 41)	87.8	90.2			82.9	65.9	58.5	68.3		46.3	46.3	51.2
Nice	Younger (*n* = 17)	94.1	100	47.1		70.6	47.1	64.7	47.1				
	Older (*n* = 24)	100	100	54.2		87.5	66.7	70.8	75				
	Total (*N* = 41)	97.6	100	51.2		80.5	58.5	68.3	63.4				
Nasty	Younger (*n* = 17)	94.1			52.9	82.4	23.5	35.3	64.7	29.4		41.2	52.9
	Older (*n* = 24)	95.8			58.3	87.5	54.2	54.2	83.3	54.2		70.8	58.3
	Total (*N* = 41)	95.1			56.1	85.4	41.5	46.3	75.6	43.9		58.5	56.1

*Threaded shoes are those that have been drawn as part of a continuous outline of the leg.

The SVFs used in both the house and flower drawings corresponded to the data reported in Chapters 4 and 6. For the house drawings there was a high frequency of occurrence of the SVF of square body, triangular roof, two or more square windows, window panes, a rectangular door in the centre of the body and a doorknob. For the flower drawing children tended to draw a round face, a vertical line stem and curved separate petals. These results point towards a high level of homogeneity in terms of not only what general category of features children include in their free drawings of houses and flowers but also the specific variation of those features.

Only the older children drew SVFs for the flower of four leaves, no stem and curved stem. Only the younger children included 5 or more leaves, roots and bulb.

For the drawings of neutral human figures, in keeping with previous results examining neutral emotions (see Chapters 4 and 6, Schulenberg, 1999 as reported in Cox, 2005 and Sayil, 2001), the SVF of upturned mouth had a high frequency of occurrence across both age groups. This provides further evidence that children, when instructed to draw a person with no explicit characterisation, will draw a smiling face.

A smile was also a core feature in drawings of a nice person. The high frequency of occurrence of a smile in the nice people drawings may explain the lower use of SVFs from the general category of *other* for the nice drawings (73.1%) as opposed to the nasty drawings (85.4%). The single feature of a smile may have been deemed effective enough to display a nice person. However, there was no SVF of mouth that was used to a great extent in the nasty drawings. In previous studies in this thesis that have examined happy and sad faces (see Chapter 4, Section 4.4), a frown was shown to be a core feature in displaying sadness, however the characteristic of nasty is not shown here to be associated with any single mouth shape. Therefore children may have sought to display the affect of nasty through the use of additional details (the *other* category).

The SVF of spiky hair was found to be used by the majority of children for the nasty person and could therefore explain the general category of hair reaching a slightly higher level of inclusion in the nasty (97.6%) as opposed to nice (85.4%) drawings. Again perhaps as there is not such a powerful single svf with which to depict the characterisation of nasty (unlike a smile for nice) children had to rely on other features.

The inclusion of hands as a core general feature in nasty drawings can also be explained by children seeking to display nastiness in ways that require the explicit use of hands (through the *other* category). When all *actions* that involve the use of hands in a negative respect, such as *raised fists, holding of weapons* or *hurting/punching another* were examined, 24 (58.5%) children (8 younger and 16 older) had included such actions in their nasty drawings. Conversely when positive actions that would make hands explicit, such as *present giving* or *waving*, were examined for the nice drawings only 7 (17.1%) children (2 younger and 5 older) had included them.

Overall there was a lower level of homogeneity in terms of the SVFs used to depict people (nice, nasty and neutral) than the house or the flower, although children did show a tendency to draw t-shirt and trousers as the most frequently displayed specific variation of clothes across all the drawings, but this did not reach over 50% for the nice people drawings. As this was the case across all three characterisations these clothes could not be seen to differentiate between characterisations.

Gender and size. In addition to examining the similarities in terms of the general category of features and specific variation of features in children's drawings, gender and size were also examined for the human figure drawings to explore any similarity in children's use of these two factors.

Gender. Gender was examined as a potential feature that children may have used to indicate nice and nasty people. The frequencies with which each gender was depicted for all three of the drawings of people are displayed for both age groups and genders in Table 7.7.

Table 7.7: *Frequency (%) with which each gender was used to depict the neutral, nice and nasty figures by age and gender*

		Gender of figure	
		Male	Female
Neutral	Younger (n = 17)	10 (58.8)	7 (41.2)
	Older (n = 24)	13 (54.2)	11 (45.8)
	Male (n = 20)	18 (90)	2 (10)
	Female (n = 21)	5 (23.8)	16 (76.2)
	Total (N= 41)	23 (56.1)	18 (43.9)
Nice	Younger (n = 17)	8 (47.1)	9 (52.9)
	Older (n = 24)	11 (45.8)	13 (54.2)
	Male (n = 20)	17 (85)	3 (15)
	Female (n = 21)	2 (9.5)	19 (90.5)
	Total (N= 41)	19 (46.3)	22 (53.6)
Nasty	Younger (n = 17)	16 (94.1)	1 (5.9)
	Older (n = 24)	21 (87.5)	3 (12.5)
	Male (n = 20)	20 (100)	-
	Female (n = 21)	17 (81)	4 (19)
	Total (N= 41)	37 (90.2)	4 (9.7)

An examination of Table 7.7 indicates that whilst the gender chosen by children to depict the nice and neutral people were reasonably balanced, the majority of children, across both ages, were more likely to draw nasty people as male. Children were also most likely to draw their own gender for both nice and neutral people yet again the majority, regardless of their own gender, drew nasty people as males. Chi square goodness of fit tests confirmed that there was no significant preference for either gender chosen to represent the neutral, χ^2 (1, N= 41) = 0.61, p = 0.44, or nice, χ^2 (1, N= 41) = 0.22, p = 0.64 figures. However, there was a significant preference for male over female to represent the nasty person χ^2 (1, N= 41) = 26.56, p < 0.05. Of the children who used a different gender for their nice and nasty people only three boys did so and all changed the gender from nice female to nasty male. Fifteen girls

(71.4%) used a different gender in their drawings of nice and nasty people, all of them drew the nice figure as female and the nasty figure as male.

Height. Height was used as the primary measure of size (for a justification of the use of this measure see Chapter 2, Section 2.2.4). Height was examined as a potential feature that children may be using to differentiate between affectively characterised human figures. Height was measured as the distance in cm between the absolute top most point and absolute bottom most point of the figure. The means and standard deviations of the heights of the neutral, nice and nasty person by age and in total are displayed in Table 7.8.

In order to examine whether there was any significant difference between the neutral, nice and nasty drawings the height measurements were submitted to a 2 (age group) x 3 (drawing type) mixed design ANOVA, with Drawing Type (neutral, nice and nasty) entered as the repeated measure and Age as the between subjects measure. No significant main effects for Age, $F\ (1, 39) = 0.42, p > 0.05\ (0.52), \eta^2 = 0.01, P = 0.10$ or Drawing Type, $F\ (2, 78) = 0.86, p > 0.05\ (0.43), \eta^2 = 0.02, P = 0.19$ were found. There was no significant interaction effect of Age and Drawing Type, $F\ (2, 78) = 2.75\ p > 0.05\ (0.07)$, $\eta^2 = 0.07, P = 0.53$. The results indicate that children did not significantly differentiate their neutral, nice or nasty drawings by height.

Table 7.8: *The mean height (SD), in cm, for the neutral, nice and nasty human figures by age and for the children as a whole*

Affect/Characterisation	Age	Height
Neutral	Younger (n = 17)	11.25 (4.60)
	Older (n = 24)	9.89 (3.79)
	Total (N = 41)	10.56 (4.56)
Nice	Younger (n = 17)	12.05 (5.38)
	Older (n = 24)	9.50 (3.63)
	Total (N = 41)	10.45 (4.14)
Nasty	Younger (n = 17)	10.78 (4.25)
	Older (n = 24)	9.83 (3.72)
	Total (N = 41)	10.23 (3.92)

Overall the examination of the similarities in the features used across children's drawings supported the first hypothesis put forward in the introduction. Children showed a high level of similarity in terms of both the general category of features used and specific variations of those features, in their drawings of the house, flower and person. The examination of the specific variation of features indicated that there was less similarity shown in this measure for the drawings of nice and nasty people than for the house, flower, and person. The nice person drawings did however show a high level of similarity in terms of children's use of a smile.

7.3.3 Core-to-periphery progression principle. In order to examine the hypothesis that children's drawings of the house, flower and neutral person will follow the core-to-periphery progression principle with this being less evident in children's nice and nasty drawings, the relationship between mean order of appearance and percentage of occurrence of features was examined. In line with previous research (Chapter 6; Picard & Vinter, 2005) the intervals of frequencies with which features occurred were split into four frequency categories of core, periphery I, periphery II and periphery III. The frequencies of occurrence according to the four frequency categories for all five drawing topics are shown in Tables 7.9 to 7.13. As the current study was concerned with examining any age related differences, only those features that were included by both age groups are examined here. For the human figure drawings *clothes detail* was listed as a separate feature. This was done so as to be able to specifically examine any potential subsystem for drawing clothing. Other than clothes detail all additional detail extraneous to the body was included in the category *other* as listed in Appendix J.

In order to examine age differences between the sequences in which features were drawn the relation between frequency of occurrence and mean order of appearance of features was analysed for each age group, furthermore the standard deviations for the mean order of appearance (displayed in Figures 7.4, 7.7, 7.10, 7.13 and 7.16) were reported (for all features included by more than two children) in order to further examine the extent to which the sequences with which features were drawn may have shown consistency across children.

All the data (frequency of occurrence of features, relationship between mean order of appearance and frequency of occurrence of features for both age groups and standard deviations for mean order of appearance of features) for each of the drawing topics are reported in turn. The house data are displayed in Table 7.9 and Figures 7.2, and 7.3; flower data in Table 7.10 and Figures 7.4 and 7.5; neutral people data in Table 7.11 and Figures 7.6 and 7.7; nice people data in Table 7.12 and Figures 7.8 and 7.9 and the nasty people data in Table 7.13 and Figures 7.10 and 7.11.

For all the drawings, across both ages, a reasonably systematic relationship was observed between the frequency with which a feature was drawn and how early it was drawn: the more frequent a feature was, in terms of how many participants included it, the earlier it was drawn. Each drawing topic and any age related differences are discussed in further detail below.

House. Overall the mean order of appearance of the core features was always before the peripheral features. In keeping with previous results (see Chapter 6 and Picard & Vinter, 2005) a minimal version of the house is drawn first following which additional features are then added. This recurrent sequence was 'body → roof → windows → door'. Again, as observed by Picard and Vinter (2005) and reported in Chapter 6, subsystems were also observed in the house drawings with a window subsystem for order in which windows were drawn 'lwi → rwi → [lwi2 → rwi2] → w+' and a door subsystem 'do → dkb'.

Table 7.9: *Distributions of the features in the house drawings across four ranges of occurrence*

	Core 80–100%	Periphery I 60-79%	Periphery II 20-59%	Periphery III 0-19%
House (*N* = 41)	Body (bo), Roof (ro), Left window (lwi), Right window (rwi), Door (do), Doorknob (dkb), Window panes (wip)		Second left window (lwi2), Second right window (rwi2), Chimney (ch)	Tiles (ti), Door mat (dmt), Path (pth), House number (num), Further windows (wi+), Ground (gnd)

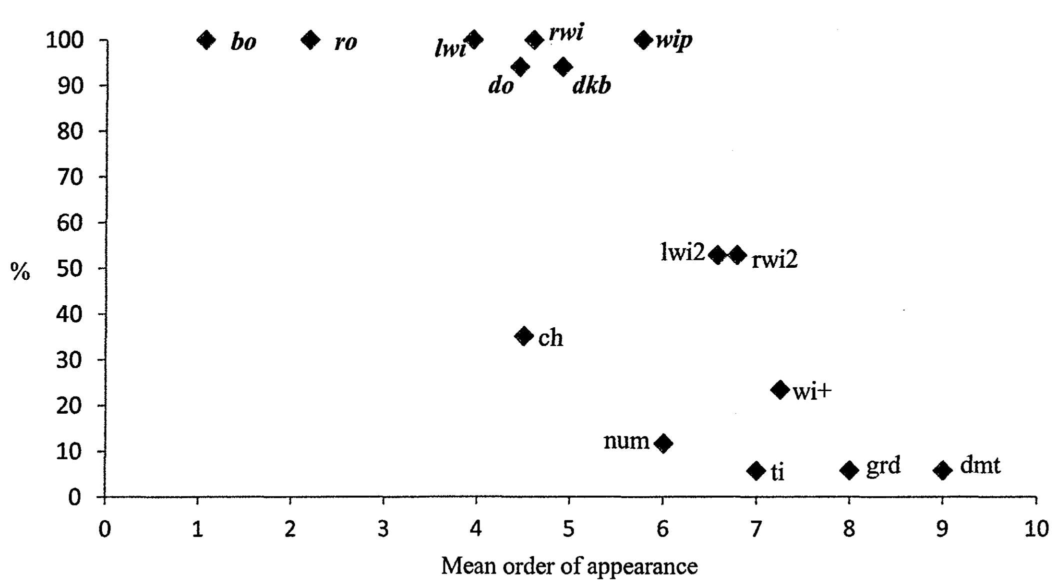


Figure 7.2: Relation between percentages of occurrence of house features and their mean order of appearance in the drawing for the Younger (*n* = 17) children. Core features are italicized in bold.

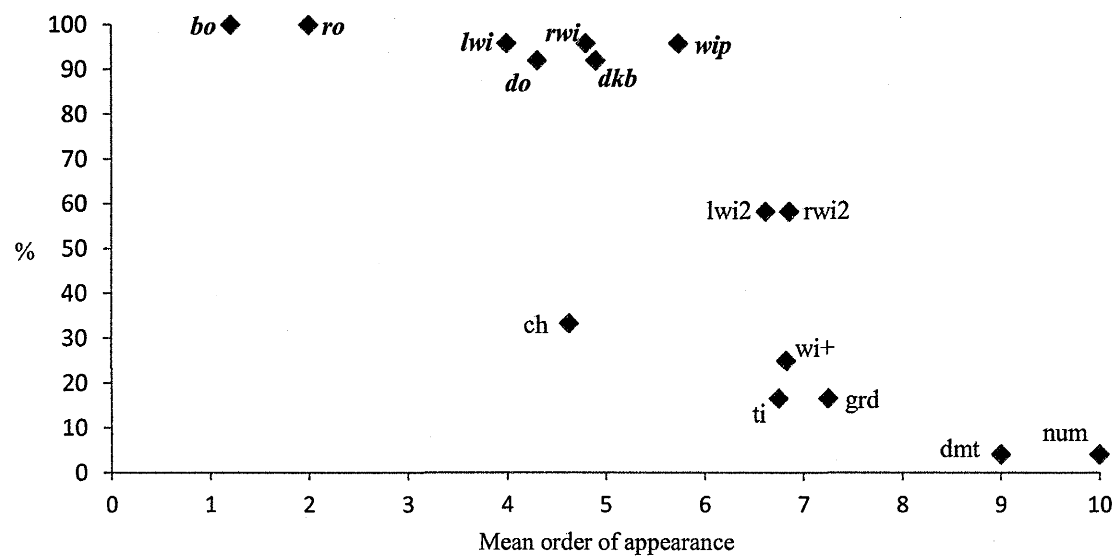


Figure 7.3: Relation between percentages of occurrence of house features and their mean order of appearance in the drawing for the Older (n = 24) children. Core features are italicized in bold.

The sequence with which features were drawn for the house showed a high level of consistency across both age groups. The stability of the order with which features were drawn is also reflected in the low standard deviations (all below 2) observed in the mean order of appearance for the features for both ages.

Flower. The drawings of a flower also followed the core-to-periphery progression principle. Again in keeping with previous results (see Chapter 6) a minimal version of a flower was built up consisting of a stem and face following which the petals and leaves were added. The only age related difference that was observed was that the older children were more likely to start with the face with the younger children starting with the stem.

As with the house drawings there was a relatively low standard deviation (all under 2.4) for the mean order of appearance of features again suggesting that the sequence with which features were drawn was fairly uniform.

Table 7.10: *Distributions of the features in the flower drawings across four ranges of occurrence*

	Core 80–100%	Periphery I 60-79%	Periphery II 20-59%	Periphery III 0-19%
Flower (N = 41)	Face (fa), Petals (pet), Stem (st), Leaf (lf)			Ground (grd), Pot (pt), Other (ot)

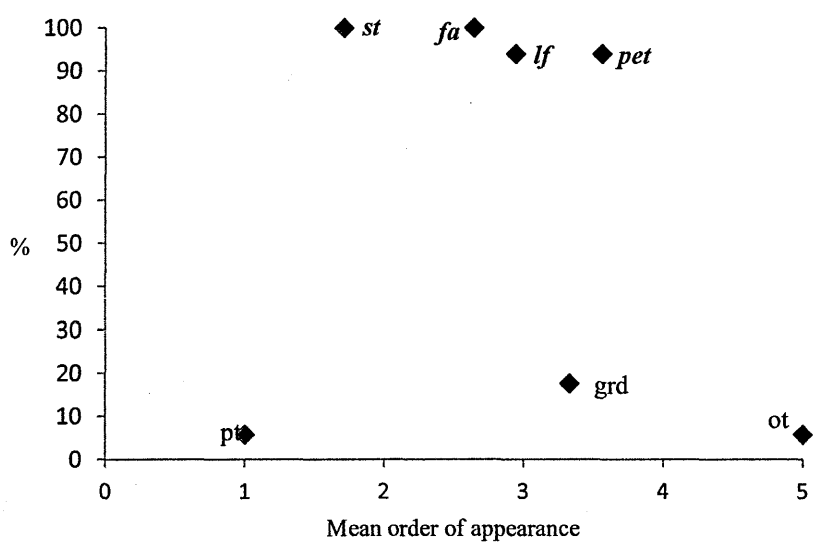


Figure 7.4: Relation between percentages of occurrence of flower features and their mean order of appearance in the drawing for the Younger (n = 17) children. Core features are italicized in bold.

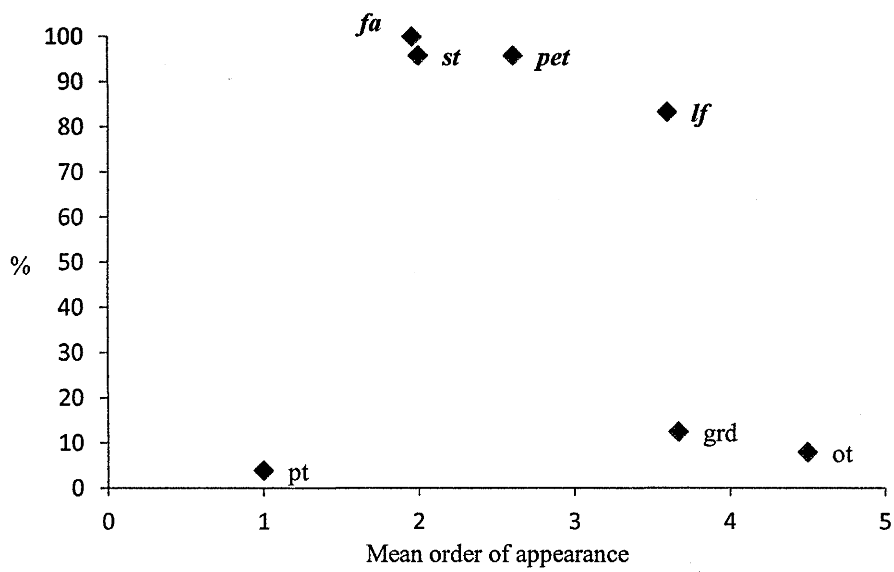


Figure 7.5: Relation between percentages of occurrence of flower features and their mean order of appearance in the drawing for the Older (n = 24) children. Core features are italicized in bold.

Human figure drawings. For all the human figure drawings the drawing of a body prior to other limbs was more clearly observed for the younger children, whereas the older children would draw a left arm prior to the body and then the right. This is consistent with the greater prevalence of threaded figures for the older children in which the arms and body were drawn using a continuous outline rather than segmented separate parts that the majority of the younger children were drawing (see Appendix K for examples). There were some clear differences between the different characterisations that are reported below.

Neutral Person

Table 7.11: *Distributions of the features in the neutral people drawings across four ranges of occurrence*

	Core 80–100%	Periphery I 60-79%	Periphery II 20-59%	Periphery III 0-19%
Neutral (N = 41)	Head (he), Left eye (ley), Right eye (rey), Mouth (mo), Body (bo), Left arm (lar), Right arm (rar), Left leg (llg), Right leg (rlg), Hair (ha), Clothes (cth) Left foot (lft)*, Right foot (rft)*	Nose (no)	Left hand (lhd), Right hand (rhd)	Ears (ea), Clothes detail (cdt), Eyebrows (eb)

*Feet were classified as a Periphery I features for the older children

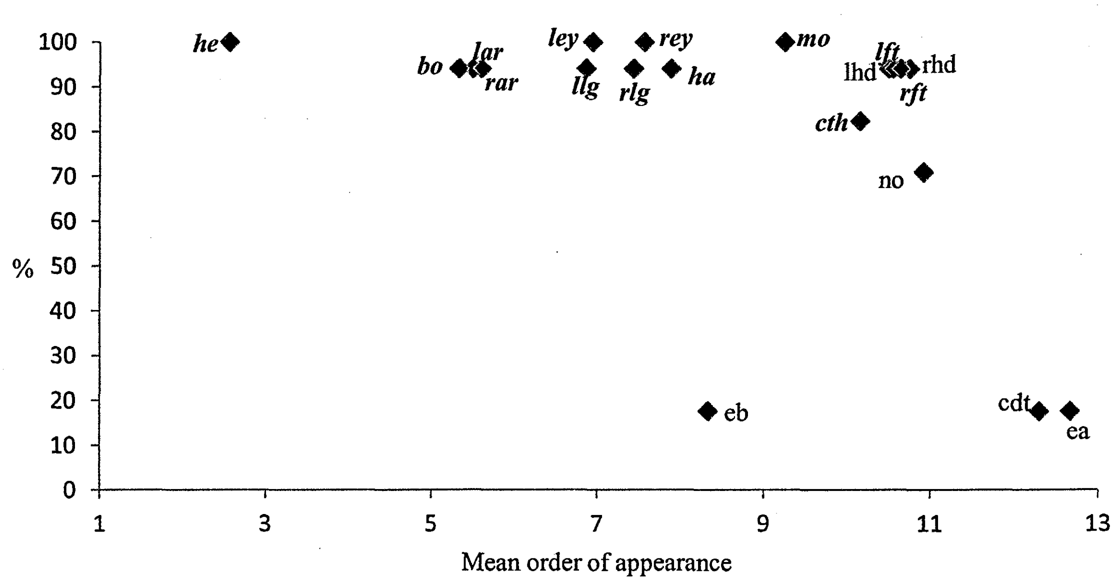


Figure 7.6: Relation between percentages of occurrence of neutral person features and their mean order of appearance in the drawing for the Younger (n = 17) children. Core features are italicized in bold.

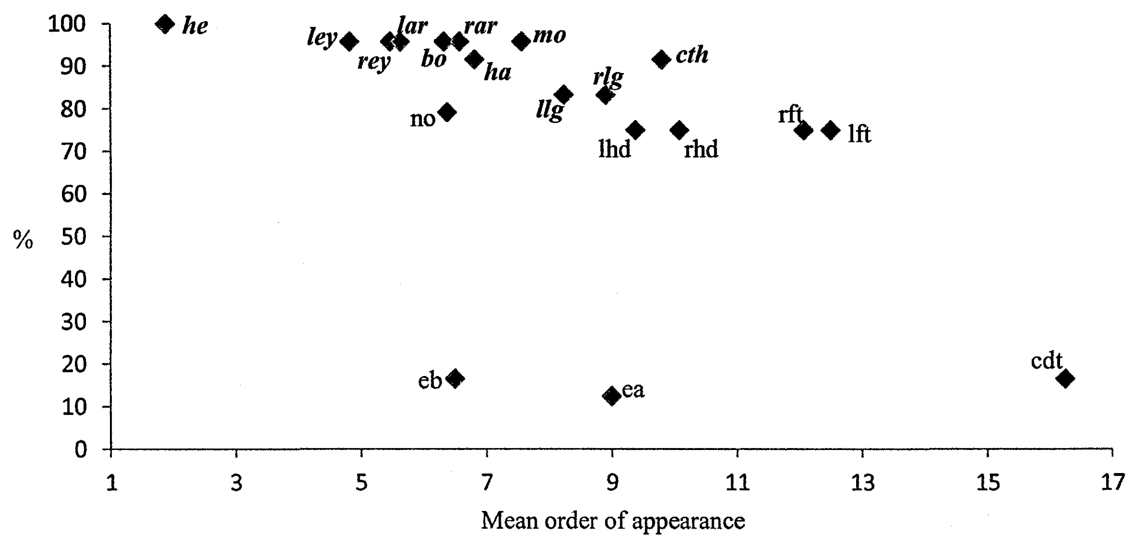


Figure 7.7: Relation between percentages of occurrence of neutral person features and their mean order of appearance in the drawing for the Older (n = 24) children. Core features are italicized in bold.

Nice Person

Table 7.12: *Distributions of the features in the nice people drawings across four ranges of occurrence*

	Core 80–100%	Periphery I 60-79%	Periphery II 20-59%	Periphery III 0-19%
Nice (N = 41)	Head (he), Left eye (ley), Right eye (rey), Mouth (mo), Body (bo), Left arm (lar), Right arm (rar), Left leg (llg), Right leg (rlg), Hair (ha), Clothes (cth), Other (ot) *	Nose (no), Left hand (lhd)**, Right hand (rhd)**	Left foot (lft), Right foot (rft), Clothes detail (cdt)	Eyebrows (eb), Eyelashes (el), Teeth (th), Ears (ea)

*Other was classified as a Periphery II feature for the Younger children

**Hands were classified as a Core feature for the Younger children

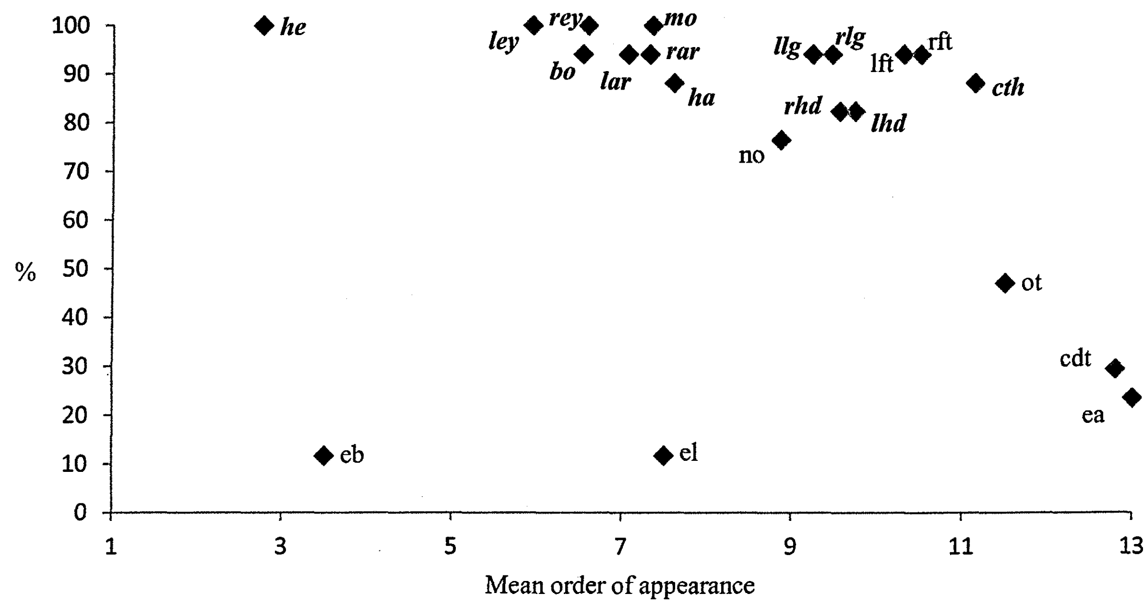


Figure 7.8: Relation between percentages of occurrence of nice person features and their mean order of appearance in the drawing for the Younger (n = 17) children. Core features are italicized in bold.

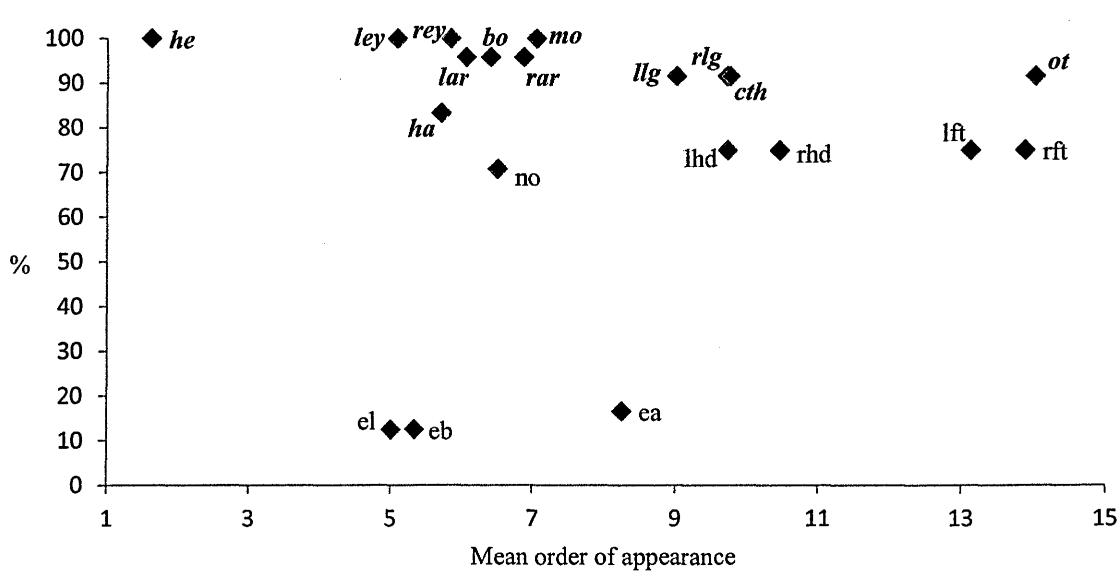


Figure 7.9 Relation between percentages of occurrence of nice person features and their mean order of appearance in the drawing for the Older (n = 24) children. Core features are italicized in bold.

Nasty Person

Table 7.13 *Distributions of the features in the nasty people drawings across four ranges of occurrence*

	Core 80–100%	Periphery I 60-79%	Periphery II 20-59%	Periphery III 0-19%
Nasty (*N* = 41)	Head (he), Left eye (ley), Right eye (rey), Mouth (mo), Body (bo), Left arm (lar), Right arm (rar), Left leg (llg), Right leg (rlg), Hair (ha), Clothes (cth), Other (ot)*	Nose (no), Left foot (lft)**, Right foot (rft)**,	Left hand (lhd), Right hand (rhd), Clothes detail (cdt), Teeth (th)	Eyebrows (eb), Ears (ea)

*Other was classified as a Periphery I feature for the Younger children
**Feet were classified as a Core feature for the Younger children

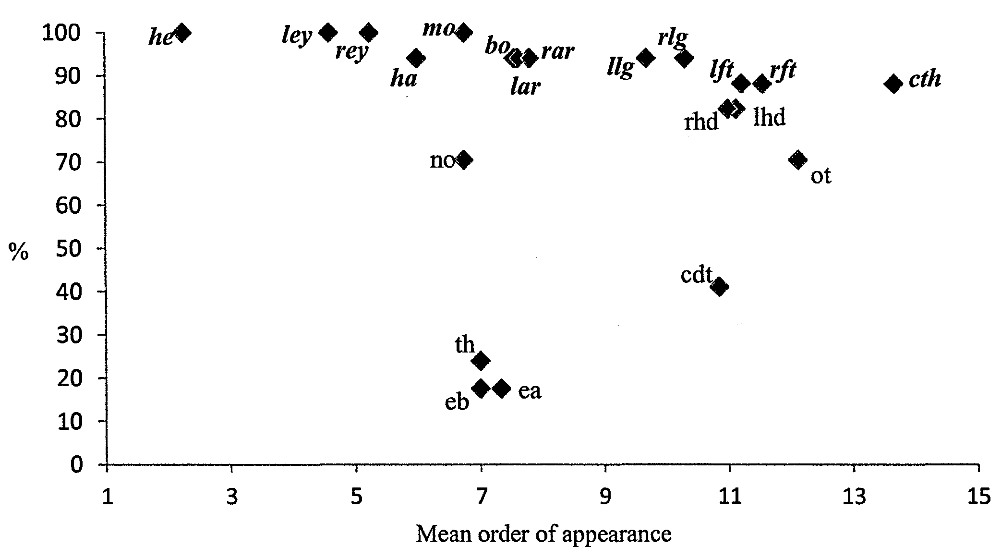


Figure 7.10 Relation between percentages of occurrence of nasty person features and their mean order of appearance in the drawing for the Younger (*n* = 17) children. Core features are italicized in bold.

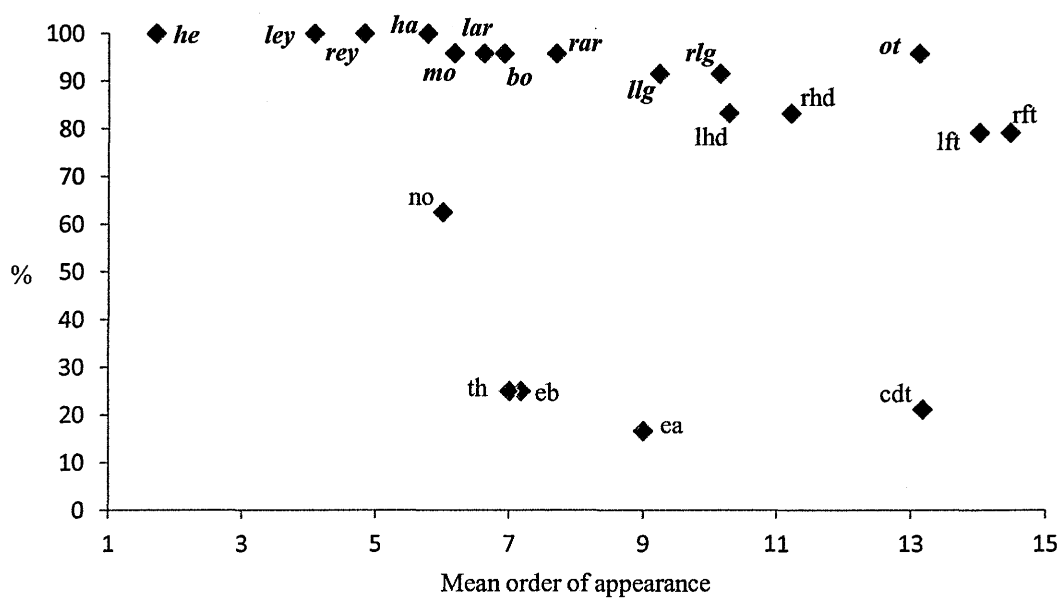


Figure 7.11 Relation between percentages of occurrence of nasty person features and their mean order of appearance in the drawing for the Older ($n = 24$) children. Core features are italicized in bold.

For the neutral figures, in keeping with the house and flower drawings, a minimal version of the topic was constructed first to which details were then added, this was particularly evident for the younger children who tended to draw 'head → body → arms → legs → facial features → hands, feet and clothes'. The older children had more of a tendency to complete the head and facial details prior to moving on to the body, with the hands, feet and clothes all featuring towards the end of the sequence. For both of the affectively characterised figures facial features were included earlier in the sequence than was the case for the neutral person drawings. For the nice drawings this was primarily the eyes with a sequence of head → eyes → body → arms → other facial features → legs → hands, feet and clothes. For the nasty drawings this was even more pronounced with the sequence head → all facial features → hair/teeth/ears/eyebrows → body → arms → legs → hands, feet and clothes. The earlier inclusion of facial features, especially for the nasty drawings, could suggest their increased salience for displaying the desired characterisation. Furthermore, the inclusion of smaller features such as eyes before larger features such as legs would not support the possibility raised by Picard and Vinter (2005) that the order with which children drew features simply reflected the size of the features (largest to smallest).

The earlier inclusion of hair, teeth, eyebrows and ears for the nasty drawings also reflect these features being drawn more frequently in the nasty people drawings. This is most notable in the use of spiky hair (used by 56.1% of children for the nasty person drawing). Teeth were more frequently used in nasty drawings (a Periphery II feature in nasty drawings but only a Periphery III feature in the nice drawings and unused in the neutral) and thus could be viewed as a salient feature in children's representations of nasty people. The early display in the drawing of ears may also have been so as to accommodate the detail of a single earring; this specific feature only being used in nasty drawings.

A note of caution must be attached to these findings however as the high standard deviations (a range of 0.58 to 6.25) for the mean order of appearance for all the human figure drawings indicates that the level of uniformity with which children ordered the drawing of features was lower than that of the house and flower drawings and there was a greater level of individual difference. However, the standard deviations across all the figures and features tended towards being lower for the older children than the younger.

7.4 Discussion

The study reported in this chapter set out to investigate three primary issues. Firstly, the similarity of features used by children in their drawings of named concrete topics was examined. The results supported the data reported in previous chapters. Children showed a high level of similarity in terms of the features used to represent these topics. Secondly, the similarities in children's drawings of the topics of a nice and a nasty person were examined. The results reported here supported the hypothesis that children would not show a high level of similarity in the features used to represent these topics.

Thirdly, the lack of similar features was hypothesised to be because children did not hold clear internal representations of what constituted the core features for representing these more descriptive drawing topics. Therefore these drawings would not be drawn according to the core-to-periphery progression principle. The results indicate that children did not clearly draw features of nice and nasty people according to the core-to-periphery progression principle. The results will be discussed in terms of similarities found across drawings and the core-to-periphery progression principle. Two age groups were examined in order to explore any possible age related differences in the features drawn or sequence with which features were drawn.

7.4.1 Similarity of features. It was hypothesised that children would show a greater level of similarity in the features drawn for the more concrete drawing topics of house, flower and neutral person. The results for the house and flower drawings supported this hypothesis in line with previous results (Chapters 4 and 6; Picard & Vinter, 2005) in terms of the features children drew. There was a high level of similarity across both age groups in terms of the general category of features used as well as the specific variation of features used. Some age related differences between the SVFs used by the older and younger children were observed. There was a decrease in the frequency with which a square body and triangular roof were drawn by the older children. Examination of the drawings showed that the older children were more likely to try to draw a three dimensional house and therefore a cube body and pyramidal roof.

In the flower drawings, features such as a bulb and roots were more frequently displayed by the younger children. It would be expected that the older children would be the more likely to include this greater level of detail. However, the older children may not have drawn the features of bulb and roots as they may have been more aware that these features could not be seen when looking at a flower (therefore drawing more in terms of visual realism). A second explanation comes from anecdotal evidence collected at the time of data collection. The science teacher at the school from which the drawings were taken commented upon the drawings of flowers and pointed out that the younger children had that week been learning about plants. The greater prevalence of bulbs and roots in the younger children's drawings therefore may simply have reflected the most recent experience the children had in terms of drawing a flower. This chance encounter highlights the difficulties faced when seeking to generalise information regarding children's drawings. It also suggests that a greater number of free drawings would need to be collected in future in order to control for any temporary changes in drawing style.

The less concrete, more descriptive topics of nice and nasty person were hypothesised to show less similarity in terms of the features drawn by all children. There was a high degree of similarity shown across all children in terms of the general categories of features drawn for all three human figure topics. This would be expected as these features would be common to all drawings of people (head, body, arms and legs for example). The general category of *other* did show a greater variation in terms of frequency of occurrence across the three characterisations that would support the hypothesis that less concrete, more descriptive topics would show less similarity. There was an increase in the number of children who included features categorised as *other* for both the nice and nasty drawing topics compared with the neutral. Not only was this seen for the older children but for the children as a whole. Only 21.9% of children included a feature categorised as *other* in their neutral person drawing, whereas 73.1% included at least one for nice and 85.4% for nasty. The category *other* included all those features that could not be grouped under a single unifying heading (such as hair or clothes) and as such were relatively idiosyncratic (see Appendix J for a full list of features in the *other* category). The greater occurrence of features in the *other* category therefore suggests that children's drawings of nice and nasty people did indeed show less similarity and greater amount of variety in terms of features drawn.

Analysis of the specific variations of general features used further supports the hypothesis that children's drawings of less concrete, more descriptive topics show less similarity in terms of features drawn. There was a high frequency of occurrence across all children's drawings of nice people for the specific feature of a smile. Smile was included to the extent that it could be classified as a core feature (included by over 80% of children). However, there was no single svf that reached the level of core for nasty people. The use of spiky hair was exclusively used in drawings of nasty people, suggesting for some children this feature may be a core feature for nasty people. It is interesting to note that the use of spiky hair was also used to a greater extent in children's drawing of angry people (reported in Chapter 4, Section 4.4), therefore indicating that it may have more general negative associations.

The lack of a single core feature for specifying nastiness (unlike smile to specify niceness) is further highlighted by the greater use of features in the *other* category for nasty drawings. The nasty person was the only topic for which *other* was a core feature (included by over 80% of children). The greater inclusion of features in the *other* category may also explain the greater inclusion of hands in nasty drawings (again the only topic in which hands were a core feature). Many of the specific features in the *other* category require manipulation by hand, notably weapons (see Appendix J for a full list of features). The displaying of fists or raised hands (negative actions involving hands) was also more often displayed in nasty people drawings and therefore also contributed to raising the category of hands to a core feature.

As well as the general categories of features and specific variations of those features, two further factors, gender and height, in the children's human figure drawings were examined to establish if there was any similarity shown across children in their use. It would be expected, based upon results reported in Chapters 2 and 3, that children would not show any similarities in their use of height. This was found to be the case with no significant difference between the heights of the drawings of the nice, nasty or neutral people. The results for the use of gender did however show a high level of similarity across children. Whilst the drawings for neutral and nice figures were most likely to reflect the gender of the drawer, the drawings of nasty people were significantly more likely to be male than female. This would suggest that whilst children may not show much similarity in terms of the specific details they use to represent nasty people they are more likely to use the same gender (male) to depict a nasty person.

The analysis of similarities of features in children's drawings therefore supported the hypotheses put forward in the introduction to this chapter. Children's drawings of the more concrete topics of a house, a flower and a person showed a high level of similarity with clearly established core features being depicted across all children's drawings. The drawings of the more descriptive topics of nice and nasty person however did not show such clear similarities.

7.4.2 Core-to-periphery progression principle. The examination of the sequence with which children drew features provided the opportunity to test the reliability of previous results regarding the core-to-periphery progression principle (see Chapter 6 and Picard & Vinter, 2005) as well as extending previous research to include a wider range of drawing topics. The sequence data, through analysis of the core-to-periphery progression principle, also provided a measure of the extent to which certain features could be argued to be core to a child's concept of that object-category (Picard & Vinter, 2005). Furthermore age related differences were examined in order to examine Picard and Vinter's (2005) suggestion that older children were more likely to draw according to the accretion principle than the core-to-periphery progression principle.

The results for the house and flower drawings supported those found in previous research (see Chapter 6 and Picard & Vinter, 2005). The higher the frequency of occurrence of a feature the earlier it was drawn, a finding evident across all children's drawings. These results therefore support the core-to-periphery progression principle. Furthermore no clear age related differences were observed. Both the older and younger children in the house and flower topics appeared to be drawing according to the core-to-periphery progression principle. The low level of standard deviations for both the house and flower drawings also further supported the fact that there was a high level of similarity across children in terms of how they drew these topics.

It was hypothesised that as children would not be familiar with the core features that would specify a nice and a nasty person their drawings of these topics would not follow a core-to-periphery progression principle although the neutral figure would. The neutral human figures did indeed show a pattern similar to that of the house and flower in which a minimal version of a human outline was constructed first to which details were then added. However, due to the large number of features that were classified as core in terms of their frequency of occurrence it was not as easy to establish if a feature had been drawn early in a sequence as a result of its salience or simply as a result of an accretion principle. Thus, contrary to the hypothesis put forward in the introduction, a clear indication of the core-to-periphery progression principle could not be established for the neutral figure. For example the pattern for the neutral people drawings tended towards 'head → body → arms → legs'. All four features were classed as core; however, the sequence could also be explained by accretion as the child works their way from top to bottom along a vertical axis. Whilst age related differences were observed in the drawing sequence these provided no clearer indication of what may be motivating the sequence with which features were being drawn. The older children did show more of a tendency to draw the facial features before moving on to the rest of the body. It would be hypothesised, based upon the results reported by Picard and Vinter (2005) that the older children would be more likely to be drawing according to accretion. Once again however, the earlier inclusion of facial features may also reflect the salience of these features (as again they were also deemed core features) and thus the core-to-periphery progression principle.

The results for the nasty human figure drawings could, contrary to the hypothesis put forward in the introduction, be interpreted as providing clearer evidence for the core-to-periphery progression principle. For the nasty people drawings the facial features were drawn earlier in the sequence than for the neutral person. Furthermore the features of hair, teeth, ears and eyebrows were all drawn earlier in the sequence than the body, arms, legs, hands, feet and clothes. The use of hair, notably spiky hair, earrings, sharp or bared teeth and inclined eyebrows were all SVFs that were most commonly used in nasty people drawings. This, combined with the fact that they were drawn earlier in the sequence for nasty people drawings, may indicate that due to their importance in specifying a nasty person they were drawn earlier. This would be in keeping with the core-to-periphery progression principle. However, what limits this evidence is that there was found to be a lack of clearly established core features for depicting nasty people.

The lack of clear evidence to support either the core-to-periphery progression principle or accretion principle in the human figure drawings supported the hypothesis that children would not show as many similarities, both in terms of the drawing sequence and the features used, for the nice and nasty human figure drawings. The content analysis did not reveal any clear similarities in terms of the specific features children drew for the nasty person and to a lesser extent the nice person (although a smile was found to be a core feature here). Therefore there were no core features for these topics that could then be drawn according to a core-to-periphery progression principle. It must however be acknowledged that the large number of features included in human figure drawings could also have made it difficult for any clear drawing sequence to be recorded and this could account for a lack of a clear core-to-periphery progression principle.

Overall the results suggest that children do display fewer similarities in terms of the features they use for less concrete, more descriptive topics (nice and nasty) than more concrete topics (a house and a flower). The results from Chapter 4 also indicated that children show fewer similarities in terms of the features drawn for less concrete topics (angry, scared and confused faces). Clear support, based upon the core-to-periphery progression principle, for the hypothesis that children do not hold well established core features for the drawings of the more descriptive topics of nice and nasty drawings was not provided by the data. This could be interpreted as having shown that children do not hold well established core features for these topics. Furthermore the sequence with which children drew features did support the hypothesis that those features drawn for the objects that showed a high level of similarity across children's drawings were associated with being core features for those object-categories. This in turn supports the hypothesis that the internal representations that children may hold for these less concrete, more descriptive topics are not as clearly specified as those for concrete objects. So whilst some general factors may be similar (such as gender for nasty people) the specific details are not. This could be a result of the greater plurality of possible examples of nice and nasty people that children have experience of. As such it is hard to isolate, identify and store features they may all have in common. Whereas for a house or a flower for example there are certain features that all houses and flowers have as a functional necessity, such as a roof or a stem.

In order to examine this hypothesis further Chapter 8 reports on the findings from the second half of this study. Children were interviewed about their drawings and asked why they had drawn the features that they had. The interview was designed so as to examine the extent to which children may be drawing features due to the functional role they play in defining an object.

Chapter 8

Children's explanations for the features they have drawn

8.1 Introduction

The current study set out to better understand the use of core features in children's drawings by expanding upon and assessing the reliability of the results reported in Chapter 7. Children took part in a semi-structured interview in order to examine the extent to which those features identified as core in Chapter 7 were also perceived by children to be important features in their typical drawings of a house, a flower, a neutral, a nice and a nasty person. The interview carried out in the current study also provided the opportunity to examine the extent to which children's own reasons for including certain features in their drawings compliment the argument put forward as a result of the content analyses conducted in Chapters 4, 6 and 7. It was argued that children may have shown fewer similarities in the features they drew for less concrete, more descriptive topics (such as the affective states of angry, scared and confused or the affective characterisations of nice and nasty) because they did not have recourse to specific core features that would denote these topics. Therefore it would be expected that there would not be consistency across children's responses to the interview questions regarding what they viewed to be the core features in their drawings of nice and nasty people. The present study also provided the opportunity re-examine the perception task results reported in Chapters 2 and 3. Children were asked to explain why they had identified the larger or smaller figure as nice or nasty. It was anticipated that these explanations could clarify why children have been found to use size consistently in drawing perception tasks but not in drawing production tasks.

The use of children's own reports about why they drew something in a certain way marks a shift from more well established methods used in examining children's drawings. Drawing research in the experimental tradition has in the past tended to focus on the product during children's drawing tasks whilst not attributing as much importance to the process by which the drawing comes about (Birbeck & Drummond, 2005). Furthermore, the intention of the child and the intended meaning of their drawing can be overlooked as the drawing is interpreted by an adult sometimes without any insight into what the child may have desired the drawing to represent (Gross & Hayne, 1999).

In keeping with a more general move towards a greater emphasis on involving children in research (Christensen & James, 2000) and making sure their voice is heard in matters that concern them, most notably in areas of early childhood education (Cremin & Slatter, 2004; Dockett & Perry, 2005, 2007), drawing research has begun to place a greater emphasis on the child as collaborator and begun to investigate children's reports of their drawing intentions and explanations of their drawings. The research reported here was conducted in light of this shift and in response to a call for greater examination of children's own views of their drawings (Jolley, 2010).

The two-way interaction between child and researcher about the drawing process should hopefully facilitate a greater understanding of the drawing, and shift the emphasis on to the role of drawings as expressions of meaning and understanding (Ring, 2006). Experimental drawing research that ignores the child's perspective could be criticised as a "process that is devised by adults, applied to children with results interpreted by adults" (Birbeck & Drummond, 2005, p.582). Such criticism has led to a shift in focus in some areas of drawing research onto children's own reports regarding their drawings. This has seen more attention being paid to the narrative that accompanies children's drawing both during the drawing process as well as in their description of the end product (Coates, 2002; Coates & Coates, 2006; Kress, 2000). It is the child's explanation of the end product, the finished drawing, which is of primary concern to the study reported here.

The exploratory nature of the interview reported in this chapter entailed the construction of open-ended questions with relatively open terminology so as not to lead children's responses. Due to the implications that open-ended questions could have upon the length of time the interview data collection could take, each child was asked a maximum of four questions for each drawing. The questions children were asked about their drawings were designed so as to provide support for the "results interpreted by adults" (Birbeck & Drummond, 2005, p.582) reported in Chapter 7. Children's interview responses were examined for the similarity that they showed to the conclusions made based on the content analyses carried out in Chapter 7. For all drawing topics children were asked to draw the named topics (Session 1 of the study, reported in Chapter 7) and then, following completion of all the drawings, were asked why they had drawn the pictures the way they had (Session 2 of the study, reported in the current chapter). This initial question was designed to examine if children were explicitly aware of having drawn for a communicative purpose or for some alternative reason.

Children were also asked to identify what features they thought to be the most important in their drawing. This question was asked so the features identified as important by the children could then be compared with those identified as core in the content analysis reported in Chapter 7. An extension to this question was asked with regards the more concrete drawing topics of a neutral person, a flower and a house. Children were asked to explain why they had identified those particular features as being important. The aim of this question was to assess the argument put forward in Chapter 7 that the core features drawn in concrete topics were included due to their functional necessity for that topic (a door drawn in a house so you could get in and out for example).

A final question, similar to that posed by Burkitt and Barrett (2010), was asked with regards to the drawings of nice and nasty people. Burkitt and Barrett (2010) examined children's and adults' reports of the different strategies children used to depict the characterisation of nice and nasty in drawings of a man, a dog and a tree. Burkitt and Barrett (2010) specifically asked children how they had shown their drawing was of a nice or nasty man/tree/dog. The responses given by the children validated the strategies that adults had identified. Therefore in the current study children were asked how they thought someone could identify their drawing as either a nice or nasty person. This question sought to corroborate the conclusions reached by the content analysis reported in Chapter 7, namely that children were not explicitly aware of the core features that specify a nice or nasty person.

Finally, in order to assess why children have shown a consistent response in drawing perception tasks examining the relationship between size and affect (as in Chapters 2 and 3), but not in production tasks in the current thesis, children took part a drawing perception task. The drawing perception task procedure was the same as that which had been conducted in the studies reported in Chapters 2 and 3. It was hypothesised that children, as in previous studies, would identify the larger figure as nasty and the smaller figure as nice. In order to gain further understanding as to why this may be the case children were then asked, following their completion of the perception task, to explain the reasons for their choice.

The main aims of the current study were therefore:

To assess whether the features identified as core features in the content and sequencing analyses carried out in Chapter 7 were also identified by children as important in their own drawing.

To assess the extent to which children's explanations as to why certain features were important are in line with the arguments put forward in Chapter 7: that features in the object drawings were core due to their functional importance.

To further understand why children show consistency in using size to determine affect in drawing perception tasks but not in drawing perception tasks.

8.2 Method

This chapter concerns Session 2 of the investigation described in Chapter 7. Session 1 and the materials used in Session 2 have been described in Chapter 7. The procedure for Session 2 is described below.

8.2.1 Participants. The same participants that took part in Session 1 reported in Chapter 7 took part in Session 2 described here. 41 children (21 girls and 20 boys) aged between 6- and 11-years (M = 10.1 years, SD = 4.11 years) took part in the study. The children were divided into two age groups 6- to 7- years (n = 17, M = 6.8 years, SD = 5 months) and 11- to 12-years (n = 24, M = 11.6 years SD = 5 months). All the participants went to a mainstream primary school in London, UK.

8.2.2 Procedure

Semi-structured interview. Immediately following the drawing task (Session 1, reported in Chapter 7, Section 7.3.3) children's drawings were placed separately, in counterbalanced order, in front of them. For each drawing they were asked the following questions:

Q1). *Why did you draw the* [name of object/figure] *the way you did?*

The second question was a two part question. Due to the open-ended structure of the question the second part was included in order to ensure that children clarified why they thought those specific features to be important if they had not done so in their initial response to Question 2. Some children provided explanations without the need for the prompt of the second part of the question.

Q2a). *What do you think are the most important things you need to include in a drawing of an* [name of object/figure]?

Q2b) *Why do you think they are the most important things?*

For the nice and nasty people drawings the question below was asked:

Q3). *How would someone be able to recognise this as a picture of a [nice/nasty] person?*

The questions were repeated in full if the child did not understand. All children were made explicitly aware prior to the commencement of the interview that there was no right or wrong answer. If children were having difficulty responding they were again reassured that whatever they answered was considered the correct answer and if they were really unsure then they could simply say that they were unsure. There was no time limit placed upon how the children had to respond to each question.

Following the interview a drawing perception task took place.

Picture perception task. The perception task was carried out after the interviews so that children's participation in the perception task did not influence the responses given during the interviews. Children were randomly assigned so that half were shown Card A and half shown Card B. The instructions given regarding the perception task were counterbalanced; half of the children were given the following instruction:

One of these men is very horrible and mean, and they are very unfriendly to everyone and the other man is a nice man, a man who is very kind and nice and they are very pleasant and friendly to everyone. Can you tell which one is the nasty man and which one is the nice man?

The other half of the children were given the following instruction:

ıen is very kind and nice and they are very pleasant and friendly to everyone and the 'ery horrible and mean, and they are very unfriendly to everyone. Can you tell which one ın and which one is the nice man?

n a quantitative independent measure of how the children felt about each figure they sented with a Likert scale and asked to rate how they felt about each figure after they had n as nice or nasty.

ir identification of the figures as nice or nasty the children were asked:

hink that the [*big/small*] *man was* [*nice/nasty*] *and the* [*small/big*] *man was* [*nasty/nice*]*?* her questions the question was repeated in full if the child indicated that they had not e question. Children's responses to all the questions were recorded on a Dictaphone.

Data Analysis

terview responses. In order to examine what features the children thought were ılient for the depiction of each of the topics and the children's explanation of why they ıres in the way they did, a content analysis was carried out on children's responses to the ɘd interview questions.

perimenter examined all the children's verbal responses in order to identify possible response, and then drew up a formal list of categories accompanied by their definitions. r Questions 1 and 2b were mutually exclusive. For all the other questions children could responses. A random sample of 20% of the children's interview responses were then cond rater, naive to aims of the experiment, using this formal list with the additional *ther* included for Questions 1 and 2b to allow for the possibility that not all categories of responses had been accounted for by the experimenter in the initial analysis. The *other* category was not used for any of the questions indicating that the initial content analysis had accounted for all possible categories. Inter-rater agreement was at 100% as all responses received the same coding from both raters. This list of categories was then used by the experimenter to classify the verbal responses given to the four questions. The categories identified for responses to each question are listed below. Selections of transcripts that provide examples of how responses were coded for each question are also listed.

<u>Q1). Why did you draw the [name of object/figure] the way you did?</u>

Responses coded as follows:

Egocentric reasons – because I like..., or that is how I usually draw it, it is me/my house

Aesthetic - that is what an X looks like, it looks cool/good

Communicative – so that people can see it is an X

Influence of others – that is how X showed me, that is how it is drawn by Y

Practical reasons - it is easier to draw like this, it is the only way I know

Unsure

Example of coding of response* to *Question 1

Experimenter: *Why did you draw the person the way you did?*

Child: *Well...I decided to draw in circles and then just go over it again because that is what my dad taught me, he's an artist. Then you just rub out the circles.*

This response was coded as *Influence of others.*

<u>Q2a). What do you think are the most important things you need to include in a drawing of a [name of object/figure]?</u>

Responses coded as follows:

All features given in response were recorded and then a quantitative analysis was made in order to establish the most frequently mentioned drawn items.

Q2b). Why do you think they are the most important things?

Responses coded as follows:

Functional – a functional reason, eyes so you can see, a roof so you don't get wet etc.

Communicative – so you can tell it is an X

Unsure

Example of coding of response **to** ***Question 2***

Experimenter: *What do you think are the most important things you need to include in a drawing of a house and why do you think they are the most important things?*

Child: *Um...a roof because the house wouldn't be very nice to live in if it didn't have a roof because if it was raining the rain would go all over you and drench you and a door because otherwise a thief could just walk in and steal stuff and windows otherwise it would just be a very dark house and you might want to open a window to look out.*

This response was coded for the important features of *roof, door* and *windows*. The reason for these features being included (Q2b) was coded as *functional.*

Q3). How would someone be able to recognise this as a picture of a [nice/nasty] person?

Responses coded as follows:

All features given in response were recorded and then a quantitative analysis was made in order to establish the most frequently mentioned drawn items.

Example of coding of response **to** ***Question 3***

Experimenter: *How would someone be able to recognise this as a picture of a nice person?*

Child: *Because she is friendly here, she is saying hello, she is waving. And she has a smile here.*

This response was coded for the features of *smile* and *action*.

8.3 Results

8.3.1 Semi-structured interviews

Questions 1 and 2i - Children's explanations for why a drawing was made the way it was. Questions 1 and 2a sought to examine the extent to which children were able to articulate their awareness of why they had drawn the topic the way they had and included the features they had. These questions thus sought to address the second aim listed in the introduction.

Question 1. Responses to Question 1 (why children drew the figure/object the way they did) were coded into six mutually exclusive categories: *egocentric* reasons, *aesthetic* reasons, *communicative* reasons, the *influence of others*, *practical* reasons and *unsure*. The results in terms of percentage of response given to Question 1 for each of the six categories of response across all five drawing topics are displayed in Table 8.1.

Table 8.1: *Percentages of response for given to Question 1 for each category of response by age groups and overall*

		Response					
Drawing topic	Age	Egocentric	Aesthetic	Communicative	Influence of others	Practical	Unsure
House	Younger (n = 17)	58.8	5.9	0	0	17.6	17.6
	Older (n = 24)	45.8	25	0	0	20.8	8.3
	Overall (N = 41)	51.2	17.1	0	0	19.5	12.2
Flower	Younger (n = 17)	47.1	23.5	0	0	0	29.4
	Older (n = 24)	29.2	45.8	0	4.2	12.5	8.3
	Overall (N = 41)	36.6	36.6	0	2.4	7.3	17.1
Neutral Person	Younger (n = 17)	35.3	23.5	0	0	5.9	35.3
	Older (n = 24)	29.2	20.8	4.2	4.2	25	16.7
	Overall (N = 41)	31.7	22	2.4	2.4	17.1	24.4
Nice Person	Younger (n = 17)	17.6	35.3	11.8	0	5.9	29.4
	Older (n = 24)	4.2	20.8	54.2	4.2	0	16.7
	Overall (N = 41)	9.8	26.8	36.6	2.4	2.4	22
Nasty Person	Younger (n = 17)	17.6	58.8	11.8	0	0	11.8
	Older (n = 24)	4.2	33.3	41.7	4.2	0	16.7
	Overall (N = 41)	9.8	43.9	29.3	2.4	0	14.6

The category of response given showed a marked difference between topics, with egocentric and practical reasons being the most frequent response given across both age groups for all topics except the nice and nasty people. For nice and nasty people there were a high percentage of responses in the communicative category.

Responses coded in the communicative category were mainly given for the nice and nasty people drawings. The older children gave a higher proportion of responses in this category than the younger children. These results would suggest that not only are the children more aware of the need for these drawings to communicate the desired characterisation but also that this increases with age.
The increase in responses coded in the communicative category for the characterised figures could reflect the fact that there was a clearer need to communicate something in these drawings. The drawings of a house, a flower and a neutral person only needed to successfully communicate that they were simply generic exemplars of those topics. The nice and nasty figures needed to distinguish themselves from simply a drawing of a generic person (the neutral figure).

The younger children gave a higher number of responses to Q1 that were coded in the aesthetic category for the drawings of nice and nasty people (simply *that is how a nasty person is*, for example). These results suggest that younger children had been exposed to a more limited range of exemplars of this type of figure and as such had a smaller pool of information to draw upon. As a result the figure they drew may have been more likely to represent a specific nasty person. This in turn could explain the lack of similar features found in the content analysis of the nasty people drawings reported in Chapter 7.

Question 2b. In Question 2b children were asked why they had identified certain features as important in their house, flower and neutral person drawings. Responses were given that fell into three categories, *functional* (for example, door so you can get in and out, stem so the flower can grow and eyes so you can see), *communicative* (so you can tell it is a house/flower/person) and *unsure*. The results in terms of percentage of response given to Question 2b for each of the three categories of response across the three drawing topics are displayed in Table 8.2.

Table 8.2: *Percentages of response for given to Question 2b for each category of response by age groups and overall*

		Response		
Drawing topic	Age	Functional	Communicative	Unsure
House	Younger (n = 17)	82.4	11.8	5.9
	Older (n = 24)	83.3	12.5	4.2
	Overall (N = 41)	82.9	12.2	4.9
Flower	Younger (n = 17)	82.4	17.6	0
	Older (n = 24)	75	25	0
	Overall (N = 41)	78	22	0
Neutral Person	Younger (n = 17)	52.9	35.3	11.8
	Older (n = 24)	58.3	41.7	0
	Overall (N = 41)	56.1	39	4.9

The majority of responses across both age groups for all three drawings fell into the functional category. These results reinforce the argument that, in order to portray the topics of a house, a flower and a neutral person, the primary explanation for feature inclusion was that the feature was necessary for the successful functioning of the topic (i.e. eyes so you can see in the neutral person drawings and a roof so rain does not get in for the house drawings). This was also reflected in the content analysis (reported in Chapter 7) carried out on the drawings whereby there were a limited number of additional details, not required for the successful functioning of the object, in each of these drawings.

Questions 2a and 3 - Core features described by the children. Questions 2a and 3 were asked in order to identify the features that children deemed most important to the depiction of the topic given to them. Therefore these questions specifically addressed the first aim noted in the introduction. Children were able to give more than one response (i.e. identify more than one feature). The frequencies with which all the features that were identified by the children as the *most important* for a topic as well as those they felt were the most likely to aid identification for the nice and nasty people were calculated. These results are displayed for each of the drawing topics in Tables 8.3 to 8.8.

Table 8.3: *The frequencies (in percent) with which children identified a feature in their house drawings as important (Q2a)*

	Features					
Age	Door	Windows	Roof	Body	Chimney	Doorknob
Younger (n = 17)	88.2	82.4	58.8	17.6	11.8	0
Older (n = 24)	95.8	62.5	66.7	33.3	4.2	4.2
Total (N = 41)	92.7	70.7	63.3	26.8	7.3	2.4

Table 8.4: *The frequencies (in percent) with which children identified a feature in their flower drawings as important (Q2a)*

	Features						
Age	Petals	Stem	Face	Leaves	Roots	Ground	Pot
Younger (n = 17)	70.6	82.4	35.3	52.9	5.9	0	0
Older (n = 24)	83.3	66.7	54.2	16.7	4.2	8.3	4.2
Total (N = 41)	78	73.2	46.3	31.7	4.9	4.9	2.4

Table 8.5: *The frequencies (in percent) with which children identified a feature in their drawings of a neutral person as important (Q2a)*

	Features											
Age	Head	Face	Eyes	Body	Mouth	Nose	Legs	Arms	Clothes	Hair	Feet	Hands
Younger ($n = 17$)	52.9	41.2	70.6	23.5	58.8	41.2	29.4	5.9	5.9	11.8	5.9	11.8
Older ($n = 24$)	87.5	66.7	45.8	66.7	33.3	29.2	25	20.8	20.8	16.7	16.7	8.3
Total ($N = 41$)	73.2	58.5	56.1	48.8	43.9	34.1	26.8	14.6	14.6	14.6	12.2	9.8

Table 8.7: *The frequencies (in percent) with which children identified a feature in their drawings of a nice person as important (Q2a) as well as those features that others would use to identify the person drawn as nice (Q3).*

		Features									
Q	Age	Smile	Action	Face	Eyes	Detail	Eyebrows	Hair	Hands	Gender	Clothes
2a	Younger ($n = 17$)	70.6	11.8	23.5	41.2	5.9	5.9	5.9	11.8	0	5.9
	Older ($n = 24$)	91.7	29.2	12.5	0	12.5	8.3	4.2	0	8.3	0
	Total ($N = 41$)	82.9	22	17.1	17.1	9.8	7.3	4.9	4.9	4.9	2.4
3	Younger ($n = 17$)	82.4	23.5	0	11.8	0	0	5.9	5.9	0	0
	Older ($n = 24$)	91.7	37.5	4.2	0	29.2	4.2	0	0	0	0
	Total ($N = 41$)	87.8	31.7	2.4	4.9	17.1	2.4	2.4	2.4	0	0

Table 8.8: *The frequencies (in percent) with which children identified a feature in their drawings of a nasty person as important (Q2a) as well as those features that others would use to identify the person drawn as nasty (Q3).*

		Features										
Q	Age	Face	Eyes	Eyebrows	Hair	Action	Teeth	Weapon	Clothes	Detail	Hands	Size
2a	Younger ($n = 17$)	52.9	11.8	23.5	29.4	11.8	11.8	5.9	11.8	11.8	5.9	0
	Older ($n = 24$)	50	41.7	25	20.8	16.7	12.5	12.5	8.3	4.2	4.2	8.3
	Total ($N = 41$)	51.2	29.3	24.4	24.4	14.6	14.6	9.8	9.8	7.3	4.9	4.9
3	Younger ($n = 17$)	35.3	29.4	23.5	29.4	17.6	11.8	0	0	11.8	0	0
	Older ($n = 24$)	29.2	8.3	33.3	12.5	33.3	12.5	12.5	0	20.8	0	0
	Total ($N = 41$)	31.7	17.1	29.3	19.5	26.8	12.2	7.3	0	17.1	0	0

Fewer features overall were identified as important by the children than were identified as core in the content analyses reported in Chapter 7. Using the same criteria to define a core feature as used for the content analyses in Chapter 7 only two features across all the drawings would have reached the level of frequency of occurrence in children's responses (80%) to be classified as a core feature. These were *door* (92.7%) for house drawings and *smile* (82.9%) for the drawings of a nice person. No features reached the level of a core feature for drawings of a flower, neutral or nasty person. However, when examined by age the *stem* (82.4%) for the younger children and the *petals* (83.3%) for the older children reached the level of a core feature in drawings of a flower. The features of *windows* reached the level of core feature for the younger children's house drawings. The only other age related core feature was *head* (87.5%) for the neutral drawings. This reached the level of frequency of occurrence in the older children's responses to be classified as a core feature.

8.3.2 Picture perception task. Children took part in a picture perception task in order to test the reliability of previous results (reported in Chapters 2 and 3) that children showed a consistent interpretation of affect based solely on size. The percentages of the responses given for each figure are shown in Figure 8.1.

In line with previous results (Chapters 2 & 3; Cotterill & Thomas, 1990; Jolley, 1995; Galpin, 2006) Figure 8.1 indicates that the majority of children (82.9%, n = 34) rated the larger figure as nasty for both age groups (82.4%, n = 14, in the younger and 83.3%, n = 20, in the older age group).

In order to ensure that the appropriate affect was felt towards each figure, children were asked to rate, on a Likert scale, how they felt about the figures they had identified as nice or nasty. The mean Likert ratings given for each characterisation of figure for each age group and overall are displayed in Table 8.9. The higher the rating the more negatively they had rated the figure.

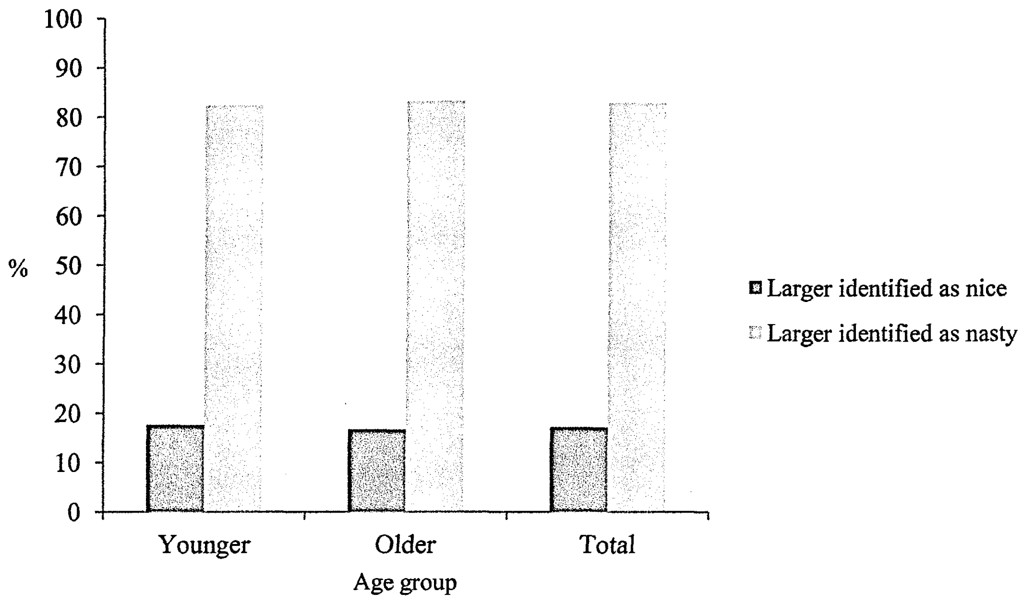


Figure 8.1: Histogram displaying drawing perception task responses, in percent, by age group and in total

Table 8.9: *Mean Likert ratings given for the affectively characterised figures in the drawing perception task*

Identification of figure	Age		
	Younger	Older	Overall
Nice	2.35 (*SD* = 0.70)	2.38 (*SD* = 0.88)	2.37 (*SD* = 0.80)
Nasty	5.41 (*SD* = 0.80)	5.63 (*SD* = 0.82)	5.54 (*SD* = 0.81)

These ratings were submitted to a 2 (Age) x 2 (Identification of figure) mixed design ANOVA with Identification of figure (nice or nasty) entered as the repeated measure and Age as the between subjects measure. Significant main effects for Identification of figure, F (1, 39) = 391.64 $p < 0.01$, $\eta^2 = 0.91$, $P = 1.00$, were found. No significant main effect for Age or significant interaction effect was found. The figure identified as nice was given a significantly ($p < 0.01$) lower (and therefore more positive) rating than the figure identified as nasty.

Following the identification task, children were asked to explain the choice they had made. Of the 34 children who identified the larger figure as nasty, 21 (9 younger and 12 older) made reference to the larger figure being a bully. Six (two younger and four older) children made less specific reference to the larger figure being a bully, referring instead to their physical dominance and ability to fight. Four children felt the larger figure was nasty because they were a *show off* or *bossy* with the remaining three unable to provide a precise reason for their choice.

Five (three younger and two older) of the seven children who identified the larger figure as nice also cited physical strength as the principle reason why the larger figure was identified as nice; with the larger figure able to *protect people* or that they were an *adult* and therefore nice. The remaining two children who identified the larger figure as nice gave reasons for this being the case as the small figure was nasty therefore, due to the binary choice, the larger figure had to be nice. These results would suggest that children may view size as a core feature of certain specific figures (bullies) but that nasty people in general, due perhaps to the vague nature of the term *nasty*, does not in and of itself have a size associated with it.

8.4 Discussion

The three main aims addressed in the current study were to: (1) assess whether the features identified as important in a drawing by children were also identified as core features in the content and sequencing analyses carried out in Chapter 7; (2) to examine children's explanations as to why certain features were core to assess the extent to which their responses were in line with the arguments put forward in Chapter 7; and (3) to further understand why children show consistency in using size related to affect in drawing perception tasks but not in drawing production tasks. The results will be discussed for each of these aims in turn.

(1) Features identified as important. For all the topics, the children's identification of the most important features in their drawings corresponded to the core features which had been identified in Chapter 7. For the neutral person, flower and house drawings however not all the core features identified in Chapter 7 were mentioned by all the children. Whilst some children mentioned more than one feature many may have felt that any single core feature was in and of itself all that was necessary and sufficient to define these topics. Furthermore the high level of salience associated with the features mentioned (as evidenced in the core-to-periphery progression principle results described in Chapters 6 and 7) may imply that mentioning one presupposes the implicit reporting of the others by association (the mentioning of head for example implying the inclusion in this response of the features of eyes, nose and mouth). The association of one feature with another could also explain the low percentage of identification of the core features of *body* and *face* as important features by the children in their house and flower drawings respectively. Body and face were not clearly defined as separate features, instead they may have been seen simply as by-products of the other features, a frame upon which to hang other features such as a *roof* or *petals*. This may explain why not all features, using the same percentage of inclusion criteria as the content analysis, corresponded to core features (mentioned by over 80% of children) identified in Chapter 7.

For drawings of nice people, a smile was reported by children to be an important feature in drawings of nice people. Furthermore, in response to Q3, children answered that a smile would be a feature that others would use to identify their human figure drawing as a nice person. A smile was also identified as a core feature in the content analysis carried out in Chapter 7. In line with the content analysis carried out in Chapter 7 no single feature was reported across children to be important to include in a nasty person drawing. The content analysis conducted in Chapter 7 showed that nasty drawings were significantly more likely to be drawn as male. However, the children did not identify gender as a significant determiner of nastiness in their interview responses. The fact that children did not then identify gender as an important feature in their interview responses (Q2a) suggested that they were either not explicitly aware of using it or that it was so well established that it did not need pointing out. Additionally children's responses to Q3 did not clearly identify any single feature that they felt others may use to identify a drawing of a person as nasty. However, there was an increase in the number of responses that mentioned actions and details from Q2a (features the child identified as important) to Q3 (features the child thought others would use to identify the drawing) suggesting that children felt that these more detailed, demonstrative and contextual features would be used by someone to identify a drawing of a person as nasty. Burkitt and Barrett (2010) also reported that children showed a greater use of detail in the drawings of nasty as opposed to nice people, with children reporting that the use of detail was one of the ways in which they had demonstrated that their drawing was of a nasty person.

Details and *actions* for both of the characterised figures (nice and nasty) showed an increase in frequency of response from Q2a to Q3. Both of these categories of features are able to display affect in a more obvious manner (specific details such as t-shirt slogans *I hate everybody* and actions such as *giving presents* or *hitting another*). For other, arguably less demonstrative details such as eyes or face there was a reduction from Q2a to Q3 in the numbers of responses given that mentioned these features. The explicit identification of more contextual details as aiding recognition of nice and nasty people is discussed in Chapter 9 in relation to the lack of significant use of size to display the difference between nice and nasty figures in Chapters 2 and 3.

(2) Children's explanations as to why certain features were core. It was argued in Chapter 7 that the features classified as core in the content analysis, were those that could be deemed to be essential to the functions carried out in relation to the topic (door to get in and out of the house, stem to hold the flower up for example). The children's interview responses in Question 2b supported this position. In the majority of responses to Question 2b for the house, flower and neutral person drawings children stated the main reason why they had drawn the features they did was functional. Therefore, in line with the results reported in Chapter 7, these responses would indicate that children's object categories for these more concrete topics are well defined and based upon clearly identified features that reflect a functional necessity for that topic (a roof so water does not get in for example). Such features could be seen to be iconic representations. This position is discussed further in Chapter 9. The less concrete, more descriptive topics of the nice and nasty people, unlike the house, flower and neutral person, required children to draw more specific exemplars of a general category (person). Children's responses to Q1 highlighted their acknowledgement of the need for these drawings to communicate something specific as the majority of responses given to this question were coded as communicative rather than functional. This communicative response was usually given for the nice and nasty drawings. Only 4.2% of children gave a response that could be categorised as communicative for the less concrete topics. This need to communicate a specific exemplar could account for the high level of idiosyncrasy observed in the features used to represent these topics as each child may have based their drawing upon a specific nice or nasty person.

Drawings of less concrete, more descriptive topics, such as figures described as nasty, relied to a greater extent on contextual details or idiosyncratic exemplars to define them. The difference between the number of responses to Q1 coded as communicative between the older and younger children could further emphasise this.

In terms of differences between the age groups the older children were more likely to provide a response coded as communicative than the younger children who gave a higher proportion of responses coded as aesthetic (for example *that is what a nasty person looks like*). Thus whilst the older children were aware of the need to communicate the fact that the person is a nasty person (through the use of additional details or actions) the younger children may have been drawing a more idiosyncratic exemplar of a nasty person (as evidenced by the lack of core features across children identified in Chapter 7 and children's own interview responses) but think that this provides a clear example. Their categorical representation of a nasty person may be relatively narrow and as such a specific exemplar could be seen to be representative of the core features of that topic. The younger children may not have experienced such a wide variety of nasty people images and they are therefore unable to identify general features that all hold to be similar. The older children, on the other hand, could be argued to have acknowledged the lack of a single core feature that defines nastiness and the need for the use of explicit, demonstrative contextual details (such as someone *being* nasty to another person) in order for the drawing to be successful. Drawing success here utilises Willats' (2005) definition of an effective representation as one whereby "...something specific can be seen and recognised clearly and unambiguously" (p.14). What is clear is that both age groups required the use of more specific details and the use of context to define the less concrete, more descriptive topics (more so for the nasty drawing). This in turn could explain the lack of consistency seen in previous studies that have examined children's use of size to display affect in their drawings (see Chapters 2 and 3). The results from the drawing perception task further support this.

(3) Why children show consistency in using size related to affect in drawing perception tasks but not in drawing production tasks. In the drawing perception task, as in previous results (see Chapters 2 and 3), the majority of children identified the larger figure as nasty and the smaller figure as nice yet they did not use size as significant determiner of these characterisations in their own drawings. Size was also not identified as an important feature in children's interview responses regarding their drawings. Children's interview responses in the perception task, about why they had identified the figures the way they had, revealed that children who perceived the larger figure as nasty had identified the larger figure as a bully. As such the use of size was perhaps more closely associated with the term *bully* than nasty in and of itself. Again the term nasty was thus not seen to be attached to any specific features for the child but instead it needed to be put into context, a specific type of nasty, for example a bully. This further suggests that many different idiosyncratic representations of nastiness exist due to the less concrete nature of the word. As such, assessing the nastiness of a figure in children's drawings may not be done using such measures gained from the general population and instead must be examined across drawings made by a specific individual as has been suggested by Thomas and Jolley (1992).

In conclusion, the results reported here support the content analysis carried out in Chapter 7. Children did not readily identify core features for less concrete, more descriptive topics. Furthermore for the more concrete topics the core features were deemed salient due to their functional importance (i.e. a roof to stop rain coming into a house). These results further point towards children's categorical representations of less concrete, more descriptive topics as less clearly defined, perhaps allowing for the plurality of applications that such terms can have due to the wide range of manifestations of niceness and nastiness. Furthermore, as will be discussed in Chapter 9, the data reported here could be argued to provide an explanation for the lack of consistency found in previous studies that have examined the effects of affect on the size of children's human figure drawings (an area of research that motivated the studies reported in Chapters 2 and 3 of this thesis).

Interviewing children proved to be a highly informative and fruitful method for examining children's drawings. The results confirmed and clarified data gained from the content analysis in Chapter 7 and also provided a clearer understanding of children's perception task results. It was evident from children's own responses that they were identifying the figure in the perception task as a specific exemplar of a nasty person. This in turn provides a possible explanation for the inconsistency found in the literature regarding the relationship between size and affect in drawing production tasks. This explanation is discussed in more detail in Chapter 9.

The inclusion of children's own explanations for why they had drawn what they did also proved to be a highly informative method for examining children's drawings. As had been noted by Burkitt and Barrett (2010) the children's responses to the interview questions in the current study enhanced and clarified results gained from the content analyses and other quantitative measures and proved to be a fruitful paradigm. The results reported here highlight the need for future research to ensure that it takes into account children's own views of their drawings in order to gain a more holistic understanding of children's drawings.

Chapter 9

Concluding Discussion

The current chapter will begin with a brief overview of the studies reported in the main body of the thesis. A summary of the main findings from each of the studies and how they relate to one another and the literature reviewed in Chapter 1 will then be presented. The implications of these results for each of the main questions and issues raised in Chapter 1, as well as limitations regarding the results, will also be considered. The potential explanations for the results obtained in the thesis will then be discussed followed by suggestions for future research.

9.1 Overview

The present sequence of studies was designed to examine the impact of affect and labelling on children's drawings. The influence of labelling on the form of children's drawings was examined across both objects and emotions. Free drawings as well as drawings copied from a model were examined. The first two empirical studies, reported in Chapters 2 and 3, specifically addressed the literature regarding children's (intentional or incidental) use of size in relation to affect. Previous research had indicated that children will reliably increase the size of positively characterised drawing topics (Burkitt et al. 2003a, 2003b; Fox & Thomas, 1990; Thomas, et al., 1989). It had also been shown that children, although less reliably, decrease the size of negatively characterised topics (Burkitt et al., 2003b; Burkitt & Barnett, 2006). Two mechanisms were proposed to account for the size changes: acquired pictorial convention (APC) and an appetitive/defensive mechanism (ADM) (Thomas, et al., 1989). The focus of the first two studies, was upon the effect that a positive or negative characterisation of a human figure labelled as either nice or nasty, would have upon the size of children's human figure drawings when drawn from a model image. The studies set out to examine the two proposed mechanisms motivating size change as well as to address concerns regarding some of the methods used in previous research.

Chapters 4, 5 and 6 reported two empirical studies that examined the impact that naming has upon the accuracy of children's drawings when given a model to copy. The studies reported in these chapters also examined the similarity of features drawn in children's free drawings of objects and emotions, an area that had been under-researched. The final study, reported in Chapters 7 and 8, returned to the topic of positive and negative characterisations addressed in Chapters 2 and 3. Unlike the earlier studies in which the children copied a model figure, the focus for this final study was upon the similarities in children's free drawings of nice and nasty human figures. In the study reported in these chapters children were also interviewed in order to examine their explanations about why they had represented the topics in the way that they had.

9.2 Summary of the main findings

9.2.1 Children's use of size as an indicator of affect in human figure drawings. The study presented in Chapter 2 was designed to investigate children's use of size to represent the affect felt towards a drawn topic. It also set out to test two hypotheses that had been put forward to explain why children altered the size of positively and negatively characterised topics. These were acquired pictorial convention (APC) and an appetitive/defensive mechanism (ADM) (Burkitt et al., 2003b; Thomas, et al., 1989). A carefully designed experiment was conducted so as to control for a number of factors, other than affect, which might influence the size of children's drawings. Concerns regarding existing methodologies were also addressed. Thus, a new, more neutrally viewed model figure was used; independent measures of affect were taken; the instructions used to characterise the figures were shown to be reliable and drawings were made on both the same and separate sheets of paper. In order to investigate predictions from the APC theory children also took part in a drawing perception task. A comparison between perception and production tasks provided one of the primary evaluations of APC. Previous investigators have acknowledged the need to make this comparison in order to examine the APC and ADM theories (Burkitt et al. 2003b); however, only one unpublished study had done so (Jolley, 1995).

The experimental design was carefully constructed so as to examine the possibility that the inconsistencies found in the literature regarding children's use of size to display affect was due to the methods used in previous studies. Despite the clear and tightly controlled method used the study still failed to find a significant difference between the size of children's nice and nasty human figure drawings when instructed to draw from a model. The lack of any significant size change rendered the second aim of the study relatively moot. Testing which theory (APC or ADM) may be motivating size change required there to be a significant size change. However, a slight trend was found towards children drawing the nasty figure larger than the nice figure. This directly contrasted with previous results in the literature that have found nice figures to be drawn larger than nasty figures (Burkitt et al. 2003a, 2003b; Fox & Thomas, 1990; Thomas, et al., 1989). The results from the first study therefore added to the evidence regarding inconsistent effects, in terms of the direction of size change, found in the literature. Thus the study supported the position of researchers who have suggested that children's use of size to display affect is unreliable (Jolley, 2010; Strange et al. 2010) and no clear conclusions regarding the relationship between size and affect in children's human figure drawings, independent of other cues in the drawing context (Freeman, 1980), could be made.

The main findings regarding the drawing perception task were, however, encouraging in terms of supporting existing data in this area (Galpin, 2006; Jolley, 1995). Children identified larger figures as nasty and smaller figures as nice. This suggested that children do show a conventional response during picture perception tasks. Furthermore, the perception task results reflected the trend seen in the production task for nasty figures to be drawn larger than nice figures. It was argued that the similar results found for the production and perception tasks, whilst not significant for the production task, merited further study. Therefore whilst the evidence to support the reliable influence of affect upon the size of children's human figure drawings was very weak, the perception task results supported previous findings (Galpin, 2006; Jolley, 1995) and indicated that the majority of children, when having to judge a human figure based on size alone, did display a response for larger figures to be associated with negative characterisations and smaller figures with positive characterisations. Thus, children could be argued to be utilising a convention in the drawing perception task according to which larger figures are associated with negative characteristics and smaller figures with positive characteristics.

The study reported in Chapter 3 replicated the perception task findings of the study reported in Chapter 2. These results lent further support to the position that children were identifying the figures based upon a conventional response, larger figures being equated to negative characterisations and smaller figures to positive characterisations. The study also examined children's use of size in drawing production tasks. Again there was no significant size difference between nice and nasty drawn figures. Furthermore, the trend that was observed in terms of size change was for nice figures to be drawn larger than nasty. This was in the opposite direction to the results obtained from the first study, although in keeping with some previous findings (Burkitt et al. 2003a, 2003b; Fox & Thomas, 1990; Thomas, et al., 1989). In addition, the results did not indicate that children drawing for an audience displayed any greater size difference between their figures than those not drawing for an audience. The manipulation of the variable of an audience did not therefore result in clearer or significant results regarding children's use of size to display affect. The study reported in Chapter 7 also examined children's drawings of nice and nasty people, in this instance with the children not having a model to base their figure on. Once again no significant difference in size was observed between the nice and nasty human figure drawings.

Taken together the results from the studies reported in Chapters 2, 3 and 7 indicate that children do not reliably use size to depict positively (nice) and negatively (nasty) characterised topics. Despite the rigorous methods employed that involved the development of new, more reliable stimuli and various experimental manipulations that sought to optimise the conditions in which size change may be observed, these results taken together with those in the existing literature (Thomas & Jolley, 1989; Joiner, Schmidt, & Barnett, 1996; Jolley & Vulic-Prtoric, 2001) point to the conclusion that children, in a controlled experimental setting, do not reliably use size to depict affect in their drawings. However, in the drawing perception tasks children did reliably identify larger figures as nasty and smaller figures as nice.

Future studies that require children to examine and/or draw affectively characterised figures should consider carefully the instructions used, in terms of the specific word labels used. Whilst in the studies reported in this thesis, independent measures of affect were taken at the time the drawings were made, there remain reservations regarding the instructions used. The instructions used had been shown to be effective in other studies (Burkitt & Barnett, 2006), but despite this it was possible that the instructions did not provide a strong enough characterisation, or if indeed the children were feeling any specific affect. The Likert ratings did support the target characterisations, but there is the possibility that children may have been simply providing the appropriate Likert rating so as not to contradict the drawings made in the perception task or their responses in the perception task regarding their associations. The instructions used to characterise the nice and nasty drawings could be examined and improved upon for future research. Therefore not only could these include the use of more specific terms (see Sections 9.2.5 and 9.3), whereby the children are asked to draw specific exemplars of nice and nasty people, but also in terms of the descriptions used. Widen and Russell (2007) have reported that the use of a 'fantasy' scenario (a monster) evokes fear more readily than a 'realistic' scenario (a growling dog), particularly among young children. Therefore more fantastical scenarios, involving animate topics (as opposed to the 'magic' apple used by Thomas et al., 1989) could be considered for use in positive and negative characterisations that may evoke a stronger association in children and thus provide a clearer differentiation in their drawings.

9.2.2 The use of core features in children's drawings. The studies reported in Chapters 4 to 8 built upon the perception task results reported in Chapters 2 and 3. The similarities in children's free drawings, in terms of the features that they included were examined. The results reported in Chapters 4, 6 and 7 indicated that children had included similar features in their drawings of objects and simple emotions. There was less consistency in the features they used for the more complex emotions and the more descriptive topics of nice and nasty people. Potential explanations for this are discussed in more detail in Section 9.3. Overall the results suggested that there are stable core features that children use in their drawings of objects and simple emotions. Furthermore, the number of stable core features displayed in the children's drawings differed according to the topic. The results reported in Chapters 6 and 7 replicated those in Chapter 4 and provided further evidence to support the existence of these core features. The core features included in drawings of a house and a flower were consistent across the studies reported in Chapters 4, 6 and 7 despite these studies all using different participants.

These results were also supported by the evidence for the use of a core-to-periphery progression principle (Van Sommers 1984; Picard & Vinter, 2005). Support for the importance of the core features identified in the content analysis, in terms of the semantic weight they held in defining an object, came from the sequence with which children drew the specific features for houses, flowers, faces and people. Children drew those features that had been identified as core features in the content analysis prior to more peripheral features. Taken together, these results indicated that children do draw similar core features in their drawings of objects and simple emotions. The studies reported in this thesis have provided evidence to support this not only through a highly detailed content analysis but also through the examination of the sequence with which features were drawn. The core-to-periphery progression principle results reported in Chapters 6 and 7 also replicated those made by Picard and Vinter (2005). The replication of the Picard and Vinter results for drawings of a house and other drawing topics also indicates that this principle merits further study.

One of the clinical implications of the core-to-periphery progression principle results presented in this thesis concerns the use of children's drawings in projective drawing tests. As highlighted in Chapter 1 (Section 1.1.2), a wide range of projective drawing assessments are still in use despite a paucity of evidence to support their validity (Anastasi & Urbina, 1997; Thomas & Jolley, 1998; Ter Laak et al., 2005). However, the sequencing data reported in Chapters 6 and 7 would suggest that the sequence with which features are drawn by children should be noted by clinicians during projective drawing assessments. Examination of the sequence with which features are drawn could then provide additional support for conclusions made regarding what features may be particularly salient.

The analysis of the sequence with which children drew features could have benefited from being coded by a second rater. Having a recording of the children producing their drawings would allow for a second rater to code the sequence with which the children drew and would also allow for a more detailed analysis of the way in which the children drew. This could include examining start points for each of the features of their drawings as well as the fluency with which the images were drawn.

Future research could look to build upon the results presented here and look to expand further upon the range of objects and emotions that have been examined in order to gain even more detailed evidence regarding the features children use to depict various levels of object representations, from superordinate category representations to more specific exemplars. This in turn could begin to provide clarification as to what may be motivating the features children choose to include in their drawings.

9.2.3 The relationship between naming and the use of core features. The influence of naming upon children's drawings was examined in the studies reported in Chapters 5 and 6. The results indicated that naming can motivate children to include core features in a drawing despite task demands that require them to inhibit the use of these features. In the current thesis these task demands referred to the form the drawing should take defined by a target model image. The results from the study reported in Chapter 5 did not provide clear evidence for the influence of naming upon children's drawings. However, the methods used were developed and modified and, as reported in Chapter 6, it was found that children who were presented with the target image (that could be interpreted as either a house or a face) named as a house were more likely to include features in their drawings of the target image which were present in their free drawings of a house but not present in the target image. The same pattern was found for the children who had the target image named as a face. These results indicated that naming did influence the way in which children drew an image from memory. The studies also used a novel method in which children copied familiar objects which were altered to be ambiguous (target images). This allowed for comparison of the target drawings with free drawings that showed that naming affected their drawings. Further to the new method used, the novel accuracy scoring system developed, that was based upon a detailed content analysis has also provided detailed results regarding the core features of children's drawings.

For all of the studies that examined children's typical representations, a greater range of examples of these free drawings would increase the generalisability of future studies. As was evident in the study reported in Chapter 7, children's drawing may show temporary changes due to specific recent events. This was most clearly highlighted in the increase in the inclusion of roots and bulbs in the drawings of a flower made by the younger children. This was not in keeping with the previous flower data presented in Chapter 4. It was brought to the experimenter's attention that the children who took part in the study had that week been learning about the anatomy of flowers in their science lessons. Therefore it could be argued that the inclusion of bulbs and roots may have reflected children's current representations, rather than their typical representations of these objects. Due to the drawings being collected in a school setting the children may have felt that the drawings were either a chance for them to showcase what they had recently learned or in order to give the 'right' answer they would be required to draw a flower that included the roots and bulbs. What this illustrates is that a larger sample of children's typical drawings is needed so that the extent to which certain features consistently appear could be clearly identified and the influence of contextual sensitivity upon drawing production can then be evaluated.

9.2.4 Children's interviews. Chapter 8 reported the findings from the children's interview data. The results provided additional support to those gained from the content analysis data reported in Chapter 7. Children identified the same features as core when interviewed as those identified as core in the content analysis of their drawings. The use of the interviews therefore provided effective support for the quantitative analysis reported in Chapter 7. Furthermore, the children's explanations for their responses to the perception task indicated that the possible reason for the lack of consistency in children's use of size in relation to affect during drawing production tasks (reported in Chapter 2, 3 and 7) was due to the non-specific nature of the terms 'nice' and 'nasty'. A number of children, when explaining their responses to the drawing perception task, specified that the larger figure was perceived as nasty because they viewed the figure as a bully, namely a specific type of nasty person. It could be argued therefore that children's concept of a bully would include an association of a large size. However, a non-specific nasty person may not hold any such association. Thus, the inconsistency found in the use of height in drawing perception tasks reported in the literature (see Chapter 1, Section 1.1.4.1) could be a result of the variety of nasty figures that children may be conceptualising when drawing a figure labelled as nasty. Each child may be drawing a different, specific exemplar of a nasty figure, some of which, a bully for example, may be associated with a large size, whereas others may be associated with a smaller size. Thus, children may associate size with positive and negatively characterised topics, but only when the general descriptive term of nice or nasty is clarified by referring to a specific nice or nasty person (such as a bully).

Additionally, the interview data collected in Chapter 8 suggested that the core features in the object drawings (of a flower and a house) were chosen because of their functionality and as such could imply these drawings were more iconic (i.e. directly representing a certain topic using core functional features of that topic). When the children were asked why they had identified certain features as being important a majority had stated the feature's importance was due to its functionality, for example a roof so rain does not get in or a stem so that the flower 'stays up'. This was not shown to be the case for the nice and nasty human figure drawings, the majority responses in these cases were coded as communicative, that the features that were important were those that made it clear, in the child's opinion, that the person was nice or nasty. As such the features identified as important for these topics may be seen to be more symbolic and relied more upon conventions. Features such as devil horns, positive slogans on clothes and single earrings (when drawn on a male figure) were included in the drawings of nasty people collected for the study reported in Chapters 7 and 8. Thus the data from this study would support this. These features could, in the child's opinion, be conventionally recognised as denoting positive or negative attributes rather than having a functional necessity (such as eyes being drawn 'so you can see'). Thus the position put forward, based upon the results of this thesis, would suggest that the features drawn by children may be driven by either iconicity or symbolism depending upon the topic.

Iconicity is more likely to reflect the features used to represent superordinate category objects and symbolism the features drawn for more descriptive, less concrete topics. Indeed, as regards picture perception Allen, Bloom and Hodgson (2010) found that children would identify those images of superordinate category objects (such as a house) that were less detailed, containing only the core functional features as those that best represented that object. This hypothesis, as applied to drawing production is explored in more detail in section 9.3.

The results presented in this thesis provide an explanation for the lack of consistency found in the literature regarding children's use of size to depict affect in their drawings. It could be concluded that children may indeed associate size with negative and positive characteristics; however, the use of the term nasty or nice may not be not specific enough to hold any associations with size in and of itself. Thus, rather than move away from the examination of size and affect altogether, it may be more appropriate to investigate children's use of size with more clearly specified topics as this may provide more consistent and reliable results.

The interview questions were purposefully open-ended in the terms used so as not to lead children's responses in any way. As such, children were asked what the most important *thing* was, with no specific definition of what a *thing* meant or what level of detail it represented. This could have allowed for children to assume that the mentioning of one feature necessarily included other features (head including eyes, nose and mouth for example). Future research could seek to provide a clearer definition of the specific *things* (features) that the child may deem important although caution must be taken to not influence the child's response or draw attention to features that the child may not have considered themselves. Furthermore, steps must be taken to try to ensure that children's responses are as truthful as possible. In order to address this in the current thesis it was made clear that there was no de facto right or wrong answer to the questions. Furthermore the amount of interaction that children who have been interviewed with those who have not yet been interviewed must also be held to a minimum so that children are not influenced by the responses given by their peers.

Rather than solely examining the children's drawings as an end product with no input from the child, the interview data collected in this thesis suggested that a better understanding of the child's thinking in terms of what they were seeking to represent can be obtained from discussing the drawing with them. Indeed future research should adopt the use of interview data alongside adult analysis of drawings in order to provide a more holistic understanding of what children are seeking to represent (see Coates, 2002 and Coates & Coates, 2006). The results presented here, alongside a number of recent studies that have begun to use children's own views regarding their drawings, point towards this being a fruitful area of future research (Burkitt & Barrett, 2010).

9.3 Explanations for the inclusion of core features in children's drawings.

Taken together, the findings presented in this thesis suggest that when children's drawings consist of simple, generic features that are readily recognisable, children have a well established internal representation of the drawn image. However, when drawings are more idiosyncratic, namely not composed of frequently displayed features it would suggest that the features included in these internal representations are not as similarly defined as core across children.

The results reported here could be interpreted as providing an insight into children's conceptual development of object categories that in turn could explain the depiction of certain features in their drawings when they have reached behavioural mastery of a drawing topic (Willats, 2005). Whilst the assumption that children's drawings provide a direct external manifestation of an internal concept is naive, the results presented in this thesis suggest that children's drawings provide information regarding their conceptual knowledge about object categories. Brechet et al. (2009) also argued that children's typical schematic representations of human figures depicting various emotions "maybe thought of as being the translation into graphic terms of a conceptual representation of the emotions and their human expression. In this perspective, children's drawings can be viewed as an indirect means to examine children's internal representations." (Brechet et al., 2009, p.603).

In light of the results presented here, somewhat counter-intuitively, it could be argued that the more generic a child's drawing of a topic is, the more clearly established a child's concept of that object category may be. The children's drawings of faces depicting various emotions (reported in Chapters 4 and 5) could be seen to provide evidence for this. The extent to which children drew similar features in their free drawings showed a move from a majority of features in common for the simple emotions (happy, sad and neutral) to very few features in common for the more complex emotional states (scared, angry and confused). These differences might be due to the development in the child of a categorical conceptualisation of the emotions, which become more and more differentiated over time (Russell & Bullock, 1986; Widen & Russell, 2003). For example, as happy and sad are emotions children are presumed to have had the greatest initial exposure to the child is more easily able to develop a specific internal representation for the categories of happy and sad. The internal representation of these categories would contain the core features, such as a smile for happy and a frown for sad.

For the more complex emotions and the more descriptive terms of nice and nasty it could be argued that children may not been exposed to such a wide variety of incidences of more complex emotions and as such specific as opposed to generalised visual memories for these incidences are stored with the word label. The salient visual information needed to identify these specific exemplars does not need to be collated as there are not sufficient examples to make this possible. There was a limited amount of similarity in terms of same features in children's drawings of nasty people. Drawings of nice people did not contain as many similar features as the objects either, although for the nice person drawings the feature of a smile was widely used by all children. The lack of specific details associated with nasty and, to a lesser extent, nice people suggests that children's internal representations of these concepts are not as clearly defined as more concrete, superordinate objects such as a house or a flower. As such children's drawings of nice and nasty people will vary in how they are drawn, not just across children but arguably across different drawings made by the same child. Furthermore, the lack of a clearly defined sequence with which children drew the features in their nice and nasty people drawings, in terms of the core-to-periphery progression principle provided further evidence for core features for these topics not being well established. As such a clearly defined categorical representation of a nice or nasty person may not take the form of a single mental representation. Conversely the high level of similar features across children's drawings of objects, as well as data to support the use of the core-to-periphery principle, suggested that the internal representation for these objects was well defined and established. This internal representation also has a strong association with the word label, to the extent that the use of the word label will influence the way children draw these objects.

Similarly, children's drawings of more complex emotional states such as scared, angry and confused showed less consistency in terms of the specific features children used to represent these emotions. In light of the results described in Chapters 7 and 8 it could be argued that children's concept of an angry, scared or confused facial expression may also not be as well developed as those of generic object categories. Again, it could be argued that as these emotions can be expressed in a variety of situations and as a result of a wide range of what may seem to be unconnected events (different people will get scared by different things and express this fear in different ways) then children will require a more specific context in order to more clearly represent these emotions. The lack of clarity in these facial expressions was confirmed by the poor success rate of the adult raters in identifying the more complex facial expressions drawn by the children.

In a study investigating children's drawings of school, Tallandini and Valentini (1991) found that children aged 5- to 7-years-old draw schools like a simple house without any particular indications that it represents a school. As children begin to conceptually differentiate categories of buildings, they modify the picture into a more specific prototype, thus supporting the position that a greater exposure to examples of different representations for an object category arguably results in children being better able to draw a prototypical representation of that object category. It could also be argued that for the more descriptive terms of nice and nasty, children were not able to draw a prototypical representation of a nice and nasty person due to the polysemous nature of these words. Therefore due to the large variety of ways of expressing these characterisations it could be argued that children are less able to identify and extrapolate the core features appropriate to defining them.

One possible implication of this explanation is that children will not hold generic, schematic representations of these topics. Their representations will not contain features that are consistently used to display complex emotions and non-specific descriptive terms and it could be argued that children may instead hold visual memories (internal representations) of these categories that are more idiosyncratic and tied to specific incidences of occurrence. Nice and nasty human figure drawings are much more reliant on context than on specific functional features (such as roof for a house). Evidence for this is found in the interview responses given by children in Chapter 8 regarding their drawings of nice and nasty people and the content analysis reported in Chapter 7. In the interview responses presented in Chapter 8 children reported that the features they identified as important in their nice and nasty people drawings were important due to the communicative function they served. These details were much more likely to be contextual, for example a 'nice' person helping someone or a 'nasty' person hitting someone. Arguably these details were also more conventionally defined. The content analysis of these drawings, presented in Chapter 7, also indicated that children were much more likely to include additional detail in their nice and nasty drawings, much of it providing contextual features to help define specific incidences of niceness (helping someone, for example) or nastiness (hitting someone, for example).

Brechet et al. (2009) found that children when drawing complex emotions that had been described to them using a simple story displayed a greater amount of contextual details. The contextual details depicted by children were in close relation to elements evoked in the scenarios. In contrast this was not the case for the happy or sad drawings collected by Brechet et al. (2009). This would indicate that the children held general categories for happy and sad that could represent these emotions outside of a specific context, due to the fact that having experienced a wide variety of incidences of these emotions they had been required to extrapolate and store only the salient elements that all incidences had in common. For the complex emotions children had not formed a specific generic representation, as the core features that all incidences of these emotions had in common had not been established, Therefore it can be argued that depictions of these topics must rely on depicting specifics. This was also seen in children's drawings of nice and nasty people.

Picard and Vinter (2005) also related their findings regarding the features used by children to represent objects, and the order they produce these features, to the development of object categories. They argued that the use of peripheral features enabled a child to extend a category. For example school gates added to a house drawing would enable the category of building to include a house. Picard and Vinter (2005) therefore "propose to relate [their] results to findings classically reported in categorical development; that the extension of a category mainly concerns the peripheral features of objects (Arcuri & Girotto, 1986; Bjorklund, Thompson, & Ornstein, 1983; Cordier, 1993)" (Picard & Vinter, 2005, pg. 429). It is argued here, based on the evidence presented in this thesis, that a well-established category would display few peripheral features as seen in the limited amount of additional details used in children's drawings of superordinate objects (a house, a flower, the sun, a face, a person). Therefore, a simple, schematic representation would suggest a well-established categorical representation of these objects, and it could be argued that the child is aware of the core features that are most salient to these objects.

This position can be related back to the literature regarding drawings made by autistic savants (Sheppard, Ropar & Mitchell, 2009; Vital, Wallace, Ronald & Happé, 2009). One feature of drawings made by savant artists is the exceptional level of detail presented in their drawings. According to the argument put forward above, this would suggest that these artists' categorical representations of those drawn topics would not be well-established. This would be in keeping with the Weak Central Coherence (WCC) theory (Happé & Frith, 2006) put forward to explain the underlying cognitive abnormalities displayed by individuals with autism. Individuals with autism could be argued to have been unable to extrapolate and integrate the core features from across a range of exemplars within a single category, and as such they would hold specific representations for specific objects. This could imply that the similarities between various exemplars of an object category would need to be made explicitly clear in order to aid the formation of a robust definition of an object category. Gentner and Namy (1999) have indeed proposed that children are able to extract deeper relational commonalities among category members when comparing multiple instances of a category member. Gentner and colleagues (Gentner, Loewenstein & Thompson, 2003) have gone on to show that children's ability to draw comparisons between topics is improved when multiple cases are seen at the same time rather than separately. Thus, in order to improve category formation in children, particularly those with autism, exposure to multiple exemplars of object categories in which the core features are made explicit may aid the formation of robust object categories that are then able to facilitate the recognition of a wide range of different exemplars from within a single object category. New concepts of object categories may be better learned and generalised from exposure to highly realistic pictures and more generalised generic images side by side so core similarities are made clear. This may help children to focus on the salient features and aid future attempts at decoding an image or representation. Using drawing to focus the child's attention upon those core features, whilst highlighting the images association with a word label, may further help in this process.

9.4 Conclusion

The series of investigations that initially were concerned with what may have caused the lack of consistency in results reported in the literature, regarding children's use of size as an indicator of affect, was able to provide an evidence base for why this was the case. The descriptive nature of the terms nice and nasty were not reliably shown to be associated with any specific features, including size (see Chapters 2, 3 and 7). However, specific exemplars of nice and nasty people were suggested to be associated with specific features, including size (as reported by children in the interview data collected regarding the perception tasks). The use of the more general descriptive labels of nice and nasty may therefore have resulted in a lack of consistency in children's use of size to depict affect. The use of more specific terms (such as a bully instead of simply a nasty person) could result in a more reliable set of results regarding size change. This in turn would allow a re-examination of the APC and ADM theories. Furthermore, the thesis has shown that the use of a word label can influence how children draw. It could be argued that the use of a word label prompts children to draw a representation more akin to their usual free drawing of an object when simply asked to draw that object with no other task demands. This drawing in turn is based upon a well-established categorical representation held by the child as an internal mental model (see

Chapter 1, Section 1.2.4). Children's drawings therefore may provide an insight into the categorical representations children hold.

As speculated upon in Chapter 4 and reviewed in more detail in Chapter 1, Section 1.2.4.1, the way in which children draw superordinate objects, such as a house, a flower and a face could be argued to reflect the way in which the visual system processes and identifies objects and potentially stores their images in the brain. This would suggest that children's drawings of these objects are iconic in terms of directly representing the referent by including the core features necessary for the successful functioning of that object (a roof for a house for example). There is also evidence presented in this thesis to support the hypothesis that children may be drawing according to more symbolic conventions. The data regarding the drawings of nice and nasty figures, both the content analysis and the interview data, point towards children's drawings of these topics being more symbolic, i.e. they included features that were not necessary to the successful functioning of a drawn topic (walls of a house for example) instead they served to represent the target characterisation such as devil horns for a nasty person. The adult raters' greater ability to recognise the objects and simple emotions was related to the greater degree of similarity between the features used across children to depict those topics. It could be argued therefore that by using features that were common across all drawings, individual children's drawings were more easily interpreted. This could be a result of those features being iconic or symbolic. The results put forward in this thesis cannot conclusively suggest that the drawings are shaped by iconicity or symbolism however. Both iconicity and symbolism could be argued to be what is motivating the use of certain features and remain influences to be investigated in future research.

Cross-cultural studies may provide the best avenue by which to examine further the influences that determine what is motivating the use of specific features. It could be hypothesised that if a drawing was made based upon iconicity the features drawn would be similar across cultures whereas if a drawing contained features that were drawn so as to convey a symbolic meaning, one defined more by convention, then cultural differences would be hypothesised to be seen.

Future research could also examine the WCC theory regarding autism (Frith, 2003) by examining differences between drawings made by typically developing children and those with autism in terms of showing how well established categorical representations may be, how well established the core features of are. The sequence with which features in the drawings are drawn would provide some descriptive data in this respect. As reviewed in Chapter 1, Section 1.2.6 there is some evidence to suggest that certain children with autism will follow a non-typical sequence when drawing, a sequence that would not display evidence of the core-to-periphery progression principle (Booth, Charlton, Hughes & Happé, 2003; Mottron, Belleville & Ménard, 1999). Often the starting point for drawings would be peripheral features (Mottron & Belleville, 1993; Selfe, 1995). The same has also been shown for precocious drawers as well as professional artists (Drake et al., 2010). These populations would provide further support for the core-to-periphery progression principle providing accurate data regarding what features children could be argued to view as particularly salient for drawing a specific object and as such those features that may make up a child's internal representation of that object.

The use of interviews in future drawing research would also, based upon the results presented here, prove to be fruitful in providing a more holistic interpretation of children's intentions when drawing as well as potentially helping to identify how children may have come to learn how to draw what they draw (Jolley, 2010; Wilson & Wilson, 1977). Children could be explicitly asked if they can remember how they learnt to represent objects in certain ways.

Overall the results presented in this thesis add to the existing research literature by providing evidence that could explain why there has been a lack of consistency reported in children's use of size to display affect (Burkitt et al. 2003a, 2003b; 2004; Cleeve & Bradbury, 1992; Craddick, 1961, 1963; Di Leo, 1973; Joiner, Schmidt, & Barnett, 1996; Jolley & Vulic-Prtoric, 2001; Sechrest & Wallace, 1964; Thomas et al., 1989; Thomas & Jolley, 1989). The use of a word label has also been shown to influence the way in which children draw, with children more likely to draw according to their typical representation when the word label is used, despite requirements to draw otherwise. Evidence to support children's use of the core-to-periphery progression principle was also shown and the range of topics that children were shown to be using this principle was extended to include more concrete objects as well as more descriptive topics. Children were also shown to display a high level of consistency in terms of the features they use to represent concrete topics as well as the sequence with which those features are drawn. The studies as a whole have furthered our understanding of the influence of affect and naming upon what children draw and what they perceive in the drawings of others.

References

Adi-Japha, E., Berberich-Artzi, J. & Libnawi, A. (2010). Cognitive flexibility in the drawings of bilingual children. *Child Development*, 81 (5), 1356 – 1366.

Allen, M. L., Bloom, P., & Hodgson, E. (2010). Do Young Children Know What Makes A Picture Useful To Other People? *Journal of Cognition and Culture*, *10* (1-2), 1-2.

Aloise-Young, P. (1993). The development of self-presentation: Self-promotion in 6- to 10- year-old children. *Social Cognition*, *11*, 201-222.

Anastasi, A. (1976). *Psychological Testing*. New York: Collier-Macmillan.

Anastasi, A., & Urbina, S. (1997). *Psychological Testing*. New Jersey: Prentice Hall.

Arcuri, L., & Girotto, V. (1986). Norme di tipicita per sei categorie naturali: Uno studio evolutivo. *Giornale italiano di psicologia*, *3*, 409-443.

Arnheim, R. (1974). *Art and visual perception* (2nd ed.). Los Angeles: University of California Press.

Aronsson, K. & Andersson, S. (1996). Social scaling in children's drawings of classroom life: a cultural comparative analysis of social scaling in Africa and Sweden. *British Journal of Developmental Psychology*, *14*, 301-14.

Arrowsmith, C. J., Cox, M. V., & Eames, K. (1994). Eliciting partial occlusions in the drawings of 4-and 5-year-olds. *British journal of developmental psychology*, *12*(4), 577-584.

Baddeley, A. D. (2007). *Working memory*. Oxford: Oxford University Press.

Barenholtz, E., & Feldman, J. (2003). Visual comparisons within and between object parts: evidence for a single- part superiority effect. Vision Research, 43, 1655–1666.

Barlow, C. M., Jolley, R. P., White, D. G., & Galbraith, D. (2003). Rigidity in children's drawings and its relation with representational change. *Journal of Experimental Child Psychology, 86*, 124-152.

Barnes, E. (1893). A study of children's drawings. *Pedagogical Seminary, 2*, 451-63.

Barrett, L. F. (2006). Solving the emotion paradox: Categorization and the experience of emotion. *Personality and social psychology review*, *10*(1), 20-46.

Barrett, M. D., Beaumont, A., & Jennett, M. (1985). Some children do sometimes do what they have been told to do: Task demands and verbal instructions in children's drawings. In Freeman, N. H., & Cox, M. M. V. (Eds.) *Visual order: The nature and development of pictorial representation*. Cambridge University Press. 176-187.

Barrett, M. D., & Bridson, A. (1983). The effect of instructions upon children's drawings. *British Journal of Developmental Psychology*, *1*(2), 175-178.

Barrett, M. D., & Light, P. H. (1976). Symbolism and intellectual realism in children's drawings. *British Journal of Educational Psychology*, *46*(2), 198-202.

Barsalou, L. W. (1999). Perceptual symbol systems. *Behavioral and Brain Sciences, 22*, 577 – 660.

Beal, C. R., & Arnold, D. S. (1990). The effect of instructions on view-specificity in young children's drawing and picture selection. *British Journal of Developmental Psychology, 8*(4), 393-400.

Bekhit, N. S., Thomas, G. V., & Jolley, R. P. (2005). The use of drawings for psychological assessment in Britain: Survey findings. *Psychology and Psychotherapy: Theory, Research and Practice, 78,* 205-17.

Berman, S. & Laffel, J. (1953) Body types and figure drawing. *Journal of Clinical Psychology, 9,* 368-370.

Bender, L. (1938). *A visual motor gestalt test and its clinical use* (p. 176). In L. G. Lowrey (Ed.). New York: American orthopsychiatric association.

Bertamini, M., & Farrant, T. (2005). Detection of change in shape and its relation to part structure. *Acta Psychologica*, 120, 35-54.

Berti, A. E., & Freeman, N. H. (1997). Representational change in resources for pictorial innovation: a three component analysis. *Cognitive Development, 12, pp 405-426.*

Biederman, I. (1987). Recognition by components: A theory of human image understanding. Psychological Review, 94, 115 – 145.

Binder, J. R., Frost, J. A., Hammeke, T. A., Cox, R. W., Rao, S. M., & Prieto, T. (1997). Human brain language areas identified by functional magnetic resonance imaging. *Journal of Neuroscience. 17*(1), 353-62.

Birbeck, D., & Drummond, M. (2005). Interviewing, and listening to the voices of, very young children on body image and perceptions of self. *Early Child Development and Care, 175*(6), 579-596.

Bjorklund, D. F., Thompson, B. E., & Ornstein, P. A. (1983). Developmental trends in children's typicality judgments. *Behavior Research Methods & Instrumentation, 15*(3), 350-356.

Bloom, P., & Markson, L. (1998). Intention and analogy in children's naming of pictorial representations. *Psychological Science, 9*, 200-205.

Booth, R., Charlton, R., Hughes, C., Happé, F. (2003). Disentangling weak coherence and executive dysfunction: planning drawing in autism and attention–deficit/hyperactivity disorder. *Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences, 358*(1430), 387-392.

Booth, J. R. & Hall, W. S. (1994). Metacognitive development and the cognitive internal state lexicon. *National Reading Research Centre Reports, 18,* 1-28.

Booth, J. R., Hall, W. S., Robison, G. C. & Kim, S. Y. (1997). Acquisition of Mental State Verb Know by 2- to 5-Year-Old Children. *Journal of Psycholinguistic Research, 26,* 581-603.

Bozeat, S., Lambon Ralph, M. A., Graham, K. S., Patterson, K., Wilkin, H., Rowland, J., et al. (2003). A duck with four legs: Investigating the structure of conceptual knowledge using picture drawing in semantic dementia. *Cognitive Neuropsychology*, 20, 21/41.

Bradley, M. M., & Lang, P. J. (1994). Measuring emotion: the Self-Assessment Manikin and the Semantic Differential. *Journal of Behaviour Therapy and Experimental Psychiatry, 25,* 49-59.

Brechet, C., Baldy, R., & Picard, D. (2009). How does Sam feel?: Children's labelling and drawing of basic emotions. *British Journal of Developmental Psychology, 27*(3), 587-606.

Brechet, C., Picard, D., & Baldy, R. (2007). Expression des e′motions dans le dessin d'un homme chez l'enfant de 5 a` 11 ans. *Canadian Journal of Experimental Psychology*, 61(2), 142–153.

Brem-Graser, L. (1957). *Familie in Tieren* [Family as animals]. Munich, Germany: Ernst Reinhardt.

Bremner, J. G., & Moore, S. (1984). Prior visual inspection and object naming: two factors that enhance hidden feature inclusion in young children's drawings. *British Journal of Developmental Psychology, 2,* 371-6.

Brittain, W. L., & Chien, Y. C. (1983). Relationship between preschool children's ability to name body parts and their ability to construct a man. *Perceptual and motor skills, 57*(1), 19-24.

Brody, L. R. & Harrison, R. H. (1987). Developmental changes in children's ability to match and label emotionally laden situations. *Motivation and Emotion, 11*, 347 – 365.

Browne, C. A., & Wooley, J. D. (2001). Theory of mind in children's naming of drawings. *Journal of Cognition and Development, 2,* 389-412.

Buck, J. N. (1948). The HTP test. *Journal of Clinical Psychology, 4*, 151 -159.

Burgess, A. W., & Hartman, C. R. (1993). Children's drawings. *Child Abuse & Neglect, 17*, 161 – 168.

Burkitt, E. & Barnett, N. (2006). The effects of brief and elaborate mood induction procedures on the size of children's drawings. *Educational Psychology, 26*, 93-108.

Burkitt, E. & Barrett, M. (2010). Children's graphic flexibility: A response to representational redescription, Journal of Creative Behavior.44, (3), 169-190.

Burkitt, E. & Newell, T. (2005). Effects of human figure type on children's use of colour to depict sadness and happiness, International Journal of Art Therapy, 10, (1), 15-22.

Burkitt, E., & Barnett, N. (2006). The effects of brief and elaborate mood induction procedures on the size of young children's drawings. *Educational Psychology, 26*, 93-108.

Burkitt, E., Barrett, M., & Davis, A. (2003a). Children's colour choices for completing drawings of affectively characterised topics. Journal *of Child Psychology and Psychiatry, 44*, 445-55.

Burkitt, E., Barrett, M., & Davis, A. (2003b). The effect of emotional characterisation on the size of children's drawings. *British Journal of Developmental Psychology,* 21, 565-84.

Burkitt, E., Barrett, M., & Davis, A. (2004). The effect of affective characteristics on the use of size and colour in drawings produced by children in the absence of a model. *Educational Psychology, 24*, 315-43.

Burkitt, E., Jolley, R. & Rose, S. (2010). The attitudes and practices that shape children's drawing experience at home and at school. *International Journal of Art & Design Education, 29*, 257 – 270.

Burkitt, E., Watling, D. & Murray L. (2011). Children's drawings of significant figures for a peer or an adult audience. *Infant and Child Development, 20, (6)* 466- 473.

Burns, R., & Kaufman, S. H. (1970). *Kinetic Family Drawings (K-F-D): An interpretive manual.* New York: Brunner/Mazel.

Callaghan, T. C. (1999). Early understanding and production of graphic symbols. *Child Development, 70*, 1314-1324.

Callaghan, T. C. (2000). Factors affecting children's graphic symbol use in the third year: Language, similarity and iconicity. *Cognitive Development, 15*, 185-214.

Camara, W. J., Nathan, J. S., & Puente, A. E. (2000). Psychological test usage: Implications in professional psychology. *Professional Psychology: Research and Practice, 31,* 141-54.

Casasanto, D., & Boroditsky, L. (2008). Time in the mind: Using space to think about time. *Cognition, 106*(2), 579-593.

Casasola, M. (2005). When less is more: How infants learn to form an abstract categorical representation of support. *Child development, 76*(1), 279-290.

Cashel, M., L. (2002). Child and Adolescent psychological assessment: Current clinical practices and the impact of managed care. *Professional Psychology Research and Practice*, 33 (5), 446 -453.

Catte, M., & Cox, M. (1999). Emotional indicators in children's human figure drawings. *European Child & Adolescent Psychiatry, 8*, 86-91.

Chan, D. W., & Lee, H. C. B. (1995). Patterns of psychological test usage in Hong Kong in 1993. *Professional Psychology: Research and Practice, 26,* 292-297.

Chatterjee, A. (2004). The neuropsychology of visual artistic production. *Neuropsychologia, 42*, 1568-1583.

Chao, L. L., Haxby, J. V., & Martin, A. (1999). Attribute-based neural substrates in temporal cortex for perceiving and knowing about objects. *Nature neuroscience*, *2*(10), 913-919.

Christensen, P. M., & James, A. (2008). *Research with children: Perspectives and practices*. Taylor & Francis.

Claparède, E. (1907). Plan d'experiences collectives sur le dessin des enfants. *Archives de Psychologie, 6,* 276-278.

Clarke, A., Taylor, K. I., Devereux, B., Randall, B., & Tyler, L. K. (2013). From Perception to Conception: How Meaningful Objects Are Processed over Time. *Cerebral Cortex*, *23*(1), 187-197.

Cleeve, H. & Bradbury, R.J. (1992). Children's productions and judgements of drawings of people of different importance. *Poster presented at the 5th European Conference of Developmental Psychology, Seville, Spain, September.*

Coates, E. (2002). 'I forgot the sky!' Children's stories contained within their drawings. *International Journal of Early Years Education*, 10 (1), 21-35.

Coates, E., & Coates, A. (2006). Young children talking and drawing. *International Journal of Early Years Education, 14*(3), 221-241.

Coltheart, M., Inglis, L., Cupples, L., Michie, P., Bates, A., & Budd, B. (1998). A semantic subsystem of visual attributes. *Neurocase*, 4 , 353- 370.

Cordier, F. (1993). *Les representations cognitives privilegiees: Typicalite et niveau de base*. Lille, France: Presses Universitaires de Lille.

Cornoldi, C., De Beni, R., & Pra Baldi, A. (1989). Generation and retrieval of general, specific and autobiographic images representing concrete nouns. *Acta Psychologica, 72*(1), 25-39.

Costa, M., & Corrazza, L. (2006). Aesthetic phenomena as supernormal stimuli: The case of eye, lip, and lower-face size and roundness in artistic portraits. *Perception, 35,* 229-249.

Costall, A. (1995). How meaning covers the traces. In N. H. Freeman & M.V. Cox (Eds.), *Visual order: The nature and development of pictorial representation.* Cambridge, UK: Cambridge University Press.

Costall, A. (1997). Innocence and corruption: Conflicting images of child art. *Human Development, 40,* 133 – 144.

Cotterill, A., & Thomas, G. V. (1990). 'Children's production and perception of drawings of emotionally significant topics', poster presented at the Fourth European Conference on Developmental Psychology, University of Stirling, August.

Cox, M. V. (1981).One thing behind another: Young children's use of array-specific or view-specific representations. In N. H. Freeman & M.V. Cox (Eds.), *Visual order: The nature and development of pictorial representation.* Cambridge, UK: Cambridge University Press.

Cox, M. V. (1992). *Children's Drawings.* Harmondsworth: Penguin.

Cox, M. V. (1993). *Children's Drawings of the Human Figure.* Hove, East Sussex: Lawrence Erlbaum.

Cox, M. V. (2005). *The Pictorial World of the Child.* United Kingdom: Cambridge University Press.

Cox, M. V. & Catte, M. (2000). Severely disturbed children's human figure drawings: Are they unusual or just poor drawings? *European Child and Adolescent Psychiatry, 9,* 301-306.

Crace, J. (2003) Smart squiggles, *Guardian Education,* 15 July, pp. 4–5 – available online http://www.guardian.co.uk/education/2003/jul/15/schools.artsinschools (18.03.2012).

Craddick, R. A. (1963). Size of Hallowe'en witch drawings prior to, on and after Hallowe'en. *Perceptual and Motor Skills, 16,* 235-8.

Cremin, H., & Slatter, B. (2004). Is it possible to access the 'voice'of pre-school children? Results of a research project in a pre-school setting. *Educational Studies, 30*(4), 457-470.

Crouzet, S. M., & Serre, T. (2011). What are the visual features underlying rapid object recognition? *Frontiers in Psychology, 2,* 326.

Damon, W., & Hart, D. (1982) The development of self-understanding from infancy through adolescence. Child Development, 53 (4), 841-864.

Darwin, C. (1877). A biographical sketch of an infant. *Mind: A Quarterly Review of Psychology and Philosophy, 2,* 286-94.

Davis, A. M. (1983). Contextual sensitivity in young children's drawings. *Journal of Experimental Child Psychology, 35,* 478 – 486.

Davis, A. M., (1985). The canonical bias: Young children's drawings of familiar objects. In N. H. Freeman & M. Cox (Eds.), *Visual order: The nature and development of pictorial representation,* Cambridge, Cambridge University Press.

Davis, J. H. (1997). Drawing's demise: U-shaped development in graphic symbolisation. *Studies in Art Education: A Journal of Issues and Research, 38*, 132 – 157.

De Beni, R., & Pazzaglia, F. (1995). *La comprensione del testo: modelli teorici e programmi di intervento*. UTET libreria.

Di Leo, J. H. (1970). *Young children and their drawings*. New York: Brunner/Mazel.

DiLeo, J. H. (1973). *Children's Drawings as Diagnostic Aids*. New York: Brunner.

Diesendruck, G., Markson, L., & Bloom, P. (2003). Children's reliance on creator's intent in extending names for artifacts. *Psychological Science, 14*(2), 164-168.

Dockett, S., & Perry, B. (2005). Researching with children: Insights from the starting school research project. *Early child development and care, 175*(6), 507-521.

Dockett, S., & Perry, B. (2007). Trusting children's accounts in research. *Journal of Early Childhood Research, 5*(1), 47-63.

Drake, J. E., Redash, A., Coleman, K., Haimson, J., & Winner, E. (2010). Autistic Local Processing Bias Also Found in Children Gifted in Realistic Drawing. *Journal of Autism and Developmental Disorders, 40*, 762-773.

Dyson, A. H. (1989). *Multiple Worlds of Childwriters. Friends Learning to Write.* New York: Teachers College Press.

Edwards, B. (1989). *Drawing on the right side of the brain: A course in enhancing creativity and artistic confidence*. Revised edition. New York: Perigee Books.

Farah, M.J. (2000). The neural bases of mental imagery. In M,S. Gazzaniga (Ed), *The cognitive neurosciences* (2nd ed., 965-974). Cambridge, MA: MIT Press.

Forrest, M., & Thomas, G. V. (1991). An exploratory study of drawings by bereaved children. *British Journal of Clinical Psychology, 30*, 373-4.

Fox , T., & Thomas, G. V. (1990). Children's drawing of an anxiety-eliciting topic: Effect on size of the drawing. *British Journal of Clinical Psychology, 29,* 71-81.

Frederickson, N., Frith, U., & Reason, R. (1997). Phonological Assessment Battery (manual and test materials). Windsor: NFER-NELSON.

Freeman, N. H. (1972). Process and product in children's drawing. *Perception, 1*, 123-140

Freeman, N.H. (1977). How children try to plan drawings. In G. Butterworth (Ed.). (1977), *The Child's Representation of the World,* (pp. 3-29). London: Plenum Press.

Freeman, N., H. (1980). *Strategies of Representation in Young Children: analysis of spatial skills and drawing processes.* London: Academic Press.

Freeman, N., H. (1987). Current problems in the development of representational picture production, *Archives de Psychologie, 55,* 127-152.

Freeman, N., H. (2008). Pictorial Competence Generated From Corsstalk Between Core Domains. In Milbrath, C., & Trautner, H. M. (Eds.). (2008). *Children's understanding and production of pictures, drawings and art.* Cambridge, MA: Hogrefe & Huber.

Freeman, N. H., & Cox, M. M. V. (Eds.) (1985). *Visual order: The nature and development of pictorial representation*. Cambridge University Press.

Freeman, N. H., & Janikoun, R. (1972). Intellectual realism in children's drawings of a familiar object with distinctive features. *Child Development, 43,* 1116-21.

Freud, S. (1920). *A general introduction to psychoanalysis*. Horace Liveright.

Fu, G. & Lee, K. (2007). Social grooming in the kindergarten: The emergence of flattery behaviour. *Developmental Science, 10*, 255-265.

Galpin, J. (2006). *The use of acquired pictorial convention in children's drawings of affectively characterized human figures.* Unpublished Master's dissertation, Institute of Education, London, UK.

Galpin, J. (2008). *An investigation into the existence of an association of neutrality with four different human figure prototype drawings.* Unpublished Master's dissertation, The Open University, Milton Keynes, UK.

Garb, H. N., Wood, J. M., Lilienfeld, S. O., & Nezworski, M.T. (2002). Effective use of projective techniques in clinical practice: Let the data help with selection and interpretation. *Professional Psychology: Research and Practice. 33*(5), 454-463.

Gardini, S., Beni, R. D., & Cornoldi, C. (2004). Can we have an image of a concept? The generation process of general and specific mental images. *Imagination, Cognition and Personality, 23*(2), 193-200.

Gardner, H. (1980). *Artful scribbles*. New York: Basic Books.

Gathercole, S. E., & Baddeley, A. D. (1993). *Working memory and language.* Hove: Earlbaum.

Gendron, M., Lindquist, K., Barsalou, L., & Barrett, L. F. (2012). Emotion words shape emotion percepts. *Emotion, 12,* 314-325.

Gentle, K. (1985). *Children and Art Teaching*, London, Croom Helm.

Gentner, D., Loewenstein, J., & Thompson, L. (2003). Learning and transfer: A general role for analogical encoding. *Journal of Educational Psychology*, *95*(2), 393.

Gentner, D., & Namy, L. L. (1999). Comparison in the development of categories. *Cognitive Development*, *14*(4), 487-513.

Gibson, J., J. (1979). *The ecological approach to visual perception.* Boston: Houghton Mifflin

Golomb, C. (1973). Children's representation of the human figure: The effects of models, media and instructions. *Genetic Psychology Monographs, 87*, 197-251.

Golomb, C. (1981). Representation and reality: The origins and determinants of young children's drawings. *Review of Research in Visual Arts Education*, 36-48.

Golomb, C. (1992) *The Child's Creation of a Pictorial World.* Berkley, CA: University of California Press.

Golomb, C. (2002). *Child art in context: A cultural and comparative perspective*. American Psychological Association.

Golomb, C. (2004). *The child's creation of a pictorial world.* (2nd Ed.) Mahwah, NJ: Lawrence Erlbaum.

Gombrich, E.H. (1977). *Art and Illusion. A study in the psychology of pictorial representation.* London: Phaidon. (Original work published 1960).

Goodenough, F. L. (1926). *The measurement of intelligence by drawings.* New York: World Books.

Goodman, N. (1968). *Languages of art: An approach to a theory of symbols.* Hackett Publishing Company.

Gross, J., & Hayne, H. (1999). Drawing facilitates children's verbal reports of emotionally laden events. *Journal of Experimental Psychology: Applied, 5*, 265 – 283.

Hammer, E. F. (1958). The clinical application of projective drawings. Springfield, IL: C. C. Thomas.

Hammer, E. F. (1997). *Advances in projective drawing interpretation.* Springfield, IL: C. C. Thomas.

Hammer, M., & Kaplan, A. M. (1964). The reliability of children's human figure drawings. *Journal of Clinical Psychology, 22*, 316–319.

Happé, F., & Frith, U. (2006). The weak coherence account: detail-focused cognitive style in autism spectrum disorders. *Journal of autism and developmental disorders, 36*(1), 5-25.

Harrington, G. S., Farias, D., & Davis, C. H. (2009). The neural basis for simulated drawing and the semantic implications. *Cortex, 45*(3), 386-393.

Harris, D. B. (1963). *Children's drawings as measures of intellectual maturity: A revision and extension of the Goodenough Draw-a-Man Test.* New York: Harcourt, Brace & World.

Hayes. A. & Ross, J. (1995). Lines of sight, in *The Artful Eye*, ed. R. Gregory, J. Harris, P. Heard & D. Rose, Oxford: Oxford University Press, pp. 337-52.

Henderson, J. A., & Thomas, G. V. (1990). Looking ahead: planning for the inclusion of detail affects relative sizes of head and trunk in children's human figure drawings. *British Journal of Developmental Psychology, 8*, 383-91.

Henry, L. (2008). Short-term memory coding in children with intellectual disabilities. *American Journal of Mental Retardation, 113*, 187–200.

Hilgetag, C. C., Théoret, H., & Pascual-Leone, A. (2001). Enhanced visual spatial attention ipsilateral to rTMS-inducedvirtual lesions' of human parietal cortex. *Nature neuroscience, 4*, 953-958.

Hitch, G. J., Halliday, M. S., Schaafstal, A. M. & Heffernan, T. M. (1991). Speech, "inner speech" and the development of short-term memory: Effects of picture labelling on recall. *Journal of Experimental Child Psychology, 51*, 220–234.

Hoff, E. (2010). *Context effects on young children's language use: The influence of conversational setting and partner.* First Language, 30 (3-4), 461-472.

Hoffmann, J., Denis, M., & Ziessler, M. (1983). Figurative features and the construction of visual images. *Psychological research, 45*(1), 39-54.

Hopperstad, M. H. (2008). Relationships between children's drawing and accompanying peer interaction in teacher-initiated drawing. *International Journal of Early Years Education*, 16, (2), 133-150.

Hugdahl, K., & Öhman, A. (1977). Effects of instruction on acquisition and extinction of electrodermal responses to fear-relevant stimuli. *Journal of Experimental Psychology: Human Learning and Memory*, *3*(5), 608.

Humphreys,G. W., Riddoch, M. J. & Quinlan, P. T. (1988). Cascade processes in picture identification. Cognitive Neuropsychology, 5, 67 – 103.

Jankowiak, J., Kinsbourne, M., Shalev, R. S., & Bachman, D. L. (1992). Preserved visual imagery and categorization in a case of associative visual agnosia. *Journal of Cognitive Neuroscience,* 4, 119 - 131.

Jaswal, V., K. (2006). Preschoolers favour the creator's label when reasoning about an artifact's function. *Cognition, 99*, B83 – B92.

Joiner, T. E., Schmidt, K. L., & Barnett, L. (1996). Size, detail and line heaviness in children's drawings as correlates of emotional distress: (more) negative evidence. *Journal of Personality Assessment, 67*, 127-41.

Joiner, T.E & Schmitt, K. L. (1997). Drawing conclusions: Or not: From drawings. *Journal of Personality Assessment,* 69, 476-481.

Jolley, R.P. (1995). Children's production and perception of visual metaphors for mood and emotion in line drawings and in art. *Unpublished Doctoral Thesis, University of Birmingham, UK.*

Jolley, R. (2010). *Children and pictures: Drawing and understanding.* Wiley Blackwell: Chichester.

Jolley, R. P., Cox M., V., & Barlow, C. M. (2003, September). *What develops and why in British children's expressive drawings.* Paper presented at the British Psychological Society Developmental Section Conference, Coventry, UK.

Jolley, R. P., & Vulic-Prtoric, A. (2001). Croatian children's experience of war is not reflected in the size and placement of emotive topics in their drawings. *British Journal of Clinical Psychology, 40,* 107-10.

Jolley, R. P., Fenn K., & Jones, L. (2004). The development of children's expressive drawing. *British Journal of Developmental Psychology, 22,* 545-567.

Jones, S. S. & Smith, L. B. (2005). Object name learning and object perception: a deficit in late talkers. *Journal of Child Language, 32*, 223 – 240.

Karmiloff-Smith (1990). Constraints on representational change: Evidence from children's drawings. *Cognition, 34,* 57-83.

Karmiloff-Smith, A. (1992). *Beyond modularity. A developmental perspective on cognitive science.* Cambridge, MA: MIT Press.

Karmiloff-Smith, A. (1994). Beyond Modularity: A Developmental Perspective on Cognitive Science. *International Journal of Language & Communication Disorders*, *29*(1), 95-105.

Kellenbach, M. L., Wijers, A. A., & Mulder, G. (2000). Visual semantic features are activated during the processing of concrete words: Event-related potential evidence for perceptual semantic priming. *Cognitive Brain Research*, *10*(1-2), 67-75.

Kellogg, R. (1955). *What Children Scribble and Why*, Paolo Alto, N.P. Publications.

Kellogg, R. (1969). *Analysing children's art.* Palto Alto, CA: Mayfield.

Kerschensteiner, G. (1905). *Die Entwicklung der Zeitnerischen Begabung*. Munich, Germany: Carl Gerber.

Kindler, A. M., & Darras, B. (1998). Culture and development of pictorial repertoires. *Studies in Art Education*, 147-167.

Koch, K. (1949). *Der Baumtest: Der Beumzeichen-versuch als psychodiagnostisches Hilfmittel* [The tree drawing as psychodiagnostic aid]. Bern, Switzerland: Huber.

Konkle, T., & Oliva, A. (2010). Examining how the real-world size of objects is represented in ventral visual cortex. *Journal of Vision, 10*(7), 982-982.

Koppitz, E. M. (1968) *Psychological Evaluation of Children's Human Figure Drawings.* London: Grune and Stratton.

Koppitz, E. (1984). *Psychological evaluation of human figure drawings by middle school pupils.* London: Grune & Stratton.

Kosslyn, S.M. & Rabin, C. (1999). The representation of left-right orientation: A dissociation between imagery and perceptual recognition. *Visual Cognition*, 6, 497-508.

Krascum, R., Tregenza, C., & Whitehead, P. (1996). Hidden-feature inclusions in children_s drawings: The effects of age and model familiarity. British Journal of Developmental Psychology, 14, 441–455.

Kress, G. (1997). *Before writing. Rethinking the Paths to Literacy.* London: Routledge.

Kress, G. (2003). *Literacy in the New Media Age.* London: Routledge.

Kress, G. & van Leeuwen, T. (1996). *Reading Images. The Grammar of Visual Design.* London: Routledge.

La Voy, S. K. Pederson, W. C., Reitz, J. M., Brauch, A. A., Luxenberg, T.M., & Nofisnger, C.C. (2001). Children's Drawings: A Cross-Cultural Analysis from Japan and the United States.*School Psychology 6nternational,* 22, 53-63.

Laeng, B., Zarrinpar, A., & Kosslyn, S. M. (2003). Do separate processes identify objects as exemplars versus members of basic-level categories? Evidence from hemispheric specialization. *Brain and Cognition, 53* (1), 15 – 27.

Lally, S. J. (2001). Should human figure drawings be admitted into court? *Journal of Personality Assessment, 76,* 135-149.

Lange-Küttner , C. (1997). Development of size modification of human figure drawings in spatial axis systems of varying complexity. *Journal of Experimental Child Psychology, 66,* 264-78.

Levelt, W. J. M., & Indefrey, P. (2000). The speaking mind/brain: Where do spoken words come from? In A. Marantz, Y. Miyashita, & W. O'Neil (Eds.), *Image, language, brain: Papers from the First Mind Articulation Project Symposium* (pp. 77-94). Cambridge, Mass.: MIT Press.

Lewis, C., Russell, C., & Berridge, D. (1993). When is a mug not a mug? Effects of content, naming, and instructions on children's drawings. *Journal of Experimental Child Psychology*, 56, 291 - 302.

Light, P., H. (1985). The development of view-specific representation considered from a socio-cognitive viewpoint. In NH Freeman & MV Cox (eds), *The Creation of Visual Order: Studies of the Development of Representational Skills.* Cambridge: Cambridge University Press.

Light, P. H. & McEwan, F. (1987). Drawings as messages: The effect of a communication game upon production of view-specific drawings. *British Journal of Developmental Psychology, 5*, 53-60.

Light, P. H. & Simmons, B. (1983). The effects of a communication task upon the representation of depth relationships in young children's drawings. *Journal of Experimental Child Psychology, 35*, 81-92.

Löwenfeld, V. & Brittain, W. L. (1970). Creative and Mental Growth. 5th Edition, New York: Macmillan.

Lupyan, G., & Thompson-Schill, S. L. (2012). The evocative power of words: Activation of concepts by verbal and nonverbal means. *Journal of Experimental Psychology: General, 141*(1), 170.

Lupyan, G., Rakison, D. H., & McClelland, J. L. (2007). Language is not Just for Talking Redundant Labels Facilitate Learning of Novel Categories. *Psychological Science, 18*(12), 1077-1083.

Luquet, G.-H. (1927/2001). *Le Dessin Enfantin* [Children's Drawings]. Paris: Alcan. Trans. Costall (2001). London: Free Association Books.

MacDonald, P. M., Kirkpatrick, S. W., & Sullivan, L. A. (1996). Schematic drawings of facial expressions for emotion recognition and interpretation by preschool-aged children. *Genetic, Social, and General Psychology Monographs, 122,* 373-388.

Machover, K. (1949). *Personality Projection in the Drawings of the Human Figure*. Springfield, IL: C. C. Thomas.

Machover, K. (1951). Drawings of the human figure: a method of personality investigation. In H. H. Anderson & G. L. Anderson (Eds.) *An Introduction to Projective Techniques* (pp. 341-69). Englewood Cliffs, NJ: Prentice-Hall.

Magnie, M.-N., Ferreira, C. T., Giusiano, B., & Poncet, M. (1999). Category specificity in object agnosia: Preservation of sensorimotor experiences related to objects. *Neuropsychologia* , 37, 67-74.

Marr, D. (1980). *Vision.* San Francisco: Freeman.

Marr, D. (1982). *Vision*. New York: W.H.Freeman and Company.

Martlew, M., & Connolly, K. J. (1996). Human figure drawings by schooled and unschooled children in Papua New Guinea. *Child development, 67*(6), 2743-2762.

Matthews, W. J., & Adams, A. (2008). Another reason why adults find it hard to draw accurately. *Perception, 37*(4), 628.

Matthews, J. (1999). *The Art of Childhood and Adolescence*, London: Falmer Press.

McGrath, R. E, & Carroll, E. J., (2012). The current status of "projective" tests in *APA handbook of research methods in psychology, Vol 1: Foundations, planning, measures, and psychometrics.* Cooper, Harris (Ed); Camic, Paul M. (Ed); Long, Debra L. (Ed); Panter, A. T. (Ed); Rindskopf, David (Ed); Sher, Kenneth J. (Ed) Washington, DC, US: American Psychological Association

McMahon, J. A. (2002). An explanation for normal and anomalous drawing ability and some implications for research on perception and imagery. *Visual Arts Research,* 28, 38-52.

Merry, R., & Robins, V. (2001). Triangle Wheels and a Ghost in a Girl's Skirt: young children's representations of unreality. *Early Years: An International Journal of Research and Development, 21*(1), 41-53.

Meteyard, L., Bahrami, B., & Vigliocco, G. (2007). Motion detection and motion verbs language affects low-level visual perception. *Psychological Science, 18*(11), 1007-1013.

Milbrath, C. (1998). *Patterns of artistic development in children: Comparative studies of talent.* Cambridge: Cambridge University Press.

Milbrath, C., & Trautner, H. M. (Eds.). (2008). *Children's understanding and production of pictures, drawings and art.* Cambridge, MA: Hogrefe & Huber.

Missaghi-Lakshman, M., & Whissell, C. (1991). Children's understanding of facial expression of emotion: II. Drawing of emotion-faces. *Perceptual and Motor Skills, 72,* 1228–1230.

Mitchell, P., Ropar, D., Ackroyd, K., & Rajendran, G. (2005). How perception impacts on drawings. *Journal of Experimental Psychology: Human Perception and Performance, 31*(5), 996.

Moore, V. (1987). The influence of experience in children's drawings of a familiar and unfamiliar object. *British Journal of Developmental Psychology, 5,* 221–229.

Morra, S., Caloni, B., & D'Amico, M. R. (1994) Working memory and the intentional depiction of emotions. *Archives de Psychologie,* 62, 71 – 87.

Morra, S. (2008). Memory components and control processes in children's drawings. In Milbrath, C., & Trautner, H. M. (Eds.). (2008). *Children's understanding and production of pictures, drawings and art.* Cambridge, MA: Hogrefe & Huber. pp 53-85.

Motta, R. W., Little, S. G., & Tobin, M. I., (1993). The use and abuse of human figure drawings. *School Psychology Quarterly, 8,* 162-9.

Mottron, L. & Belleville, S. (1993) A study of perceptual analysis in a high-level autistic subject with exceptional graphic abilities. *Brain and Cognition. 23,* 279–309.

Mottron, L., Belleville, S., & Ménard, E. (2003). Local bias in autistic subjects as evidenced by graphic tasks: perceptual hierarchization or working memory deficit? *Journal of Child Psychology and Psychiatry, 40*(5), 743-755.

Naglieri, J., McNeish, T. J., & Bardos, A. N. *(1991). Draw A Person: Screening Procedure for Emotional Disturbance. Austin,* TX: PRO-ED.

Neale, E. L., & Rosal, M. L. (1993). What can art therapists learn from the research on projective drawing techniques for children? A review of the literature. *The arts in psychotherapy.*

Nicholls, A. L., & Kennedy, J. M. (1992). Drawing development: From similarity of features to direction. *Child Development, 63*(1), 227-241.

Nicolaides, K. (1990). *The natural way to draw: A working plan for art study.* New York: Houghton Mifflin.

Nimmo, L. M., & Roodenrys, S. (2004). Investigating the phonological similarity effect: Syllable structure and the position of common phonemes. *Journal of Memory and Language, 50*(3), 245-258.

Ozer, S. (2009). Turkish children's human figure drawings: can we borrow norms? *Educational Psychology, 29*(6), 701-712.

Pahl, K. (1999). *Transformations.* Stoke, Trentham Books.

Palmer, S. E., Rosch, E., & Chase, P. (1981). Canonical perspective and the perception of objects. In J. Long & A. Baddeley (Eds.), *Attention and performance.* Hillsdale, NJ: Lawrence Erbaum Associates Inc.

Parsons, M. J. (1987). How we understand art: A cognitive developmental account of aesthetic experience. Cambridge: Cambridge University Press.

Pecher, D., Zeelenberg, R., & Barsalou, L. W. (2003). Verifying conceptual properties in different modalities produces switching costs. *Psychological Science, 14,* 119–124.

Perner, J., & Lang, B. (1999). Development of theory of mind and executive control. *Trends in cognitive sciences, 3*(9), 337-344.

Phillips, W. A., Hobbs, S. B., & Pratt, F. R. (1978). Intellectual realism in children's drawings of cubes. *Cognition,* 6, 15 - 33.

Piaget, J., & Inhelder, B. (1966/1969). *The psychology of the child.* London: Routledge & Kegan.

Picard, D., & Durand, K. (2005). Are young children's drawings canonically biased? *Journal of experimental child psychology, 90*(1), 48-64.

Picard, D., & Vinter, A. (1999). Representational flexibility in children's drawings: Effects of age and verbal instructions. *British Journal of Developmental Psychology, 17,* 605-622.

Picard, D. & Vitner, A. (2005). Development of graphic formulas for the depiction of familiar objects. *International Journal of Behavioral Development, 29* (5), 418 – 432.

Picard, D., & Vinter, A. (2007). Relationships between procedural rigidity and interrepresentational change in children's drawing behavior. *Child development, 78*(2), 522-541.

Picard, D., Brechet, C. & Baldy, R. (2007). Expressive strategies in drawing are related to age and topic. *Journal of Nonverbal Behaviour,* 31, 243 -257.

Ricci, C. (1887). *L'arte dei bambini.* Bologna: N. Zanichelli.

Ricker, T. J., Cowan, N., & Morey, C. C. (2010). Visual working memory is disrupted by covert verbal retrieval. *Psychonomic bulletin & review, 17*(4), 516-521.

Ring, K. (2006). What mothers do: Everyday routines and rituals and their impact upon young children's use of drawing for meaning making. *International Journal of Early Years Education, 14*(1), 63-84.

Roberson, D., Davies, I. R. L., & Davidoff, J. (2000). Color categories are not universal: Replications and new evidence from a stone-age culture. *Journal of Experimental Psychology: General, 129,* 369–398.

Roberson, D., Pak, H., & Hanley, J. R. (2008). Categorical perception of colour in the left and right visual field is verbally mediated: Evidence from Korean. *Cognition, 107,* 752–762.

Rosch, E., Mervis, C. B., Gray, W. D., Johnson, D. M., & Boyes-Braem, P. (1976). Basic objects in natural categories. *Cognitive psychology*, *8*(3), 382-439.

Rose, S.E., Jolley, R.P. & Burkitt, E. (2006). A review of children's, teachers' and parents' influences on children's drawing experience. International Journal of Art and Design Education, 25, 341-349.

Rouma, G. (1913). *Le langage graphique de l'enfant.* F. Alcan & Lisbonne.

Russell, J. A., & Fernández -Dols, J. M. F. (Eds.). (1997). *The psychology of facial expression* (pp. 295-320). Cambridge, MA: Cambridge University Press.

Russell, J. A., & Bullock, M. (1985). Multidimensional scaling of emotional facial expressions: similarity from preschoolers to adults. *Journal of Personality & Social Psychology, 48,* 1290-8.

Russell, J. A., & Bullock, M. (1986). On the dimensions preschoolers use to interpret facial expressions of emotion. *Developmental Psychology, 22,* 97-102.

Sayıl, M. (1997) İlkokul çocuklarında duygusal yüz ifadesi çizimlerinin gelişimi. *Çocuk ve Ergen Ruh Sağlığı Dergisi.* 4 (3), 129-133.

Sayil, M. (2001). Children's drawings of emotional faces. British Journal of Developmental Psychology, 19, 493–505.

Schilder, P. (1935). The image and appearance of the human body.

Schooler, J. W., & Engstler-Schooler, T. Y. (1990). Verbal overshadowing of visual memories: Some things are better left unsaid. *Cognitive psychology*, *22*(1), 36-71.

Schulenberg, D., (1999) 'Young children's perception of the face and facial expression', unpublished undergraduate project, University of York.

Sechrest, L. & Wallace, J. (1964). Figure drawings and naturally occurring events. *Journal of Educational Psychology, 55*, 42-44.

Selfe, L. (1995). Nadia reconsidered. *The development of artistically gifted child artists: selected case studies*, ed. C. Golomb, Hillsdale, NJ: Lawrence Erlbaum, pp.197-237.

Serre, T., Kreiman, G., Kouh, M., Cadieu, C., Knoblich, U., & Poggio, T. (2007). A quantitative theory of immediate visual recognition. *Progress in Brain Research, 165*, 33-56.

Seymour, P. H. (1979). Human visual cognition. London: Collier Macmillan.

Sharpe, D. & Zelazo, P. H. (2002). The foundations and development of metalinguistic knowledge, *Journal of Child Language*, 29, 449-488.

Sheppard, E., Ropar, D., & Mitchell, P. (2009). Autism and dimensionality: Differences between copying and drawing tasks. *Journal of autism and developmental disorders*, *39*(7), 1039-1046.

Sitton, R. & Light, P. (1992). Drawing to differentiate: Flexibility in young children's human figure drawings. *British Journal of Developmental Psychology, 10,* 25-33.

Skipper, D. (2001) 'Age and sex differences in the ability to recognize and depict facial expressions of emotion', unpublished undergraduate project, University of York.

Smith, D. & Dumont, F. (1995). A cautionary study: Unwarranted interpretations of the draw-a-person test. *Professional Psychology: Research and Practice,* 23, 298-303.

Spensley, F., & Taylor, J. (1999). The development of cognitive flexibility: Evidence from children's drawings. *Human Development, 42,* 300-324.

Sperry, R. W., Gazzaniga, M. S., & Bogen, J. E. (1969). Interhemispheric relationships: the neocortical commissures; syndromes of hemisphere disconnection. *Handbook of clinical neurology, 4*(273-290).

Stanfield, R. A., & Zwaan, R. A. (2001). The effect of implied orientation derived from verbal context on picture recognition. *Psychological Science,12,* 153–156.

Stangalino, C, Semenza, C, & Mondini, S. (1995). Generating visual mental images: Deficit after brain damage. *Neuropsychologia*, 11, 1473 - 1483.

Stiles, J. (1995). The early use and development of graphic formulas: Two case study reports of graphic formula production by 2-to 3-year-old children. *International Journal of Behavioral Development, 18* (1), 127-149.

Stiles, J., Trauner, D., Engel, M., & Nass, R. (1997). The development of drawing in children with congenital focal brain injury: Evidence for limited functional recovery. *Neuropsychologia, 35*(3), 299-312.

Strange, D., Hoynck Van Papendrecht, H., Crawford, E., Candel, I. & Hayne, H. (2010). Size doesn't matter: emotional content does not determine the size of objects in children's drawings. *Psychology, Crime & Law,* 16, 459-476.

Sutton, P. J., & Rose, D. H. (1998). The role of strategic visual attention in children's drawing development. *Journal of Experimental Child Psychology, 68*(2), 87-107.

Swensen, C. H. (1968). Empirical evaluations of human figure drawings: 1957-1966. *Psychological Bulletin, 54,* 431-66.

Tallandini, M. A., & Valentini, P. (1991). Symbolic prototypes in children's drawings of schools. *The Journal of Genetic Psychology, 152*(2), 179-190.

Tarr, M. J. (1995). Rotating objects to recognize them: A case study on the role of viewpoint dependency in the recognition of three-dimensional objects. *Psychonomic Bulletin & Review, 2*(1), 55-82.

Taylor, M., & Bacharach, V. R. (1982). Constraints on the visual accuracy of drawings produced by young children. *Journal of experimental child psychology, 34*(2), 311-329.

Taylor, L. M., & Mitchell, P. (1997). Judgments of apparent shape contaminated by knowledge of reality: Viewing circles obliquely. *British Journal of Psychology, 88*(4), 653-670.

Ter Laak, J., de Goede, M., Aleva, A. & van Rijswijk, P. (2005). The Draw-a-Person Test: an indicator of children's cognitive and socioemotional adaptation? *Journal of Genetic Psychology,* 166, 77-93.

Thaiss, L., & de Bleser, R. (1992). Visual agnosia: A case of reduced attentional ''spotlight''? *Cortex*, 28, 601 - 621.

Thomas, G. V., & Gray, R. (1992). Children's drawings of topics differing in emotional significance-effects on placement relative to self drawing: A research note. *Journal of Child Psychology and Psychiatry, 33*, 1097-1104.

Thomas, G. V., & Jolley, R. P. (1998). Drawing conclusions: a re-examination of empirical and conceptual bases for psychological evaluation of children from their drawings. *British Journal of Clinical Psychology, 37*, 127-39.

Thomas, G. V., & Tsalimi, A. (1988). Effects of order of drawing head and trunk on their relative sizes in children's human figure drawings. *British Journal of Developmental Psychology,* 6, 191-203.

Thomas, G. V., Chaigne, E., & Fox, T. J. (1989). Children's drawings of topics differing in significance: effects on size of drawing. *British Journal of Developmental Psychology, 7,* 321-31.

Thompson, C. & Bales, S. (1991). "Michael doesn't like my dinosaurs." Conversations in a preschool class. *Studies in Art Education, 33, (1)*, 43-55.

Thouless, R. H. (1931). Phenomenal regression to the real object. I. *British Journal of Psychology. General Section*, *21*(4), 339-359.

Tielsch, A. H., & Allen, P. J (2005). Listen to them draw: Screening children in primary care through the use of human figure drawings. *Pediatric Nursing*, 31, 320-327.

Tolar, T. D., Lederberg, A. R., Gokhale, S., & Tomasello, M. (2008). The development of the ability to recognize the meaning of iconic signs. *Journal of Deaf Studies and Deaf Education*, *13*(2), 225-240.

Toomela, A. (2003) Developmental stages in children's drawings of a cube and a doll. *Trames*, 7, 3, 164–182.

Trautner, H. M., & Milbrath, C. (2008). *Children's knowledge about pictures, drawing, and art.* Hogrefe & Huber Publishers.

Tulving, E. (1972). Episodic and Semantic Memory1. *Organization of memory*, 381-402.

Van Lennep, D.J. (1958). *Beleving en verbeelding in het tekenen: Een klinisch psychologische studie van de Driebomentest* [Phenomenal experience and imagination in drawings: A clinical psychological study of the Three Trees Test]. Amsterdam: (publisher not cited).

VanRullen, R. (2007). The power of the feed-forward sweep. *Advances in Cognitive Psychology*, *3*(1), 167-176.

Van Sommers, P. (1984). *Drawing and cognition: Descriptive and experimental studies of graphic production processes*. Cambridge, MA: Cambridge University Press.

Vélez van Meerbeke, A., Saldoval-García, C., Ibáñez, M., Talero Gutiérrez, C., Fiallo, D., & Halliday, K. (2011). Validation Study of Human Figure Drawing Test in a Colombian School Children Population. *Spanish journal of psychology*, *14*(1), 464-477.

Vital, P. M., Ronald, A., Wallace, G. L., & Happe', F. (2009). Relationship between special abilities and autistic-like traits in a large population-based sample of 8-year-olds. *Journal of Child Psychology and Psychiatry*, 50, 1093–1101.

Vlach, H., A. & Carver, S., M. (2008). The effects of observation coaching on children's graphic representations. Early Childhood Research & Practice, 10, (1).

Walker, P., Gavin Bremner, J., Merrick, K., Coates, S., Cooper, E., Lawley, R., Sageman, R. & Simm, R. (2006). Visual mental representations supporting object drawing: How naming a novel object with a novel count noun impacts on young children's object drawing. *Visual cognition*, *13*(6), 733-788.

Walker, P., Bremner, J. G., Smart, L., Pitt, T., & Apsey, D. (2008). Object categorisation, object naming, and viewpoint independence in visual remembering: Evidence from young children's drawings of a novel object. *Memory*, *16*(6), 626-636.

Wanderer, Z. W. (1969). Validity of clinical judgments based on human figure drawings. *Journal of Consulting and Clinical Psychology*, 33, 143-150.

Wapner, W., Judd, T., & Gardner, J. (1978). Visual agnosia in an artist. *Cortex*, 14, 343-364.

Watkins, C. E., Campbell, V. L., Nieberding, R., & Hallmark, R. (1995). Contemporary practice of psychological assessment by clinical psychologists. *Professional Psychology: Research and Practice, 26,* 54-60.

Waxman, S. R. (1999). Specifying the scope of 13-month-olds' expectations for novel words. *Cognition*, 70, B35-B50.

Waxman, S., & Booth, A. (2003). The origins and evolution of links between word learning and conceptual organization: new evidence from 11-month-olds. *Developmental Science*, *6*(2), 128-135.

Waxman Sandra, R., & Markow Dana, B. (1995). Words as invitations to form categories: Evidence from 12-to 13-month-old infants. *Cognitive psychology*, *29*(3), 257-302.

Widen, S. C., & Russell, J. A. (2003). A closer look at preschoolers' freely produced labels for facial expressions. *Developmental psychology*, *39*(1), 114.

Wiggers, M., & Van Lieshout, C. F. (1985). Development of recognition of emotions: Children's reliance on situational and facial expressive cues. *Developmental Psychology*, *21*(2), 338.

Willats, J. (1997). *Art and representation. New principles in the analysis of pictures.* Princeton, NJ: Princeton University Press.

Willats, J. (2005). *Making Sense of Children's Drawings*. New Jersey: Lawrence Erlbaum Associates, Inc.

Williams, B. R., Ponesse, J. S., Schachar, R. J., Logan, G. D. & Tannock, R. (1999). Development of inhibitory control across the life span. *Developmental Psychology, 35*, 205 – 213

Wilson, B., & Wilson, M. (1977). An iconoclastic view of the imagery sources in the drawings of young people. *Art Education*, *30*(1), 5-12.

Winner, E. (1982). *Invented worlds: The psychology of the arts*. Cambridge, MA: Harvard University Press.

Winston, A. S., Kenyon, B., Stewardson, J., & Lepine, T. (1995). Children's sensitivity to expression of emotion in drawings. *Visual Arts Research, 21,* 1-15.

Wright, I., Waterman, M., Prescott, H. & Murdoch-Eaton, D. (2003). A new Stroop-like measure of inhibitory function: typical developmental trends. *Journal of Child Psychology and Psychiatry, 44 (4)*, 561-575.

Wrightson, L. & Saklofske, D. H. (2000) Validity and Reliability of the Draw A Person: Screening Procedure for Emotional Disturbance with Adolescent Students. *Canadian Journal of School Psychology , 16 (1)*, 95.

Zeki, S. (1998). Art and the brain. *Daedalus, 127*, 71-103.

Zelazo, P., D. (2003) The development of conscious control in childhood. *Trends In Cognitive Sciences, 8* (1), 12-17.

Zhi, Z., Thomas, G. V., & Robinson, E. J. (1997). Constraints on representational change: Drawing a man with two heads. *British Journal of Developmental Psychology, 15,* 275-290.

Zwaan, R. A., & Yaxley, R. H. (2003). Spatial iconicity affects semantic relatedness judgments. *Psychonomic Bulletin & Review, 10,* 954–958.

Zwaan, R. A., Stanfield, R. A., & Yaxley, R. H. (2002). Do language comprehenders routinely represent the shapes of objects? *Psychological Science, 13,* 168–171.

Appendices

A - Consent Letters

B – Perception Card

C – RAN Task

D – Animal Stroop

E – Coded items for drawings discussed in Chapters 4 and 5

F – Example drawings for Chapter 4

G – Example of drawings for Chapter 5

H – Coded items for Chapter 6

I – Example drawings for Chapter 6

J – Coded items for drawings discussed in Chapters 7 and 8

K – Examples of drawings discussed in Chapters 7 and 8

Appendix A – Consent Letters

James Galpin
Child and Youth Studies Group
Faculty of Education and Language Studies
The Open University
Walton Hall
Milton Keynes
MK7 6AA

Dear Parent or Guardian,

I am writing to you regarding the possibility of taking part in some research I am conducting as part of my PhD at the Open University. *X* School have very kindly agreed to help with this research by allowing me to conduct it at the school. My research concerns children's drawing, an activity most children enjoy and find interesting, and their drawings often help us understand their thinking. The aim of this study is to investigate whether children use a convention when drawing, i.e. do they use a shared pictorial language to communicate information in their drawings. To do this I will be asking the children to draw some stick figures who are said to be nice or nasty, or give their opinion about whether a stick person is nice or nasty. The activities will take approximately seven minutes and will be conducted in the school library. The results of this study will help to understand the development of drawing as a communicative activity.

I have an enhanced CRB disclosure, as well as full approval from my faculty to conduct this study. Should you require any further details regarding the procedure please do not hesitate to contact me by phone on 07862722209 or e-mail: j.b.galpin@open.ac.uk. Should you wish to speak to someone else regarding this research you may contact my principal supervisor, Prof. David Messer by e-mail: d.j.messer@open.ac.uk or phone: 01908 654752, or my external supervisor, Dr Esther Burkitt by e-mail: E.Burkitt@chi.ac.uk or phone 01243 816359.

I would be most grateful if you would permit to take part in the study, the full results of which will be made available to all those who take part.

Thank you for your time in reading my proposal and I look forward to hearing from you.

Yours sincerely,

James Galpin MSc, MRes

I as the parent / guardian give my consent for to take part in the above mentioned study.

Signed Date

The Open University

James Galpin
Child and Youth Studies Group
Faculty of Education and Language Studies
The Open University
Walton Hall
Milton Keynes
MK7 6AA
DATE

Dear Parent or Guardian,

I am writing to you regarding the possibility of helping me with some research I am carrying out to understand the influences on children's drawings. This is part of my PhD at the Open University. In this study I am interested in the way language can influence children's drawings. *X*, the head teacher has very kindly agreed to help with this research by allowing me to conduct it at the school.

NAME OF CHILD will take part in one short session of about 15 minutes. They will first be asked to draw a picture of a house, a flower, a person and a person characterised as nice and a person characterised as nasty. During the drawing NAME OF CHILD will be asked to explain how they are going to represent these images and their reasons will be recorded. Following the drawings they will be asked more explicitly why they have drawn the pictures the way they have. These tasks will be used to look at the influences on how children represent objects in drawings.

The tasks will be explained to NAME OF CHILD. They will be asked whether they would like to take part and reassured that they will be free to end the session at any point if they wish (this hardly ever happens and children are sometimes disappointed if they cannot take part!). The study will be run according to strict ethical guidelines. The information we collect will be anonymised; we will not use your child's name. It will be held securely and only used for research purposes. The information we collect will have no bearing on the educational provision or academic assessment of your child. A summary of the findings will be available at the school for anyone who should wish to see the results.

I very much hope you will agree for your child to take part in our research. If you **WOULD NOT** like your child to take part please complete and sign the form below then return it to your child's teacher by the **(date one week after the date of the letter)**. Once your child has taken part you may also contact me by the **(date three weeks after the date of the letter)** to remove your consent for your child to take part and their data will be removed and destroyed. Should you require any further details regarding the study please do not hesitate to contact me by phone on 07862722209 or e-mail: j.b.galpin@open.ac.uk. Should you wish to speak to someone else regarding this research you may contact my principal supervisor, Prof. David Messer by e-mail: d.j.messer@open.ac.uk or phone: 01908 654752, or my external supervisor, Dr Esther Burkitt by e-mail: E.Burkitt@chi.ac.uk or phone 01243 816359.

Many thanks for your help,

James Galpin MSc, MRes

I hereby do not give my permission for my child (name)........................... in class .... to take part in the study being run by James Galpin from the Open University, as outlined in his letter dated

Signed..Parent/Guardian

James Galpin
Child and Youth Studies Group
Faculty of Education and Language Studies
The Open University
Walton Hall
Milton Keynes
MK7 6AA
DATE

29th May 2012

Dear Parent or Guardian,

I am writing to you regarding the possibility of helping us with some research we are carrying out to understand the influences on children's drawings. This is part of my PhD at the Open University. In this study I am interested in the way language can influence children's drawings. The head teacher has very kindly agreed to help with this research by allowing me to conduct it at the school.

Your child will take part in two short sessions of about 5 - 10 minutes separated by a day. In the first session they will be asked to remember a picture named as either a house or a face (it looks like both) and then will play some word and picture games. The following day they will be asked to draw the picture they were shown the previous day and also their own drawing of a house and a face. These tasks will be used to look at the influences on how children represent objects in drawings.

The tasks will be explained to . They will be asked whether they would like to take part and reassured that they will be free to end the session at any point if they wish (this hardly ever happens and children are sometimes disappointed if they cannot take part!). The information we collect will be anonymised; we will not use your child's name. It will be held securely and only used for research purposes. The information we collect will have no bearing on the educational provision or academic assessment of your child. A summary of the findings will be available for anyone who should wish to see the results of our study.

I very much hope you will agree for your child to take part in our research. If you **WOULD NOT** like your child to take part please complete and sign the form below then return it to your child's teacher by the **11th of June**. Once your child has taken part you may also contact me by the 15th July to remove your consent for your child to take part and their data will be removed and destroyed. Should you require any further details regarding the study please do not hesitate to contact me by phone on 07862722209 or e-mail: j.b.galpin@open.ac.uk.

Many thanks for your help,

James Galpin MSc, MRes

I hereby do not give my permission for my child (name)...................................... in class .... to take part in the study being run by James Galpin from the Open University, as outlined in his letter dated 29th May 2012

Signed...Parent/Guardian

James Galpin
Child and Youth Studies Group
Faculty of Education and Language Studies
The Open University
Walton Hall
Milton Keynes
MK7 6AA
DATE

Dear Parent or Guardian,

I am writing to you regarding the possibility of helping me with some research I am carrying out to understand the influences on children's drawings. This is part of my PhD at the Open University. In this study I am interested in the way language can influence children's drawings. *X*, the head teacher of *X* School, has very kindly agreed to help with this research by allowing me to conduct it at the school.

The children will take part in two short sessions of about 5-10 minutes. Children will first be shown a picture of an everyday object, they will then play some picture and word games, and lastly they will be asked to draw the picture they saw at the beginning of the session. About two days later the children will be asked to draw the same picture and make two other drawings of everyday objects. These simple tasks will be used to look at the links between language and children's drawing.

The tasks will be explained to your child. He or she will be asked whether they would like to take part and reassured that they will be free to end the session at any point if they wish (this hardly ever happens and children are sometimes disappointed if they cannot take part!). The study will be run according to strict ethical guidelines. The information we collect will be anonymised; we will not use your child's name. It will be held securely and only used for research purposes. The information we collect will have no bearing on the educational provision or academic assessment of your child. A summary of the findings will be available at the school for anyone who should wish to see the results.

I very much hope you will agree for your child to take part in our research. If you do not wish for your child to take part, please complete and sign the form below and then return it to your child's teacher by the **(date one week after the date of the letter)**. Should you require any further details regarding the study please do not hesitate to contact me by phone on 07862722209 or e-mail: j.b.galpin@open.ac.uk. Should you wish to speak to someone else regarding this research you may contact my principal supervisor, Prof. David Messer by e-mail: d.j.messer@open.ac.uk or phone: 01908 654752, or my external supervisor, Dr Esther Burkitt by e-mail: E.Burkitt@chi.ac.uk or phone 01243 816359.

Many thanks for your help,

James Galpin MSc, MRes

I hereby do not give my permission for my child (name)........................... in class .... to take part in the study being run by James Galpin from the Open University, as outlined in his letter dated

Signed..Parent/Guardian

James Galpin
Child and Youth Studies Group
Faculty of Education and Language Studies
The Open University
Walton Hall
Milton Keynes
MK7 6AA
DATE

Dear *(Head teacher)*,

I am writing to you regarding the possibility of your school helping me with some research I am carrying out to understand the influences on children's drawings. This is part of my PhD at the Open University. In this study I am interested in the way language can influence children's drawings.

I would be asking children in Years 5 and 6 to take part. The children will take part in two short sessions of about 5-10 minutes. Children will first be shown a picture of an everyday object, they will then play some picture and word games, and lastly they will be asked to draw the picture they saw at the beginning of the session. About two days later the children will be asked to draw the same picture and make three other drawings of everyday objects. These simple tasks will be used to look at the links between language and children's drawing.

The tasks will be explained to the children child. He or she will be asked whether they would like to take part and reassured that they will be free to end the session at any point if they wish (this hardly ever happens and children are sometimes disappointed if they cannot take part!). The study will be run according to strict ethical guidelines. The information we collect will be anonymised; we will not use any child's name. It will be held securely and only used for research purposes. The information we collect will have no bearing on the educational provision or academic assessment of any child. A summary of the findings will be available at the school for anyone who should wish to see the results.

I very much hope you will agree for your school to take part in our research. Should you require any further details regarding the study please do not hesitate to contact me by phone on 07862722209 or e-mail: j.b.galpin@open.ac.uk and I can provide full details of the methodology of the drawing tasks. Should you wish to speak to someone else regarding this research you may contact my principal supervisor, Prof. David Messer by e-mail: d.j.messer@open.ac.uk or phone: 01908 654752, or my external supervisor, Dr Esther Burkitt by e-mail: E.Burkitt@chi.ac.uk or phone 01243 816359.

Many thanks for your help,

James Galpin MSc, MRes

James Galpin
Child and Youth Studies Group
Faculty of Education and Language Studies
The Open University
Walton Hall
Milton Keynes
MK7 6AA
DATE

Dear *(Head teacher)*,

I am writing to you regarding the possibility of your school helping me with some research I am carrying out to understand the influences on children's drawings. This is part of my PhD at the Open University. In this study I am interested in the way language can influence children's drawings.

I would be asking children in Years 2 and 3 to take part. The children will take part in two short sessions of about 5-10 minutes. Children will first be shown a picture of an everyday object, they will then play some picture and word games, and lastly they will be asked to draw the picture they saw at the beginning of the session. One day later the children will be asked to draw the same picture and make three other drawings of everyday objects. These simple tasks will be used to look at the links between language and children's drawing.

The tasks will be explained to the children child. He or she will be asked whether they would like to take part and reassured that they will be free to end the session at any point if they wish (this hardly ever happens and children are sometimes disappointed if they cannot take part!). The study will be run according to strict ethical guidelines. The information we collect will be anonymised; we will not use any child's name. It will be held securely and only used for research purposes. The information we collect will have no bearing on the educational provision or academic assessment of any child. A summary of the findings will be available at the school for anyone who should wish to see the results.

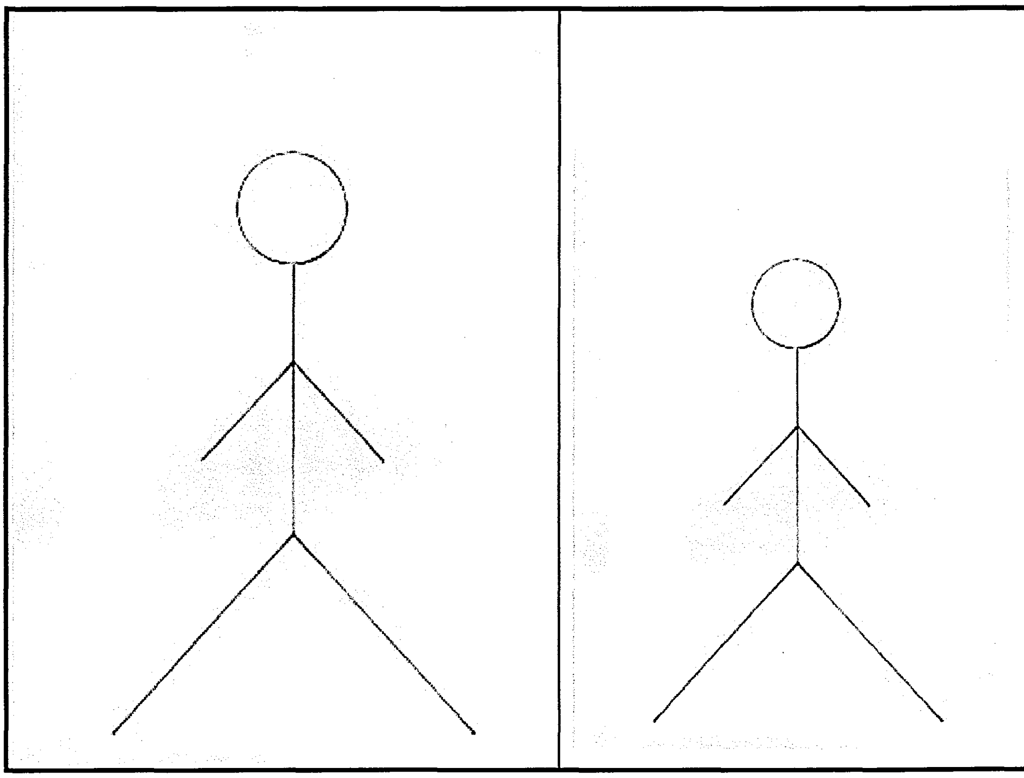
I very much hope you will agree for your school to take part in our research. Should you require any further details regarding the study please do not hesitate to contact me by phone on 07862722209 or e-mail: j.b.galpin@open.ac.uk and I can provide full details of the methodology of the drawing tasks. Should you wish to speak to someone else regarding this research you may contact my principal supervisor, Prof. David Messer by e-mail: d.j.messer@open.ac.uk or phone: 01908 654752, or my external supervisor, Dr Esther Burkitt by e-mail: E.Burkitt@chi.ac.uk or phone 01243 816359.

Many thanks for your help,

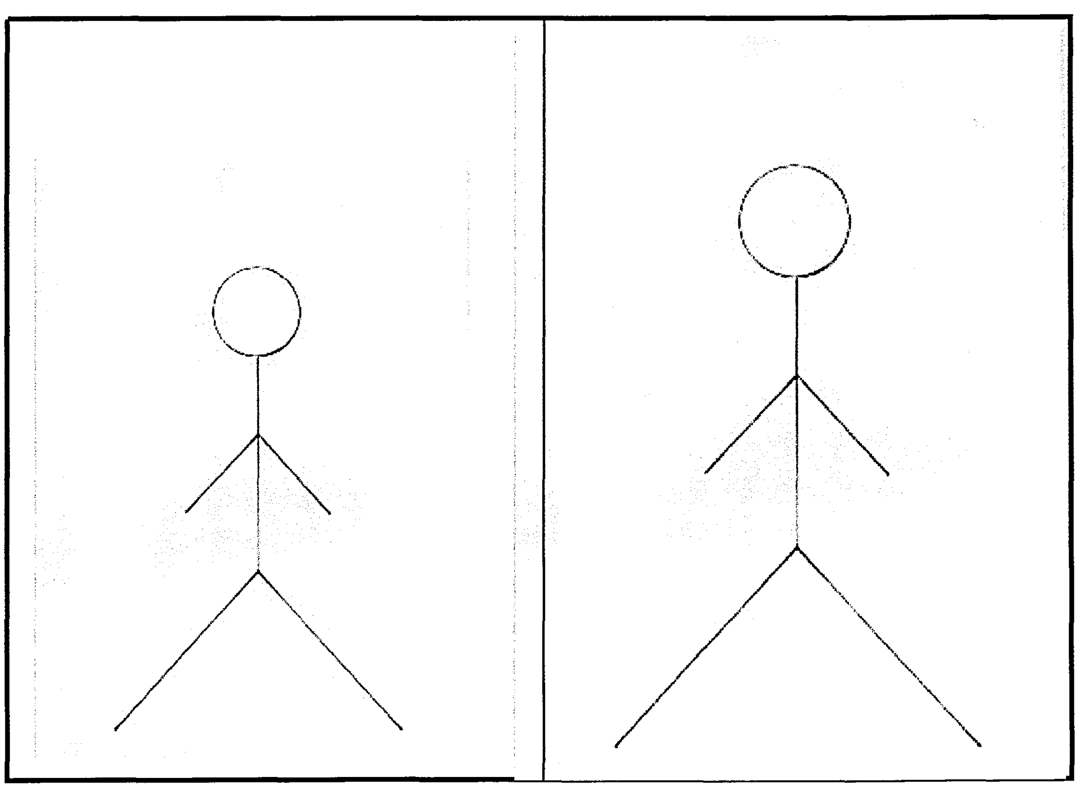
James Galpin MSc, MRes

Appendix B – Perception Cards

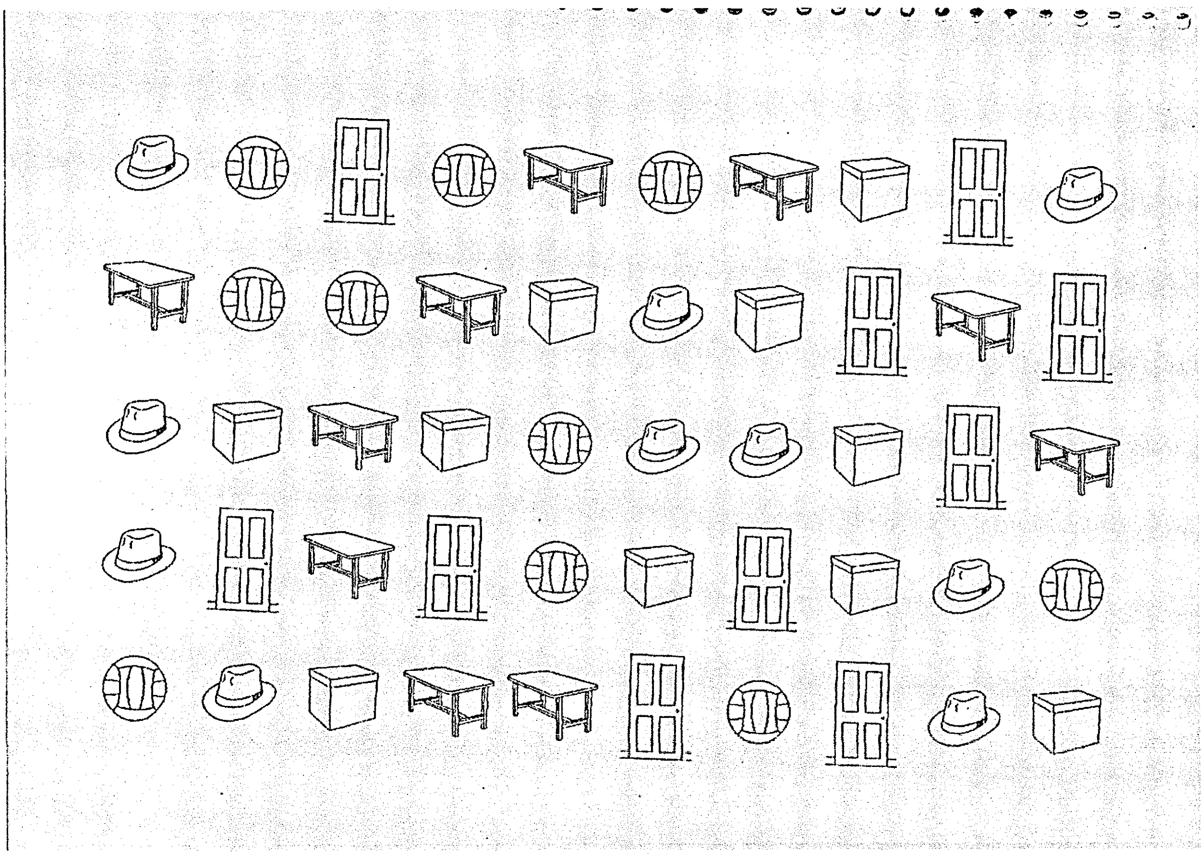
Card A



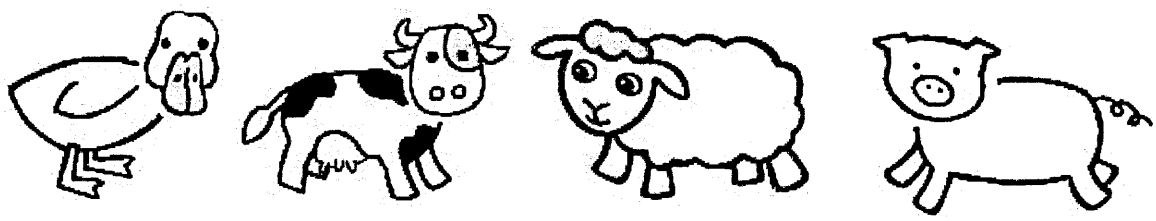
Card B



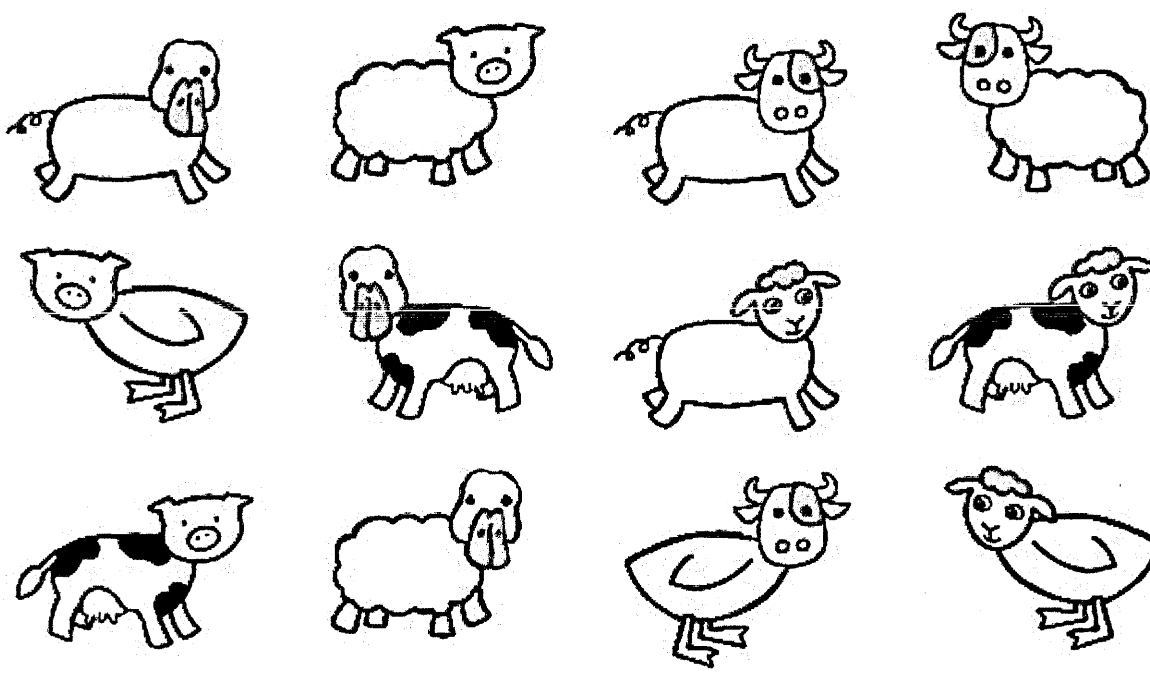
Appendix C – Random Automatic Naming (RAN) Task



Appendix D – Animal Stroop Test (AST)



Original animals used to familiarise the children with the animals and ensure they are able to name them prior to viewing the animals with the heads and bodies swapped (hybrid animals).



Hybrid animals used in the AST.

Appendix E – Coded items for drawings discussed in Chapters 4 and 5

Happy, Sad, Neutral, Scared, Confused and Angry Faces

Face

1. No Face
2. Round Face
3. Oval Face
4. Square Face
5. Potato Shaped Face
6. Rectangular Face
7. Incomplete circular Face

Mouth

8. Upturned single line mouth
9. Upturned undulating single line mouth
10. Upturned mouth with central lip line
11. Upturned hollow mouth
12. Horizontal straight line mouth
13. Horizontal undulating single line mouth
14. Horizontal jagged mouth
15. Horizontal thin hollow mouth
16. Horizontal hollow undulating mouth (continues off face)
17. Down turned single line mouth
18. Down turned mouth with central lip line
19. Down turned hollow mouth
20. Down turned mouth undulating (wobbly)
21. Down turned hollow undulating mouth
22. Oval hollow mouth
23. Oval solid mouth
24. 'O' shaped mouth

Teeth

25. Square teeth
26. Not full block of teeth
27. Scribbled teeth
28. Square teeth like fangs

Cheeks

29. Cheeks
30. Crease lines above mouth

Eyes

31. Solid round eyes
32. Hollow round eyes
33. Hollow oval eyes
34. Solid oval eyes
35. Solid dot eyes
36. Vertical line eyes
37. Horizontal line eyes
38. Down turned solid lines
39. Horizontal half circle eyes
40. Undulating (wobbly line) eyes
41. Lop sided eyes (one noticeably higher/lower than the other)
42. Repeated circular scribble
43. No pupils

43a. Solid round pupils – middle of eyes

44. Solid round pupils - bottom of eyes
45. Solid round pupils - left hand side
46. Solid round pupils - right hand side
47. Snail shell (spiral) pupils
48. Undulating pupils
49. Lop sided pupils
50. Semi circular iris

51. Circular iris

Eyebrows

52. Down turned eyebrows
53. Down turned hollow eyebrows
54. Up curved eyebrows
55. Jagged eyebrows
56. Eyebrows / \ (rectangles)
57. Eyebrows / \
58. Eyebrows \ / (rectangles)
59. Eyebrows \ /
60. Eyebrows \/
61. Eyebrows ^ ^
62. Eyebrows ~ ~
63. Eyebrows - - (rectangles)
64. Eyebrows - -
65. Eyebrows / /
66. Single eyebrow
67. Eyelashes top
68. Eyelashes bottom

Nose

69. No nose
70. Round hollow nose
71. Round solid nose
72. Triangular nose
73. 'L' shaped nose
74. Backward 'L' shaped nose
75. 'Conical flask' shaped nose
76. Vertical line nose
77. Solid round nostrils
78. Hollow round nostril/s

79. Undulating line nostrils

80. Lines from nostrils

Hair

81. Long hair single strands

82. Thick scribble hair

83. Spiky hair

84. Hair standing on end

85. Other hair

Other

86. Stick body

87. Non-stick torso

88. Arms

89. Fists

90. Tongue

91. Tears

92. Thought bubble - with ?

93. Thought bubble - with words

94. Positive words

95. Negative words

96. Hand scratching/beside head/chin

97. Arms held out and up

98. OTHER

Sun

'Body'

99. Round Body

100. Oval Body

101. Round Body with curve inward

102. Round body with lump outward

103. Mis-shapen rectangle body

104. Bulb shaped body (square/rectangle + circle)

105. Placed in corner so not fully shown

Rays

106. No rays

107. Straight line rays symmetrically around CONNECTED to body

108. Straight line rays symmetrically around UNCONNECTED to body

109. Straight lines as rays alternating in length

110. Undulating line/s surrounding body, not connected

111. Dashed lines surrounding body

112. Solid rectangular rays appears symmetrical intent

113. Solid rectangular rays unsymmetrical around body

114. Solid square x 2, solid rectangle (long x 2), solid rectangle (short x 2), single straight line

115. Mixed solid rectangular, straight line and square rays (not exact as above)

116. Flame' rays symmetrical connected to body

117. One single line ray not in keeping with the rest (DO NOT include if drawings has met criteria for 114 or 115)

Other

118. Speckled face

119. Dashed lines on face

120. Round hollow eyes

121. Upturned mouth

122. Sunglasses/glasses

123. Headphones and walkman

124. OTHER

House

'Body'

125. Square body

126. Cube body

127. Undulating rectangular body

128. Slanted square/rectangular body leaning right

129. Slanted square/rectangular body leaning left

Roof

130. Triangular roof

131. Rectangular roof

132. Pyramid (3D) roof

133. Two curved triangles roof

134. Undulating roof (like on fire)

135. Two triangle roof

136. Square/rectangular tiles

137. Tiles as undulating lines

138. Chimney

139. Two Chimneys

140. Smoke

Windows

141. No windows

142. Single square window

143. Circular windows (x4, ULH, URH, LLH, LRH)

144. Square windows x5

145. Square windows (x4, ULH, URH, LLH, LRH)

146. Square windows (x3, ULH, URH, LLH/LRH)

147. Square windows (x2 ULH, LRH/or LLH, URH)

148. Square windows (x2 ULH, CentreRH)

149. Square windows (x2 ULH, URH)

150. Window panes

151. Curtains

152. Shutters

153. Other window detail

Door

154. No door

155. Rectangular door in bottom centre

156. Curved door in bottom centre

157. Slanted rectangular/square door on RH side

158. Scribbled door RH side

159. Vertical Rectangular Door to RH side

160. Vertical Rectangular Door to LH side

161. Door with straight line down middle

162. Door knob

163. Door panels

Other

164. Straight lines coming off roof

165. Path

166. Stairs

167. Sun

168. Rain

169. Gutter

170. Ariel

171. Garage

172. Door mat

173. Lights

174. Letterbox

Flower

'Face'

175. No face

176. Round face

177. Round face off top to side

178. Speckled face

179. Circle inside round face

180. Small circles inside face (like sunflower)

181. Spiral inside face (like rose)

182. Tulip Style

Petals

183. Curved continuous petals

184. Curved and shaped Separate petals

185. Pointed continuous petals

186. Flame shaped separate petals

187. Oval shaped separate petals

188. Partially occluded petals behind main petals

189. Single line petals

190. Continuous slightly undulating line surrounding face

191. Petals coming off smaller stems of main stem

192. Petals coming out of 'face' and stem

Stem

193. No stem

194. Vertical single line stem

195. Vertical thick stem

196. Curved single line stem (LH side)

197. Undulating vertical single line stem

198. Curved thick stem

199. Straight stem on an angle (45 degs.) bottom right to top left

200. Straight stem on an angle (45 degs.) bottom left to . top right

Leaves (distinct from petals)

201. Leaves on stem 1

202. Leaves on stem 2

203. Leaves on stem 3

204. Leaves on stem 4

205. Leaves on stem 5+

206. Curved leaves

207. Straight lines leaves

208. Leaves from base

209. Leaf with veins

210. Leaf on ground

Other

211. Roots

212. Ground

213. Sun

214. Eyes

215. Smile

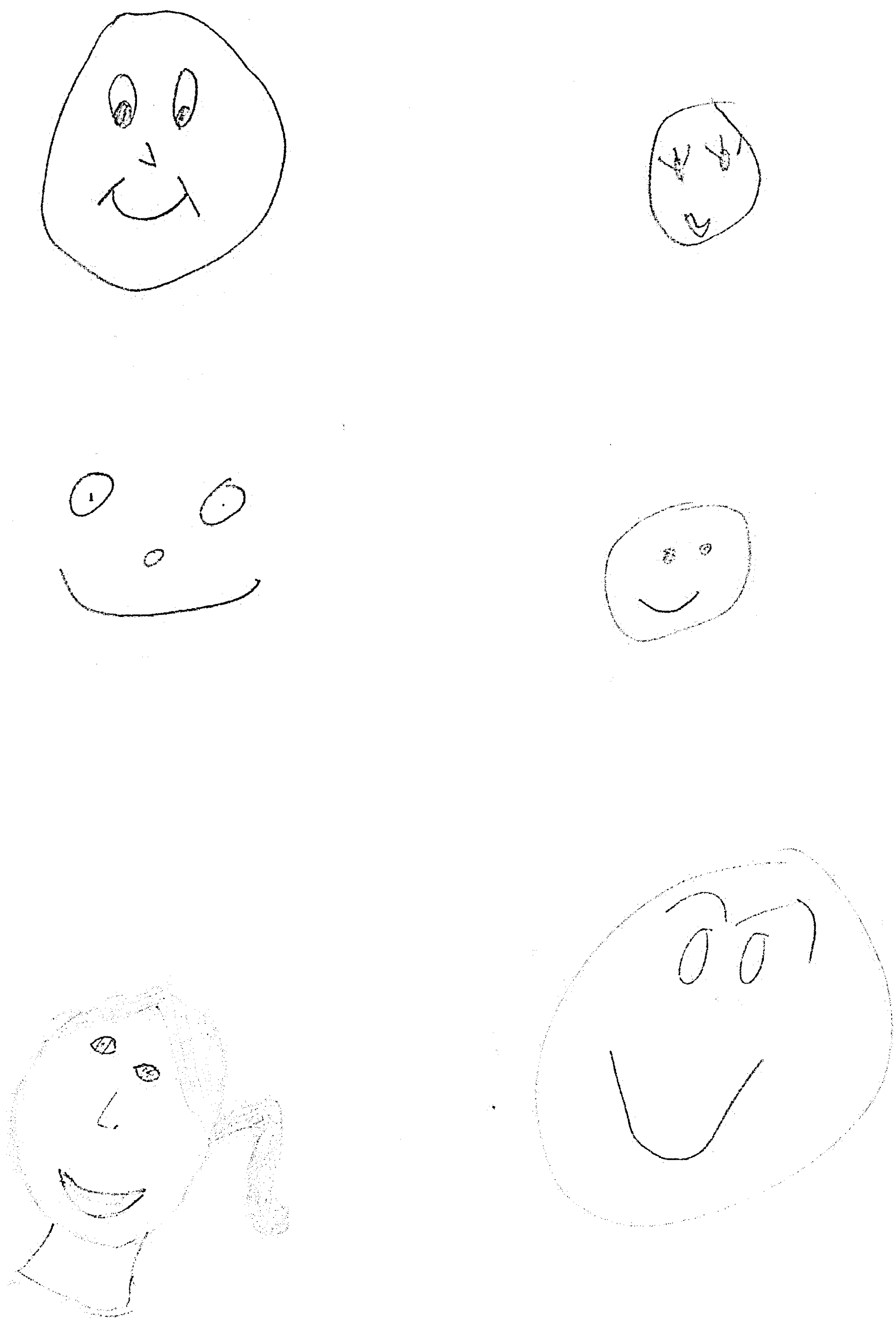
216. Stamen

217. Insect

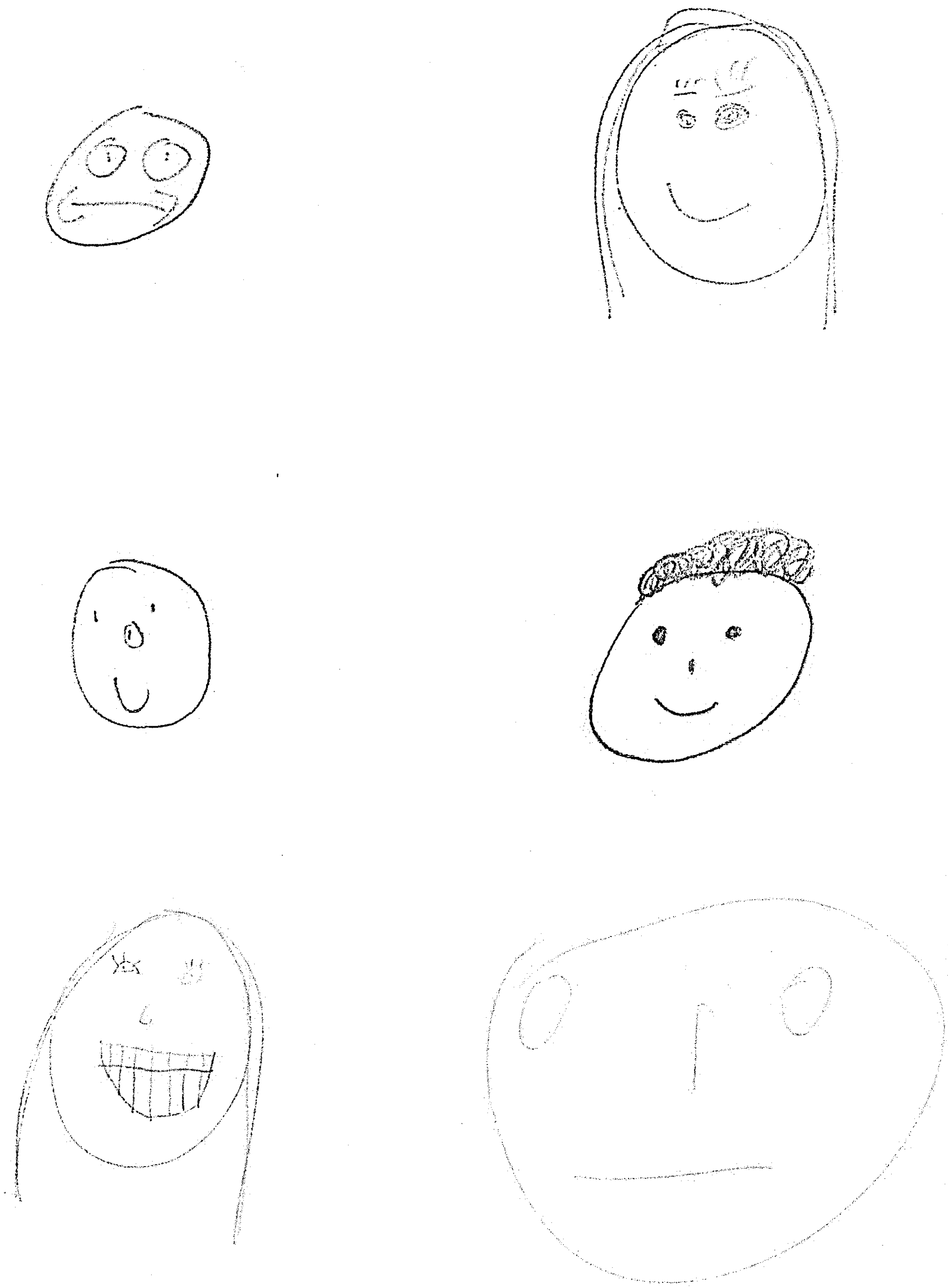
218. Speech

Appendix F - Example free drawings for Chapter 4

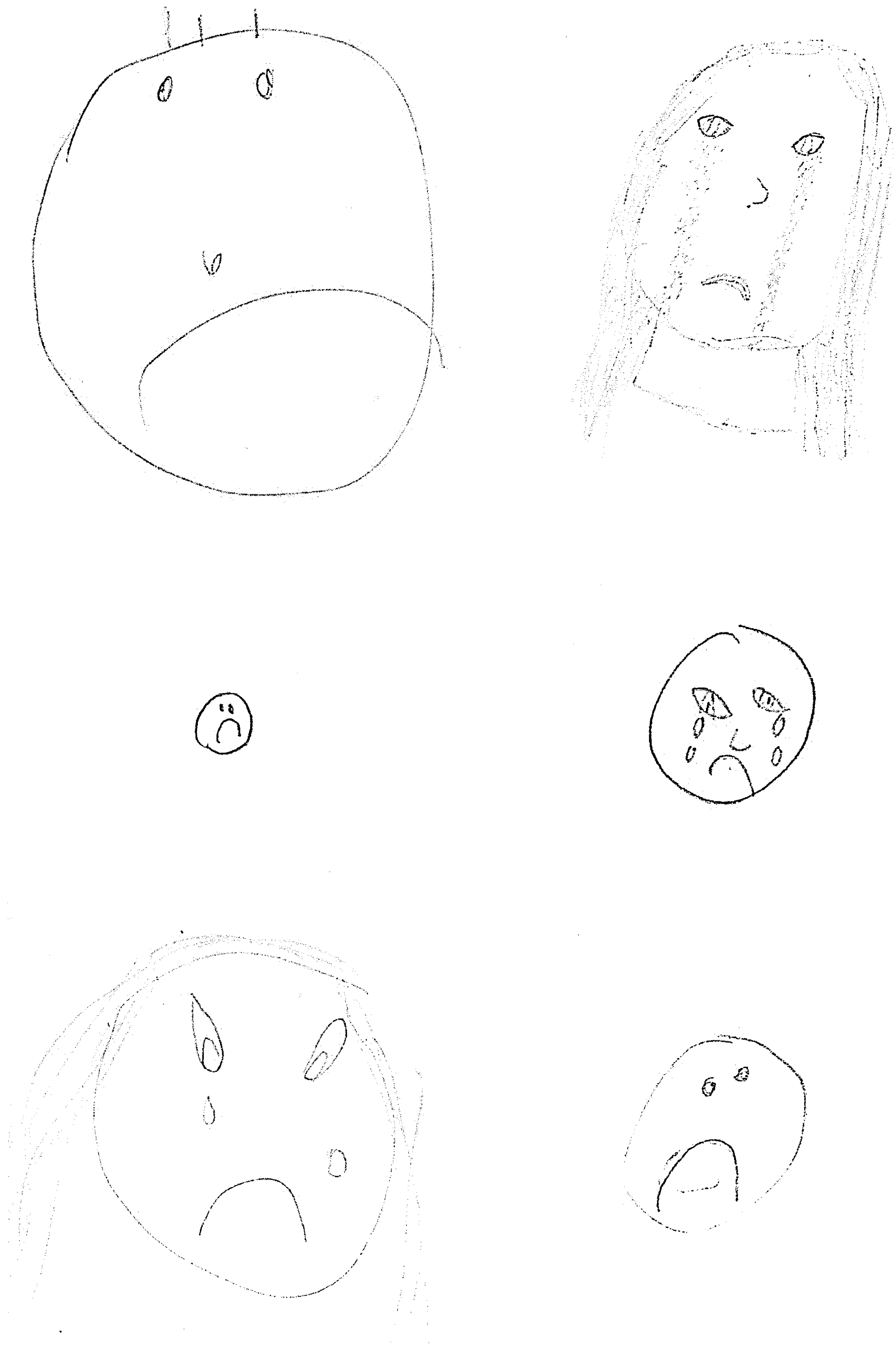
Happy Face



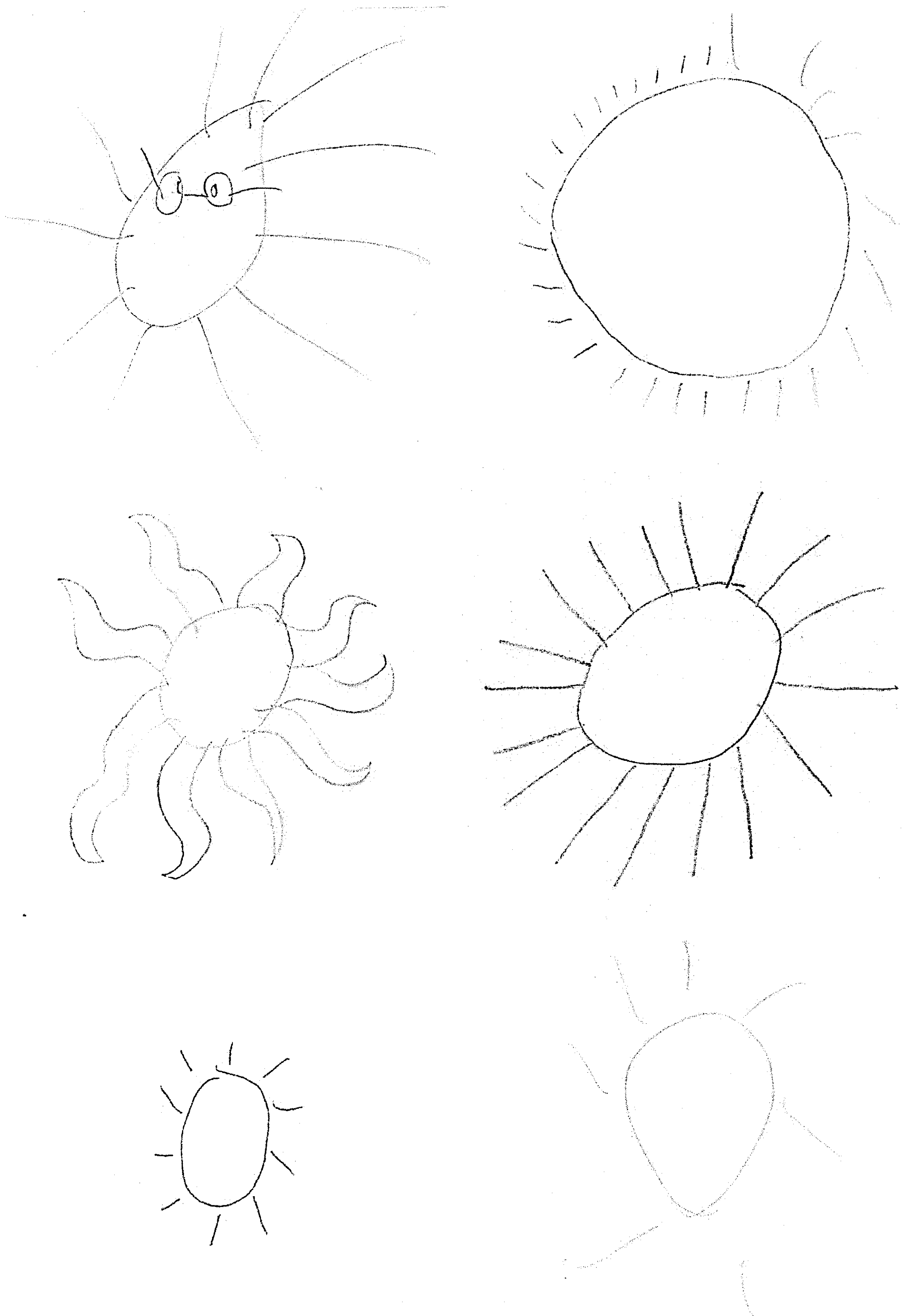
Neutral Face



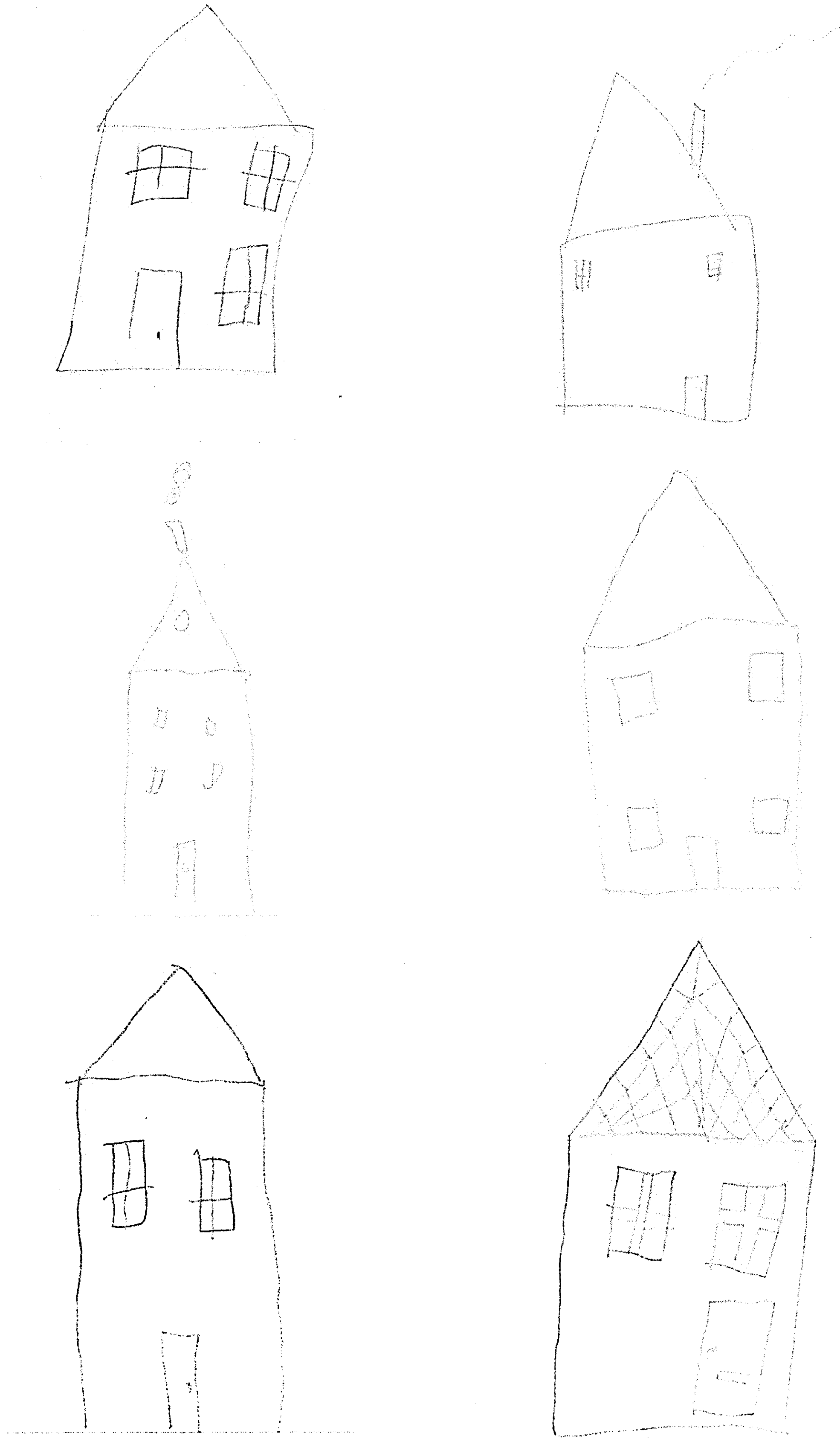
Sad Face



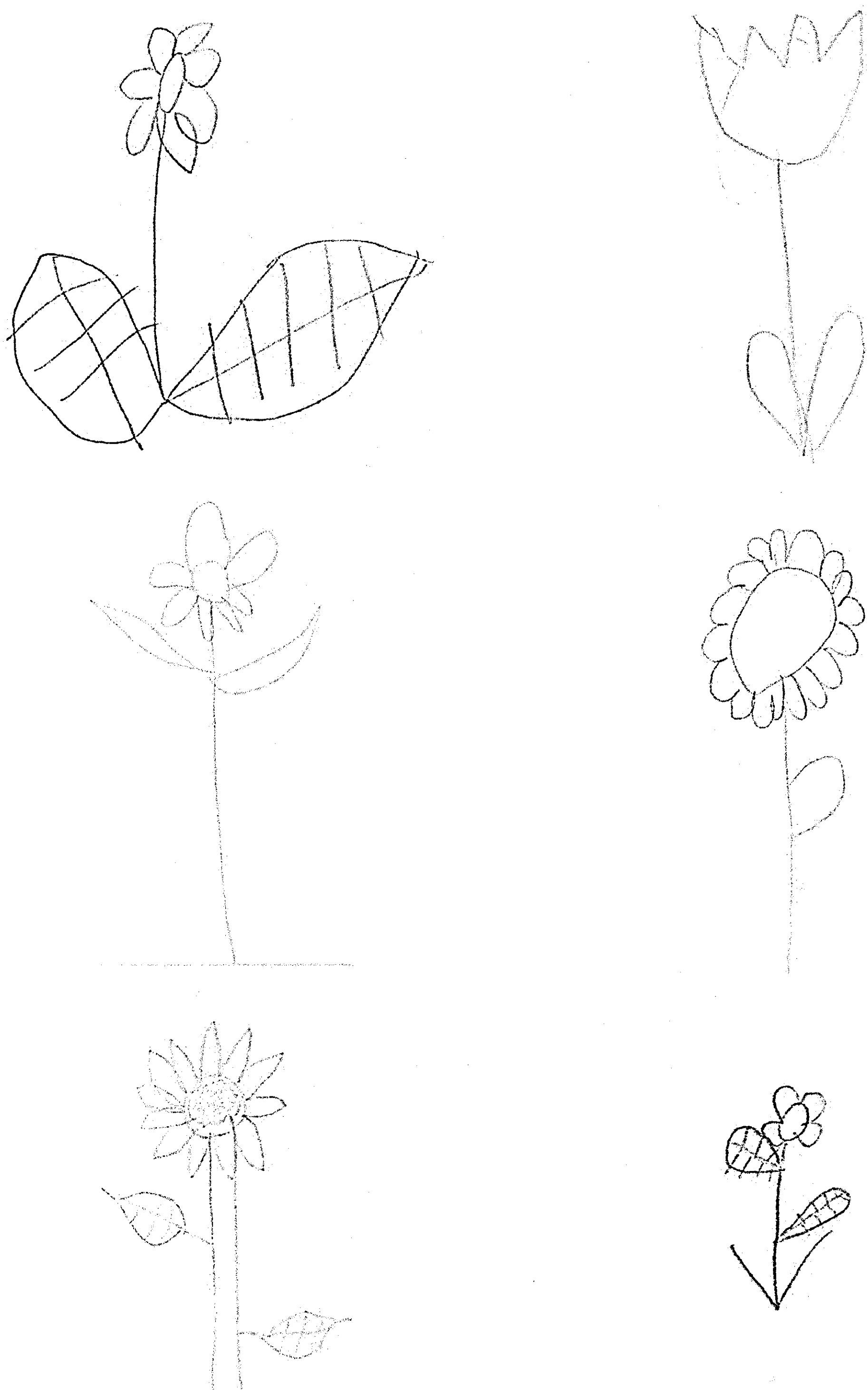
The Sun



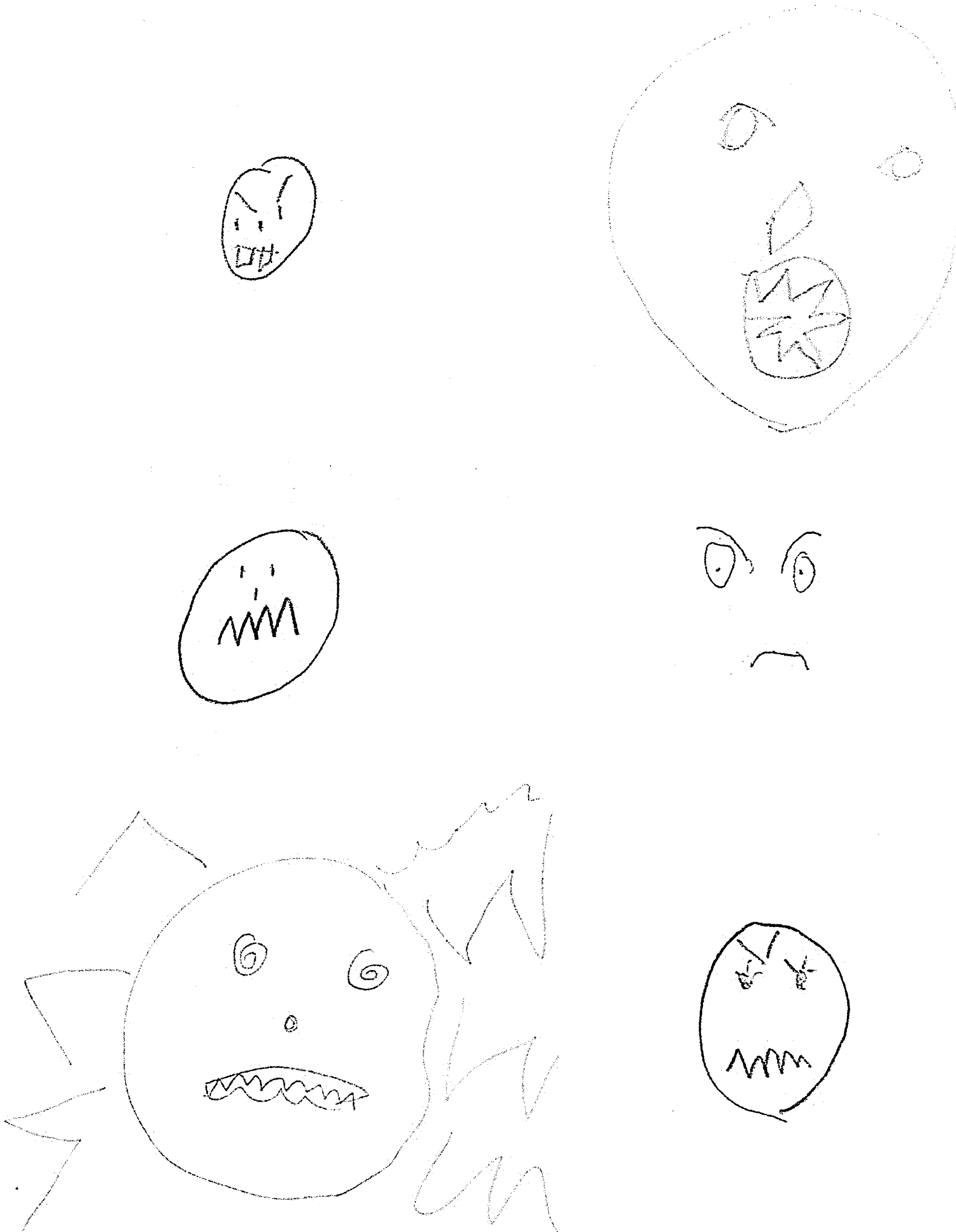
A House



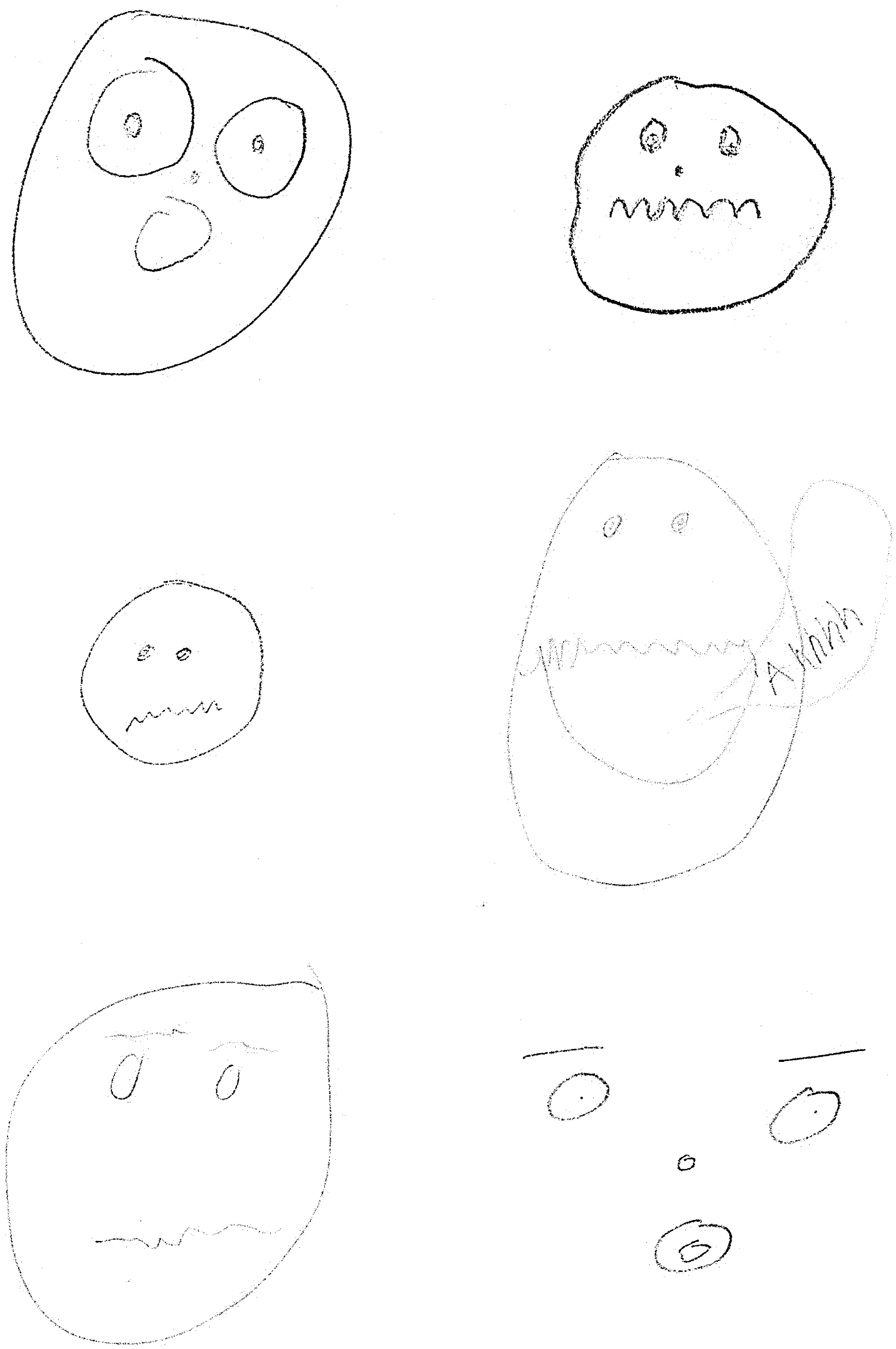
A Flower



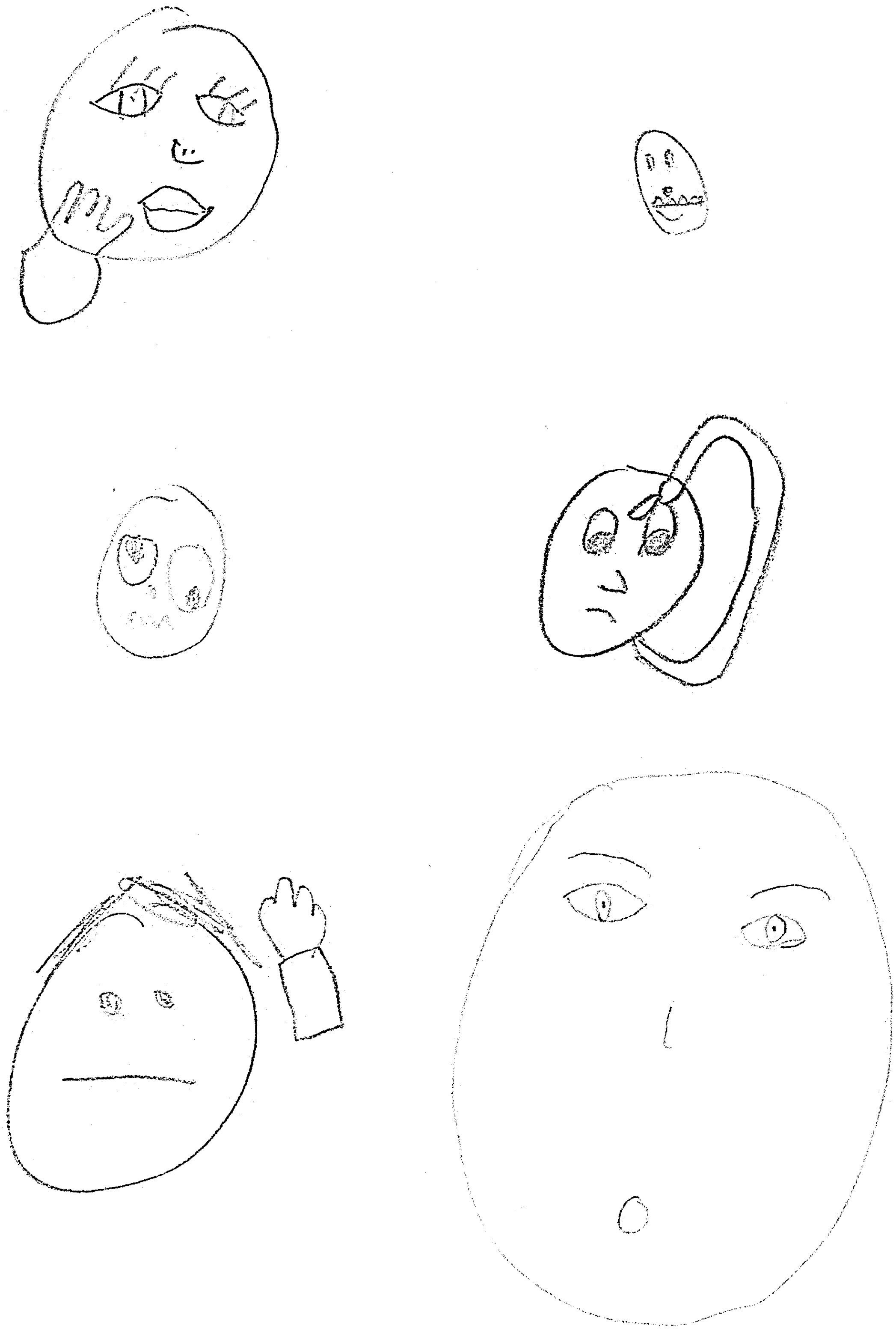
An Angry Face



A Scared Face

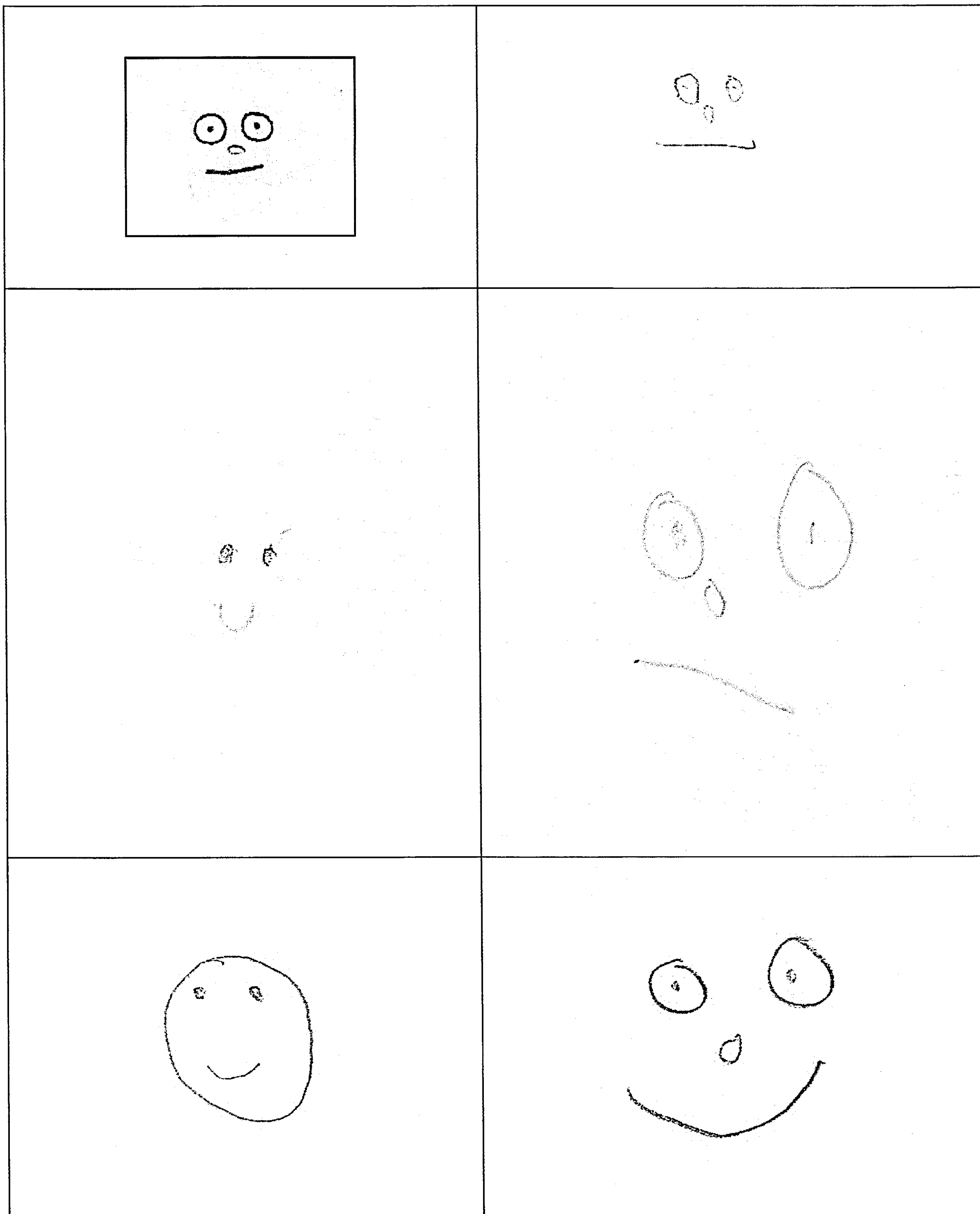


A Confused Face

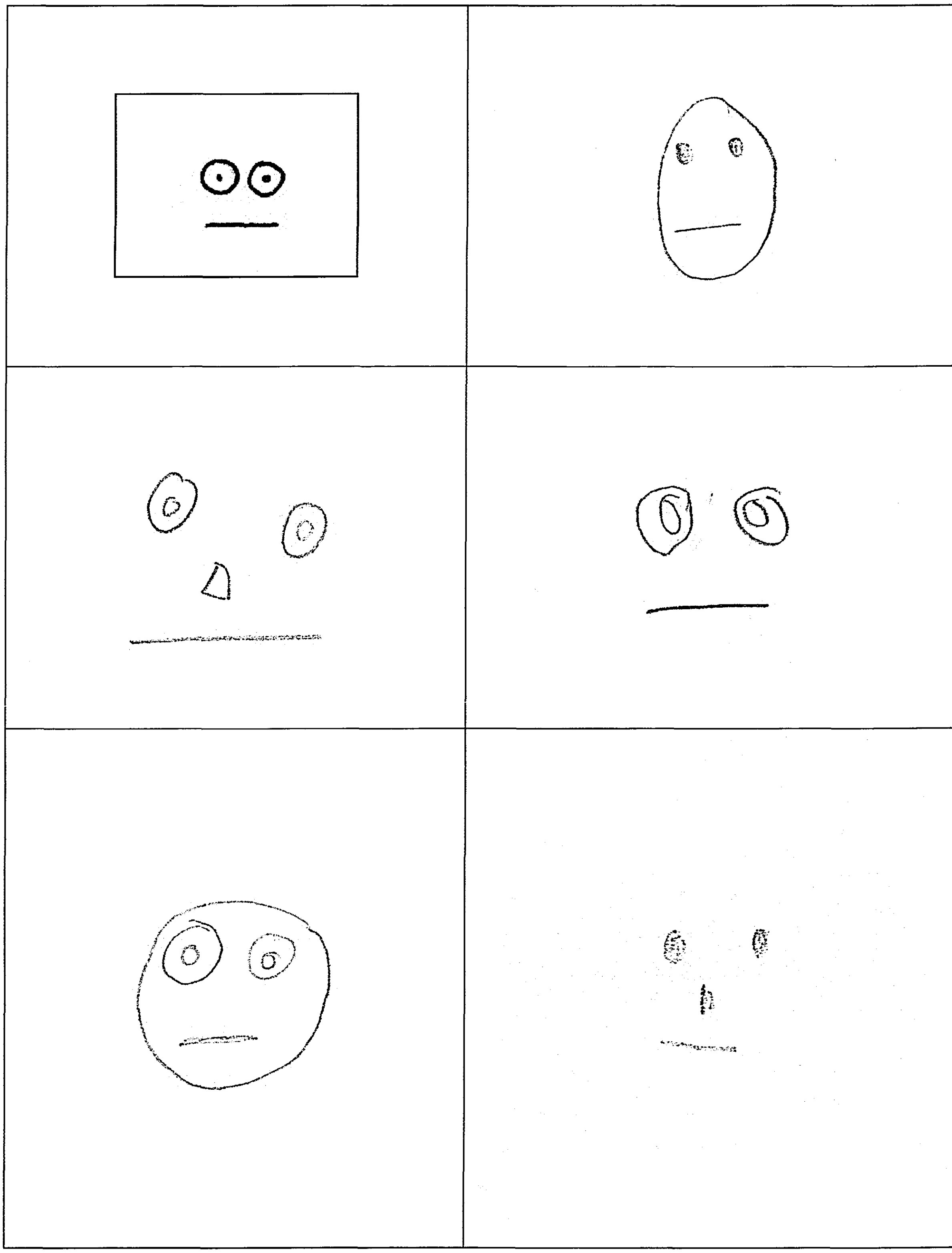


Appendix G – Examples of Target Drawings for Chapter 5

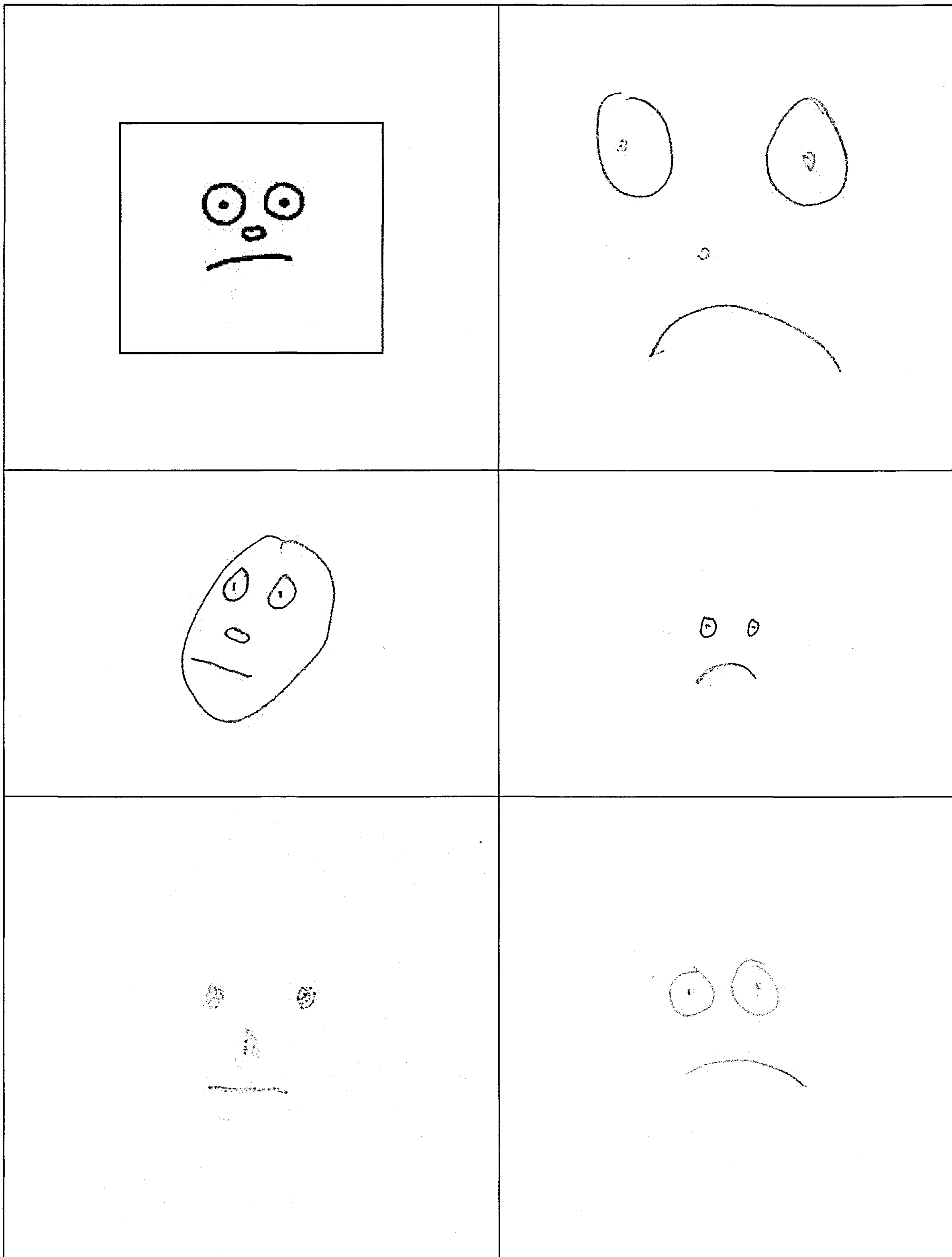
Happy Face (Target Image in top left of table)



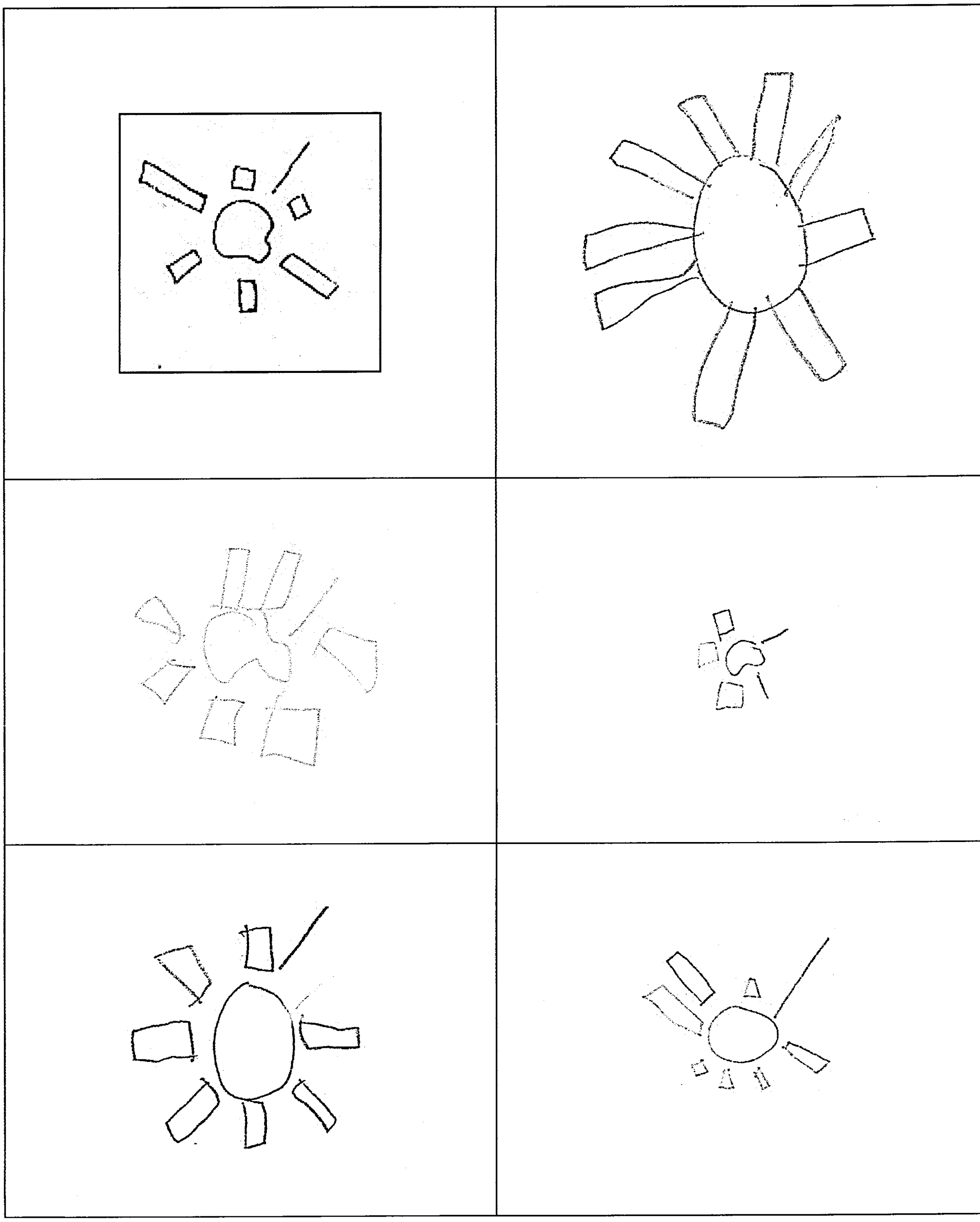
Neutral Face (Target Image in top left of table)



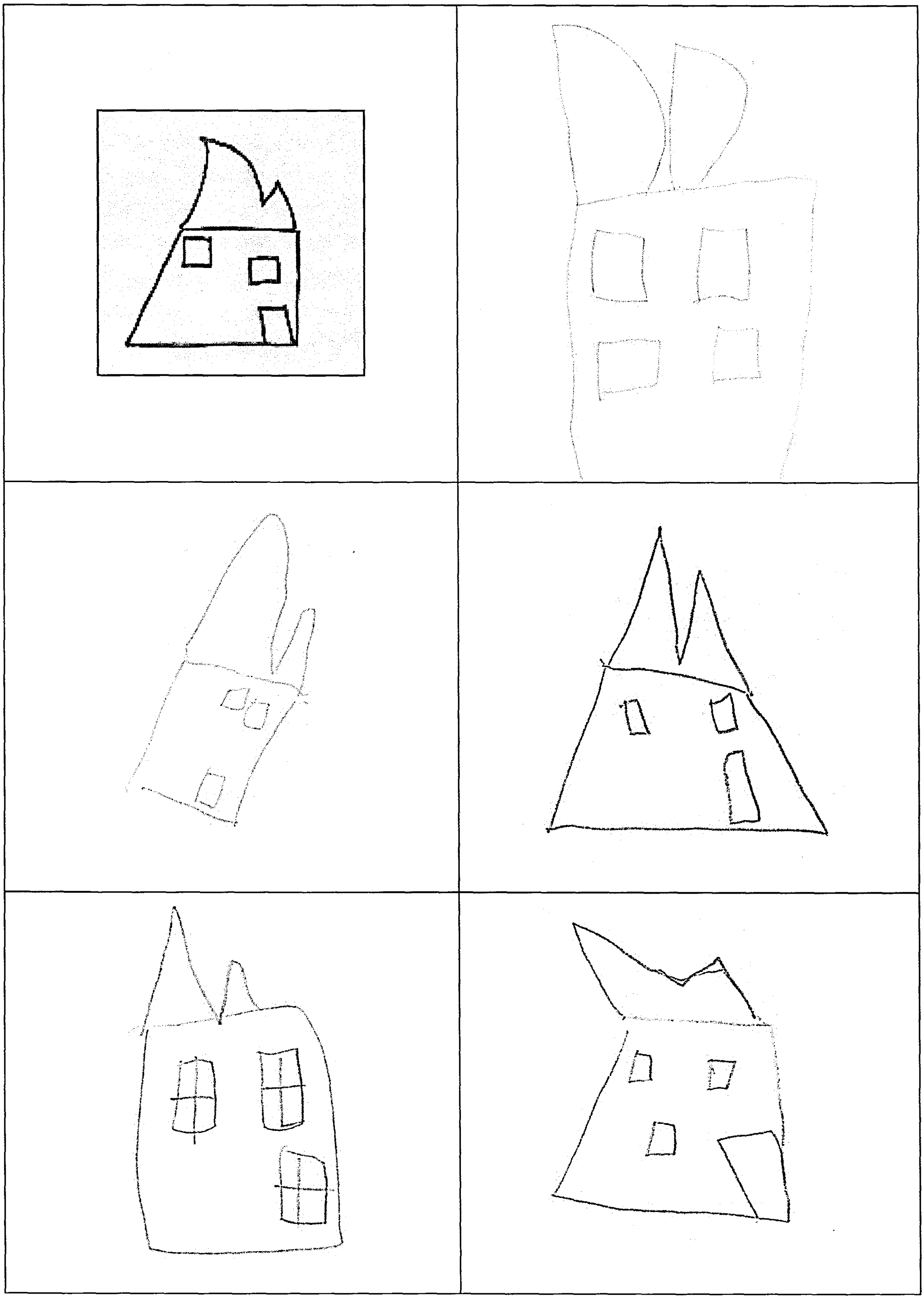
Sad Face (Target Image in top left of table)



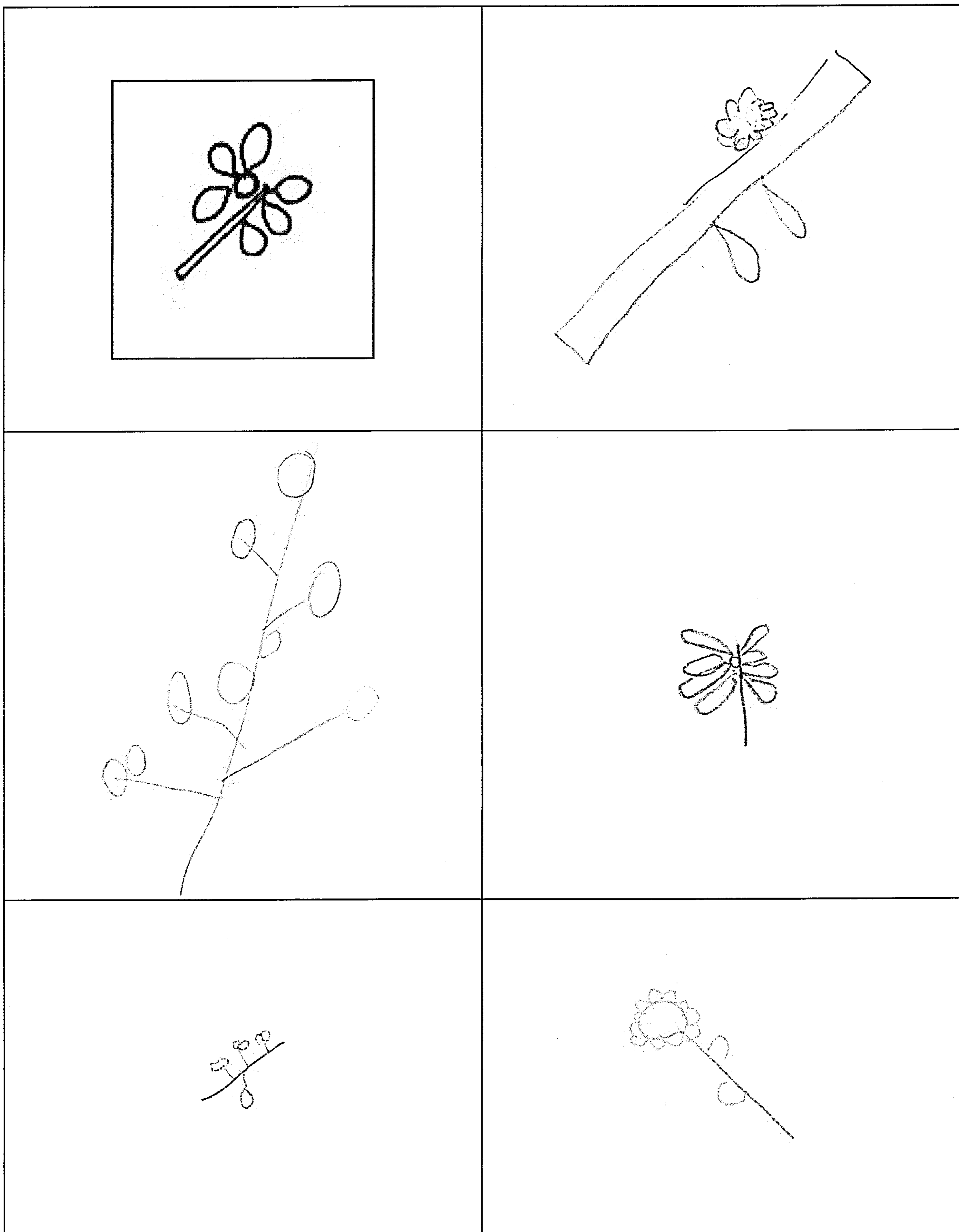
The Sun (Target Image in top left of table)



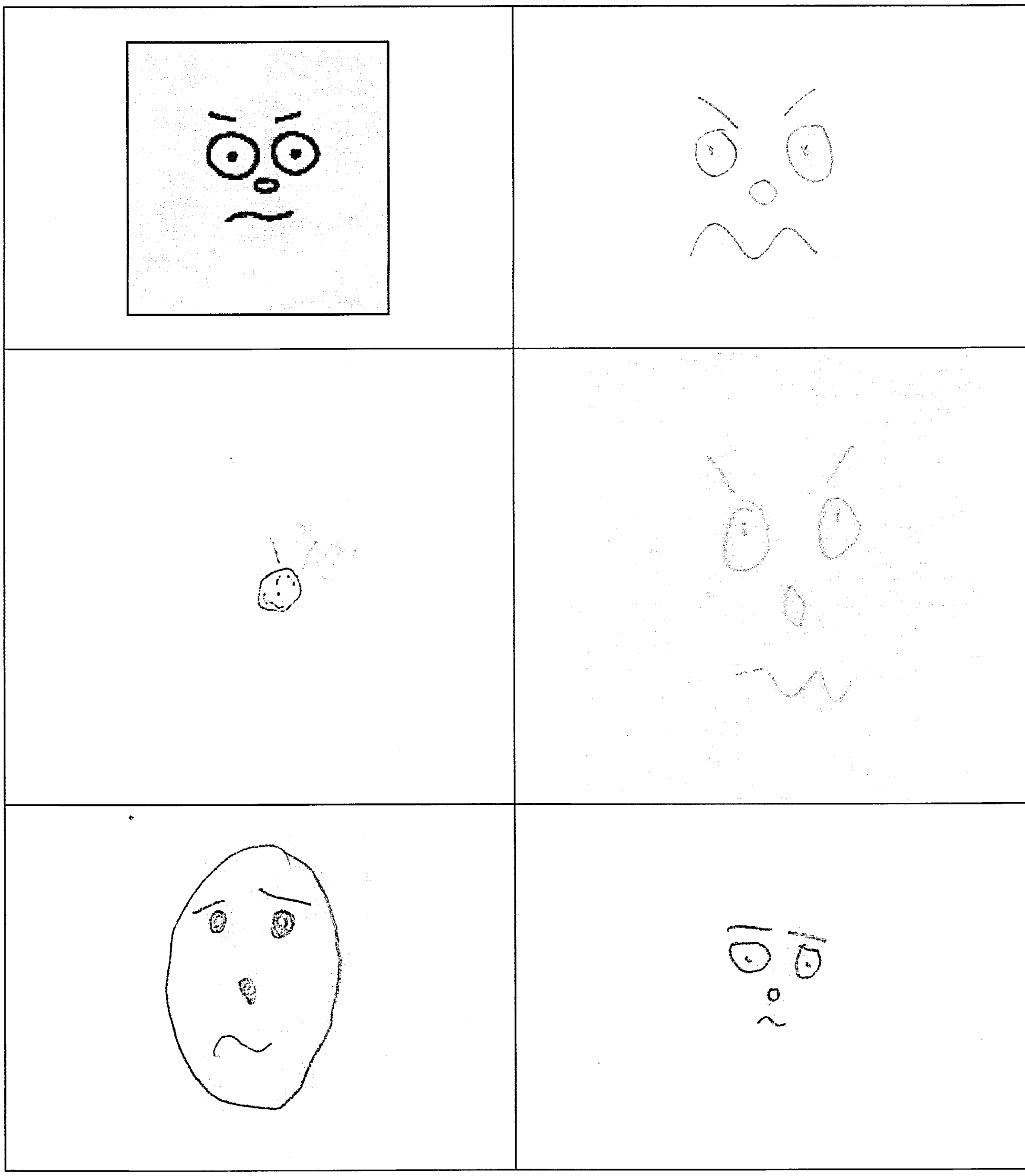
A House (Target Image in top left of table)



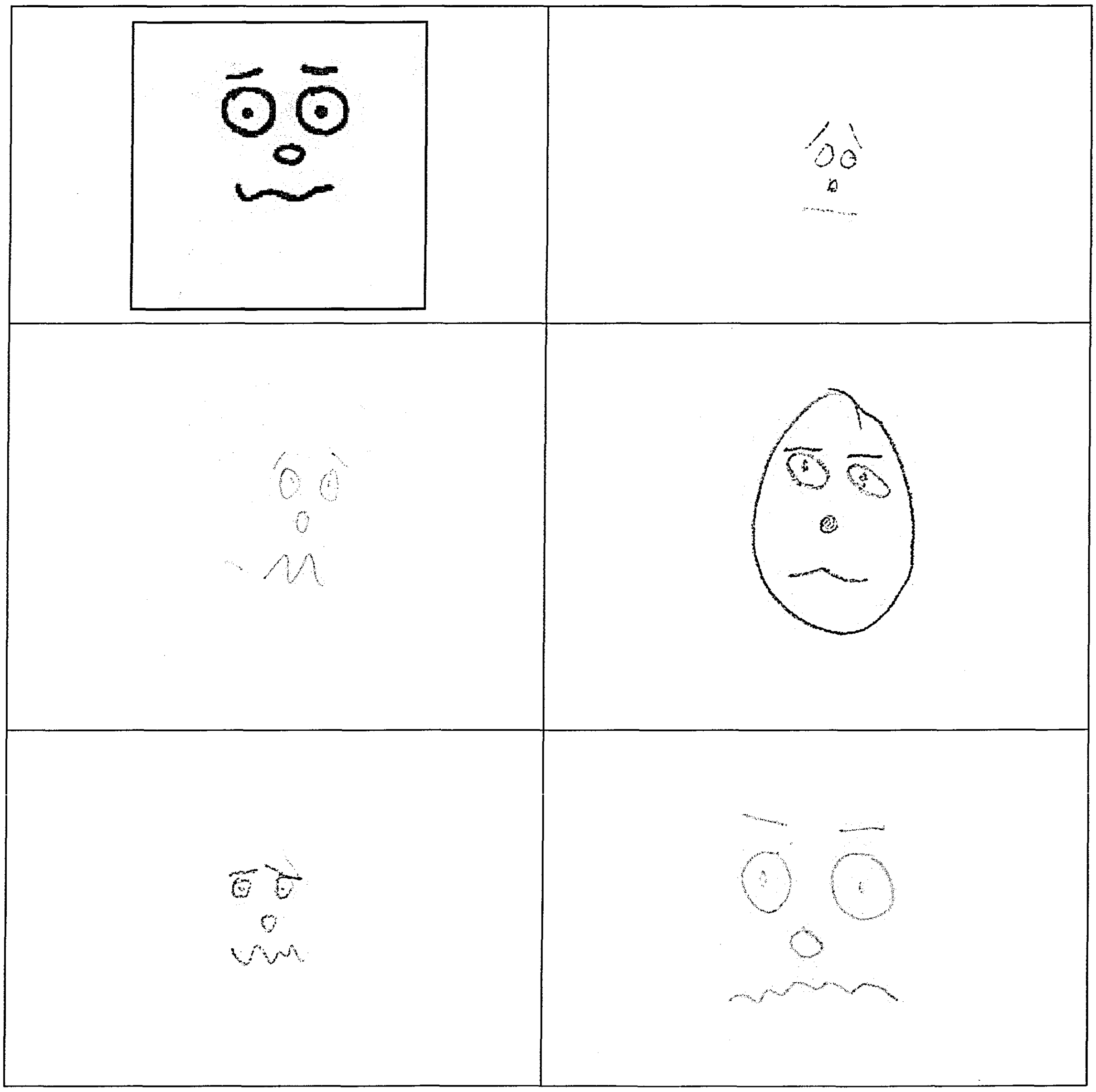
A Flower (Target Image in top left of table)



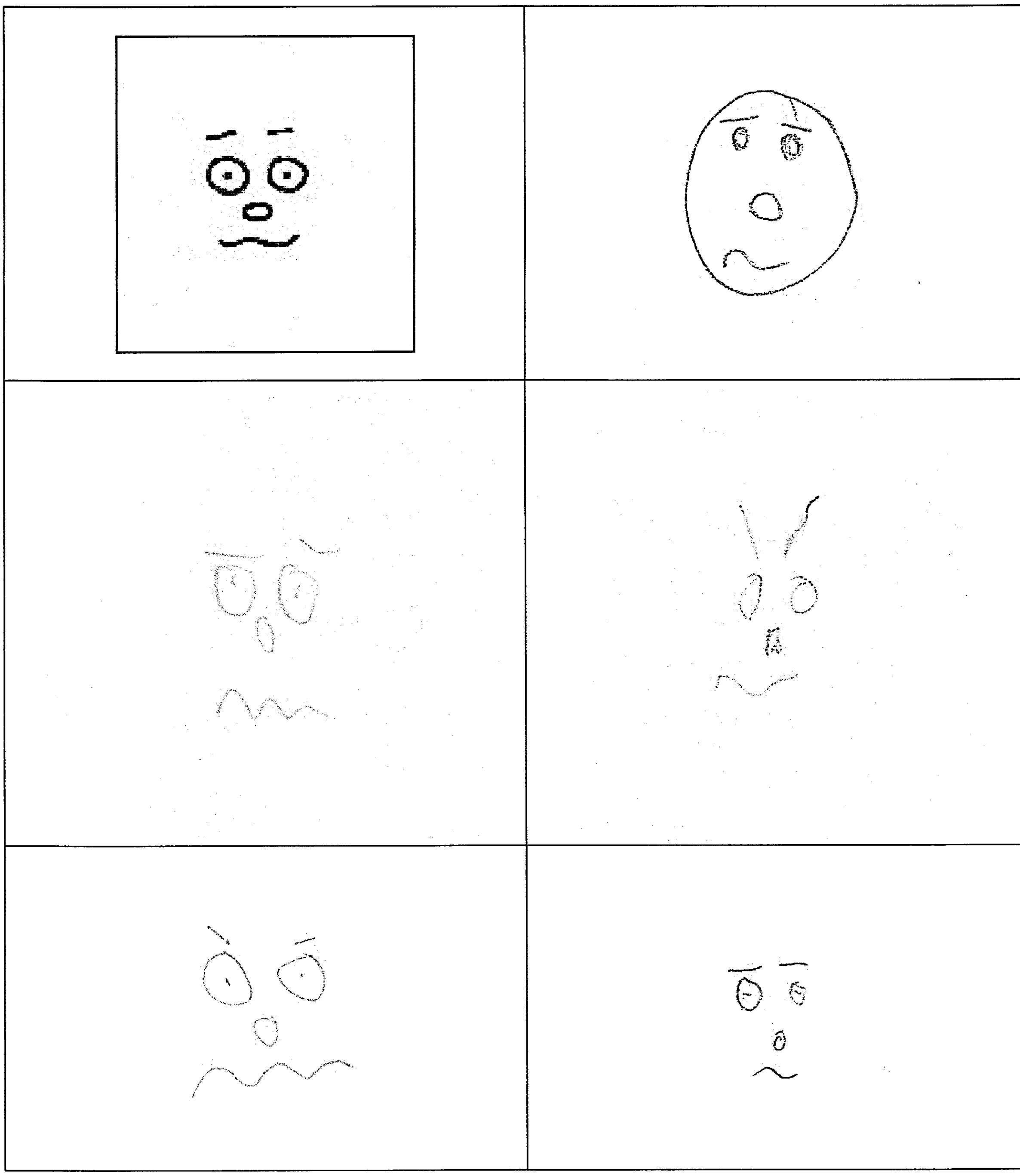
An Angry Face (Target Image in top left of table)



A Scared Face (Target Image in top left of table)



A Confused Face (Target Image in top left of table)



APPENDIX H - Coded items for Chapter 6

Face

Face

1. No Face
2. Upside down teardrop shape.
3. Round Face
4. Oval Face
5. Square Face
6. Potato Shaped Face
7. Rectangular Face

Mouth

8. Upturned single line mouth
9. Upturned undulating single line mouth
10. Upturned mouth with central lip line
11. Upturned hollow mouth
12. Horizontal straight line mouth
13. Horizontal undulating single line mouth
14. Down turned single line mouth
15. Oval hollow mouth
16. Oval solid mouth
17. 'O' shaped mouth
18. Triangular mouth

Teeth

19. Square teeth
20. Scribbled teeth
21. Square teeth like fangs

Cheeks

22. Cheeks

23. Crease lines above mouth

Eyes

24. Triangular eyes
25. Solid round eyes
26. Hollow round eyes
27. Hollow oval eyes
28. Square glasses
29. Solid dot eyes
30. Vertical line eyes
31. Horizontal half circle eyes
32. Undulating (wobbly line) eyes
33. Repeated circular scribble
34. Winking eye
35. ‘n’ shaped
36. No pupils
37. Solid round pupils –centre of eyes
38. Solid round pupils - bottom of eyes
39. Solid round pupils - left hand side
40. Solid round pupils - right hand side
41. Undulating pupils
42. Horizontal lines for pupils
43. Semi circular iris
44. Circular iris

Eyebrows

45. Down turned eyebrows
46. Eyebrows / \
47. Eyebrows \ /
48. Eyebrows ^ ^
49. Eyelashes top
50. Eyelashes bottom

Nose

51. No nose
52. Round hollow nose
53. Round solid nose
54. Triangular nose
55. 'L' shaped nose
56. Backward 'L' shaped nose
57. 'Conical flask' shaped nose
58. Vertical line nose
59. Two separate curved lines opposite each other
60. U shaped
61. Upside down heart shape
62. Solid round nostrils
63. Hollow round nostril/s
64. Undulating line nostrils

Hair

65. Long hair single strands
66. Thick scribble hair
67. Spiky hair
68. Hair standing on end
69. Other hair

Other

70. Tongue
71. Ears
72. Hat

House

'Body'

73. Square body

74. Cube body

75. U shaped body

76. No body.

Roof

77. Triangle roof with concave bottom curve overhanging body

78. Incomplete triangular roof, missing base.

79. Triangular roof

79a. Triangular roof overhanging body

80. Rectangular roof

81. Christmas tree shaped.

82. Roof not covering whole house(like small party hat)

83. Tiles

84. Chimney

85. Smoke

Windows

86. Doorway shaped windows (n) (ULH, URH)

87. Doorway shaped windows (n) (ULH, URH) – shaded

88. Doorway shaped windows (x4)

89. U shaped

90. No windows

91. One window, centre

92. Single square window

93. Circular windows (x4, ULH, URH, LLH, LRH)

94. Square windows x5 (ULH, URH, LRH, LLH, Roof)

95. Square windows (x4, ULH, URH, LLH, LRH)

96. Square windows (x3, ULH, URH, LLH/LRH/Roof)

97. Square windows (x2 ULH, URH)

98. Square windows (x2 ULH, Centre RH)

99. Window panes

100. Curtains

101. Shutters

102. Window in roof

Door

103. Curved rectangular door, not part of base of house 'n'.

104. U shaped.

105. No door

106. Rectangular door in bottom centre

107. Curved door in bottom centre

108. Scribbled door RH side

109. Vertical Rectangular Door to RH side

110. Vertical Rectangular Door to LH side

111. Triangle door

112. Door with straight line down middle

113. Door knob

114. Door panels

115. Door window

116. Door bell

Other

117. Path

118. Sun

119. Ariel

120. Garage

121. Door mat

122. Lights

123. Letterbox

124. House number

Flower

'Face'

125. No face
126. Round face
127. Speckled round face
128. Spiral inside face (like rose)
129. Tulip Style

Petals

130. Curved continuous petals
131. Curved and shaped Separate petals
132. Pointed continuous petals
133. Flame shaped separate petals
134. Oval shaped separate petals
135. Partially occluded petals behind main petals
136. Single line petals
137. Continuous slightly undulating line surrounding face

Stem

138. No stem
139. Vertical single line stem
140. Vertical thick stem
141. Curved single line stem (LH side)
142. Undulating vertical single line stem
143. Curved thick stem

Leaves (distinct from petals)

144. Leaves on stem 1
145. Leaves on stem 2

146. Leaves on stem 3

147. Leaves on stem 4

148. Curved leaves

149. Straight line leaves

150. Leaves from base x 1

151. Leaves from base x 2

152. Leaf with veins

153. Leaf on ground

Other

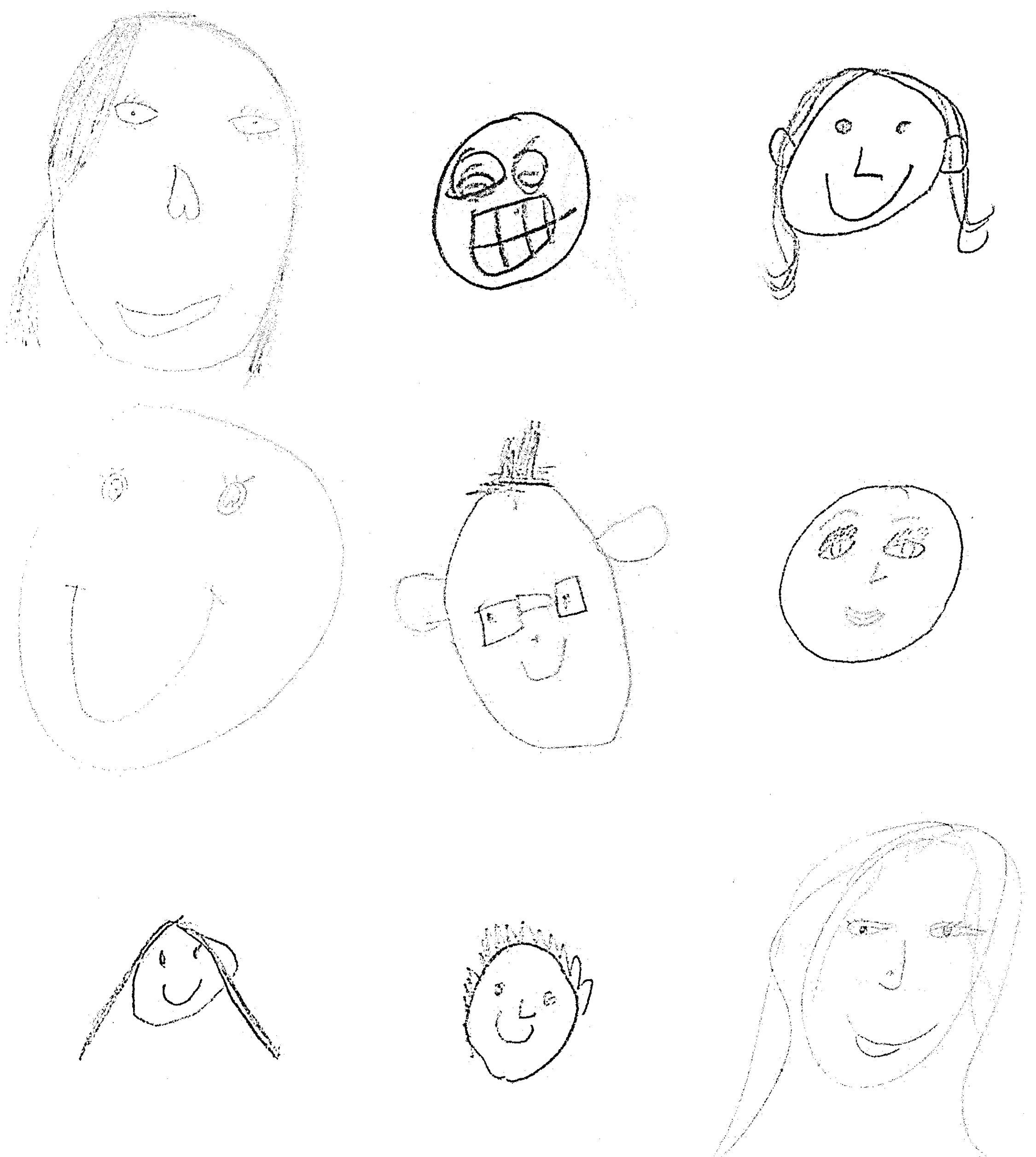
154. Roots

155. Ground

156. Pot

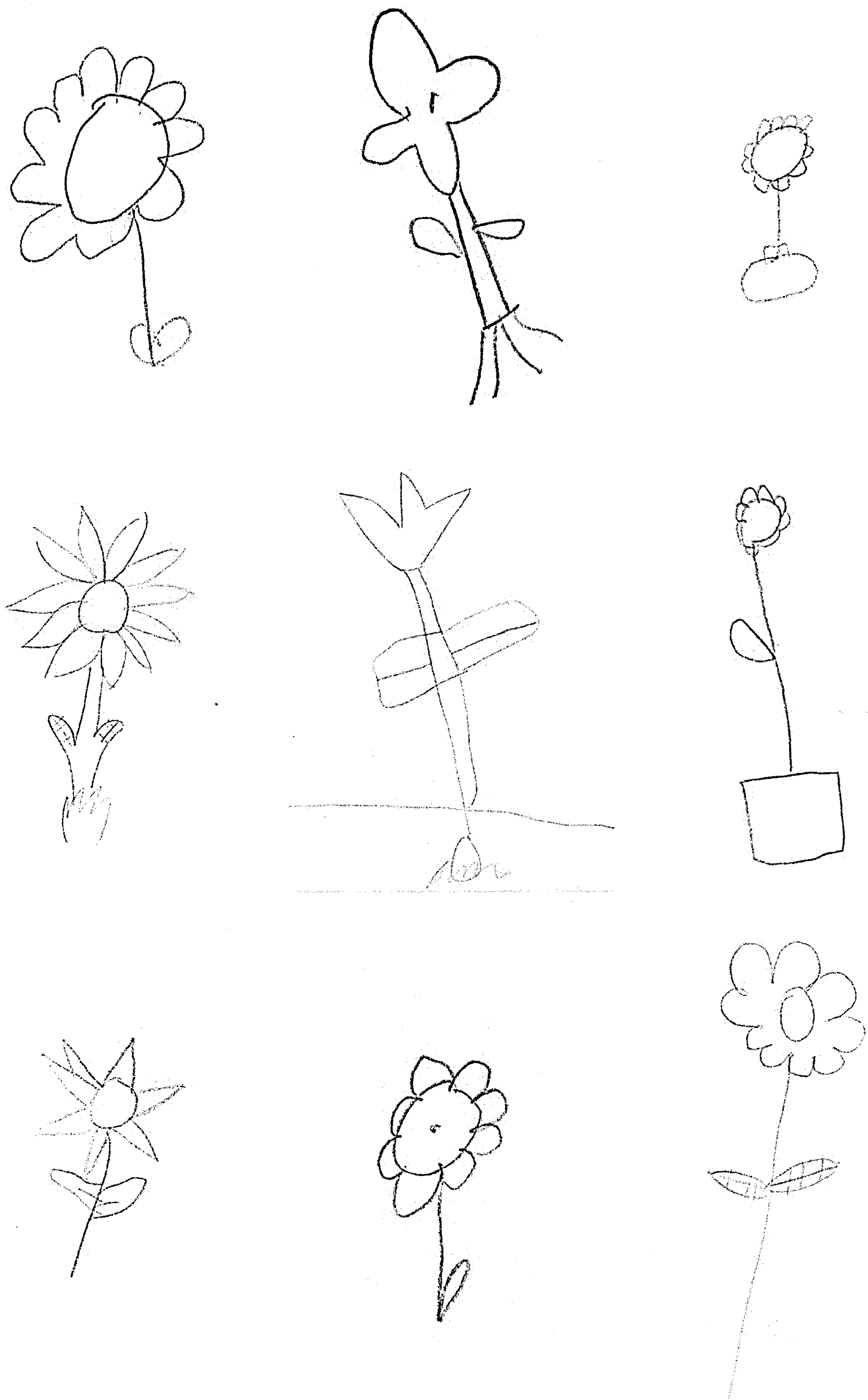
Appendix I - Example drawings for Chapter 6

Free drawings of a face

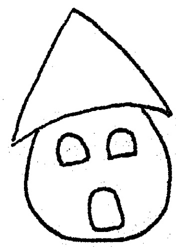
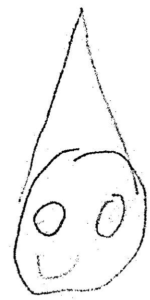
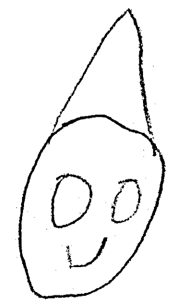
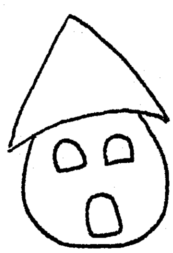
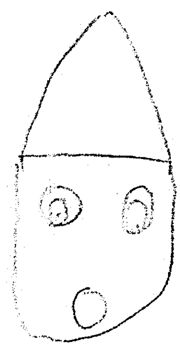
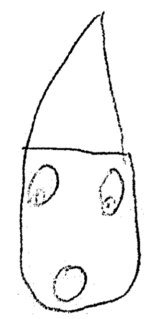
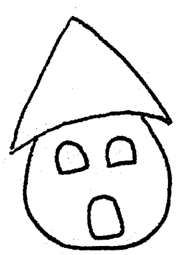
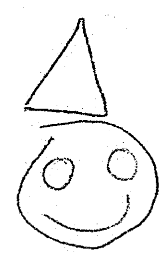
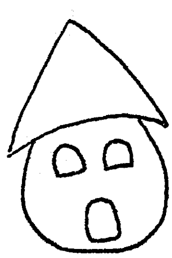
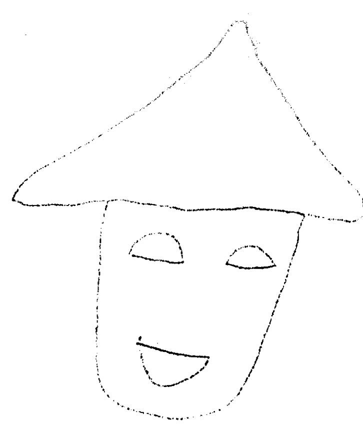
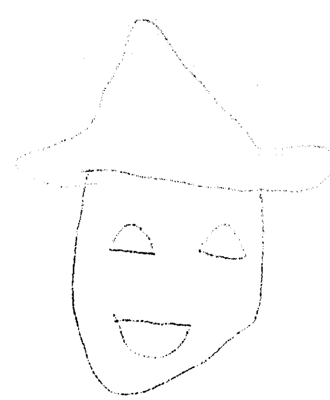


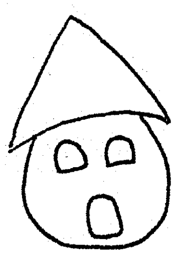
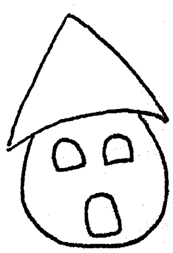
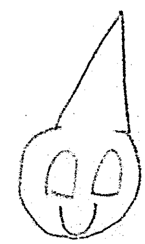
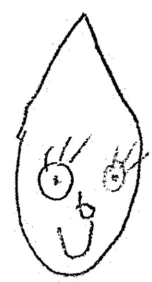
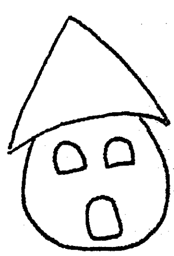
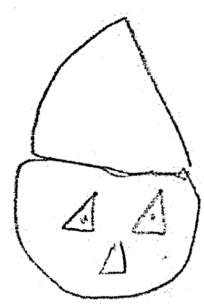
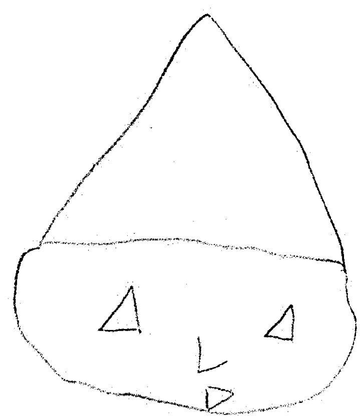
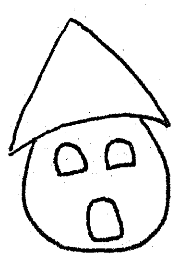
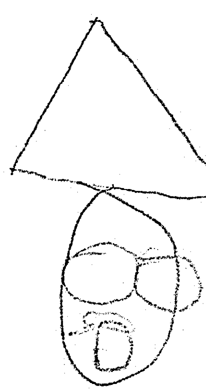
Free drawings of a house

Free drawings of a flower

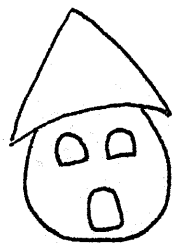
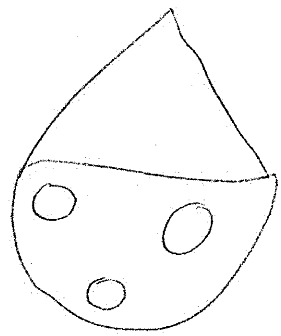
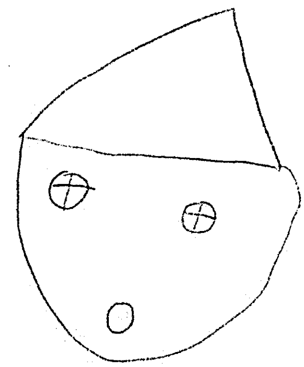
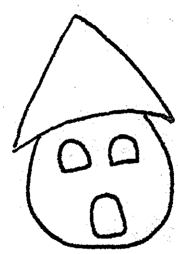
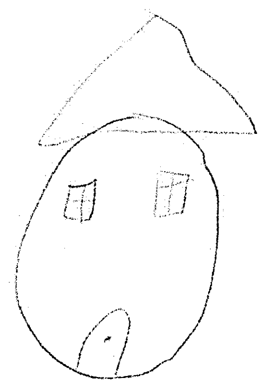
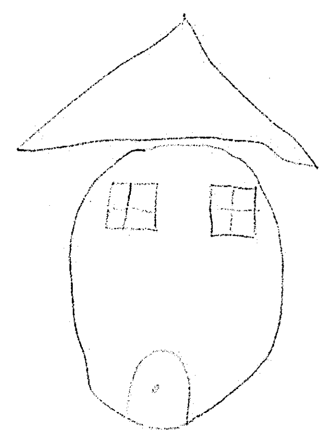
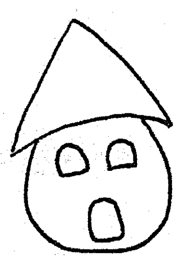
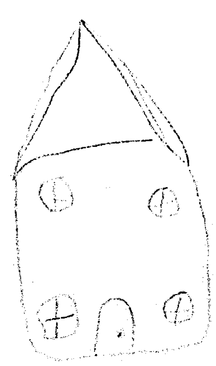
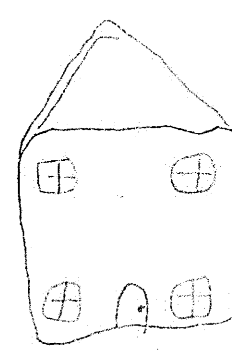
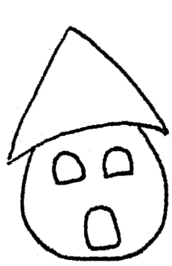
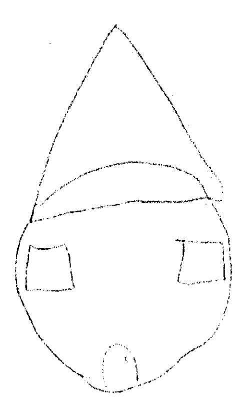
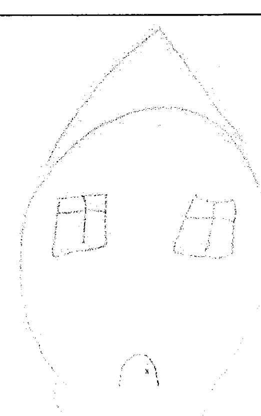


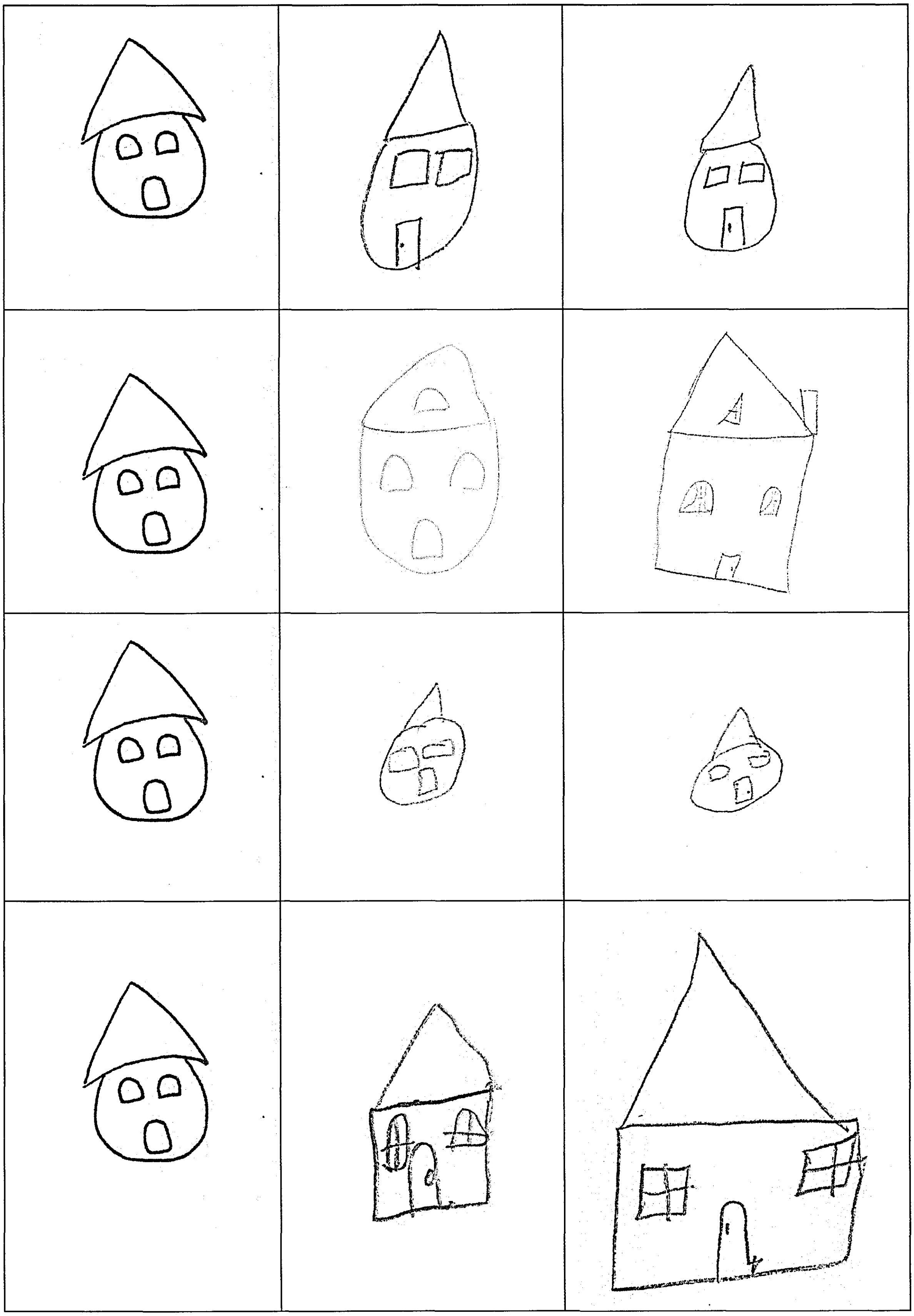
STR and LTR Target Drawings by those in the recoded Face Condition

Target	STR	LTR
		
		
		
		

Target	STR	LTR
		
		
		
		

STR and LTR Target Drawings by those in the recoded House Condition

Target	STR	LTR
		
		
		
		



Appendix J – Coded items for drawings discussed in Chapters 7 and 8

People

Face

1. No features, just round face
2. Round Face
3. Oval Face
4. Round with threaded chin
5. Ears

Mouth

8. No mouth
9. Upturned mouth
10. Horizontal straight line mouth
11. Horizontal jagged mouth
12 Horizontal thin hollow mouth
13. Horizontal scribble mouth
14. Down turned mouth
15. 'O' shaped mouth
16. Lips

Teeth

17. Square teeth
18. Undulating line teeth
19. Fangs
20. Broken teeth
21. Pointed teeth

Cheeks

22. Cheeks

23. Crease lines end of mouth line

Eyes

24. Solid round eyes
25. Hollow round eyes
26. Hollow oval/almond eyes
27. Vertical line eyes
28. Up turned line eyes
29. Shaded eyes, like eyeliner.
30. Glasses
31. No pupils
32. Solid round pupils – middle of eyes
33. Hollow round pupils – middle of eyes
34. Solid round pupils - bottom of eyes
35. Solid round pupils - left hand side
36. Vertical line pupils
37. Circular iris

Eyebrows

38. Up curved eyebrows
39. Eyebrows / \
40. Eyebrows \ / (rectangles/thick)
41. Eyebrows \ /
42. Eyebrows V
43. Eyebrows ^ ^
44. Eyebrows - -
45. Eyelashes top
46. Eyelashes bottom

Nose

47. No nose
48. Round hollow nose

49. Round solid nose

50. 'L' shaped nose

51. Backward 'L' shaped nose

52. 'Conical flask' shaped nose

53. Vertical line nose

54. Solid round nostrils

55. Upside down hollow Y shaped nose

Hair

56. Long hair single strands

57. Short hair single strands

58. No hair

59. Thick/dark scribble hair

60. Thin scribble hair

61. Spiky hair

62. Hair standing on end

63. Other hair

64. Plats

Body

65. No body, just face

66. Separate hollow body

67. Threaded body (arms, legs and body all connected, one continuous line)

68. Neck

69. Just torso and arms

70. Stick figure

Arms

71. Undulating hollow arms by side, from neck, segmented

72. Hollow arms segmented/separate, down by side

73. Hollow arms segmented/separate, raised

74. Hollow arms segmented/separate horizontal from body.

75. Threaded arms raised

76. Threaded arms by side

77. Threaded arms horizontal from body.

Hands

78. Open hands, separate

79. No hands

80. Fists

81. Threaded open hands

82. No hands

83. Spiked fingers/claws

Legs

84. Hollow legs, straight down, separate/segmented

85. Straight line legs

86. Threaded hollow legs straight down

87. No legs due to dress

Feet

88. Bare feet, separate

89. Shoes over visible bare feet, separate

90. Bow laces

91. Shoes, separate

92. Shoes threaded

93. No feet

94. High heels threaded

Clothes

95. Buttons

96. Belt

97. Dress

98. T-shirt

99. Trousers

100. Jacket

101. Tie

102. Shorts

103. Vest

104. Hat/bandana

105. Cape

106. Socks

107. Shirt

Other

108. Walking stick

109. Ear ring x 1

110. Ear ring x 2

111. Playing with another

112. Helping another

113. Hurting/hitting another

114. Skull detail on clothes/body

115. Smiling face detail on clothes/body

116. Spike bracelets

117. Horns

118. Knife/spear/gun

119. Unhappy face detail on clothes/body

120. Waving

121. Crown

122. Star detail on clothes/body

123. Spikes on clothes/body

124. Mask

125. Swag/burglar bag

126. Football

127. Teddy bear.

128. Peace sign detail

129. Presents/gifts

130. Hearts

131. Positive speech/slogan

132. Negative speech/slogan

133. Flowers

134. Cigarette

135. Wart on face

136. Eye patch

137. Watch

138. Briefcase

139. Rainbow detail

140. Storm cloud

141. Shaded all black

142. Skull & crossbones hair grips

143. Hair bow

House

'Body'

144. Square body

145. Cube body

146. Rectangular body

Roof

147. Triangular roof

148. Pyramid (3D) roof

149. Tiles

150. Chimney

151. Smoke

Windows

152. Square windows x5

153. Square windows (x4, ULH, URH, LLH, LRH)

154. Square windows (x3, ULH, URH, LLH/LRH)

155. Square windows (x2 ULH, URH)

156. Square windows (x1)

157. Windows in roof

158. Window panes

159. Curtains

Door

160. Rectangular door in bottom centre

161. Curved door in bottom centre

162. Door knob

163. Door window

Other

164. Ground/grass

165. Path

166. Window box/flowers

167. Fence

168. Door bell

169. Steps

172. Door mat

173. Lights

174. Letterbox

175. Door number

176. Bird

Flower

'Face'

177. Round face

178. Speckled face

179. Circle inside round face

180. Spiral inside face (like rose)

181. Tulip Style

Petals

182. Curved continuous petals

183. Curved Separate petals COMBINE THIS WITH 186

184. Flame shaped separate petals

185. Partially occluded petals behind main petals

Stem

186. No stem

187. Vertical single line stem combine with 195?

188. Vertical thick stem

189. Undulating vertical single line stem

190. Curved thick stem

Leaves (distinct from petals)

191. Leaves on stem 1

192. Leaves on stem 2

193. Leaves on stem 4

194. Leaves on stem 5+

195. Leaves from base

196. Leaves with veins

Other

197. Roots

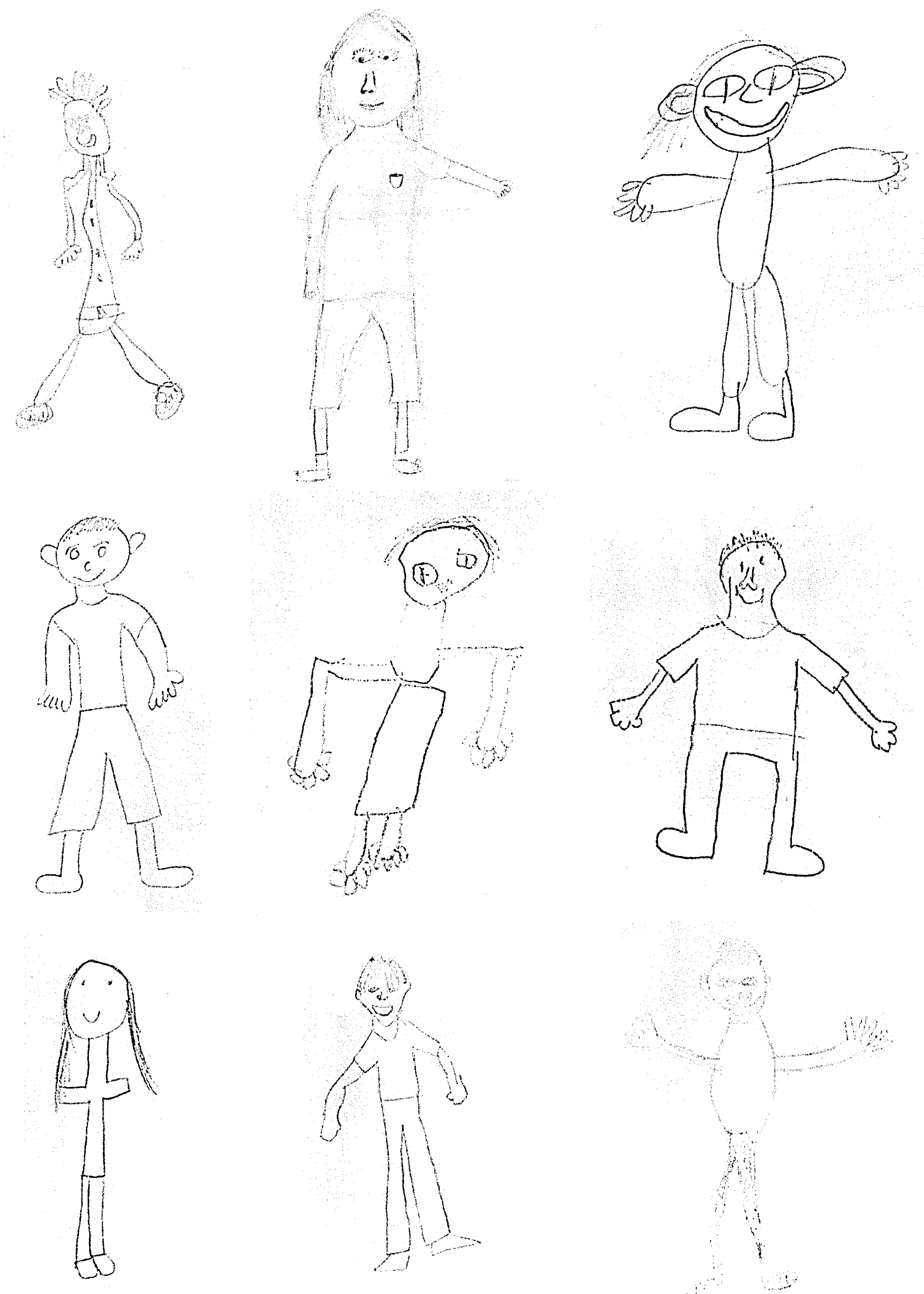
198. Ground

199. Pot

200. Bulb

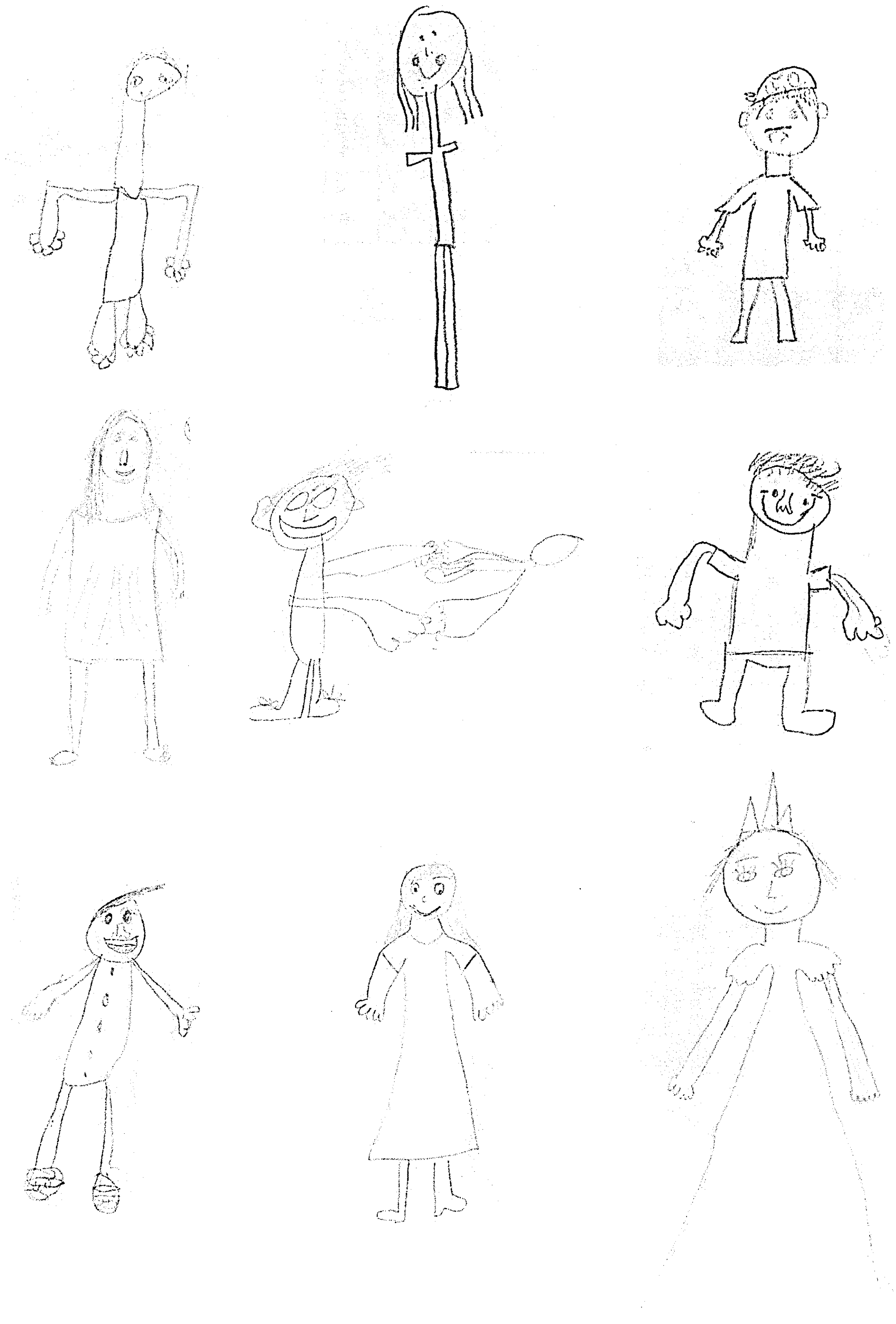
Appendix K – Examples of drawings for Chapter 7

Younger Children's drawing of a person



Older children's drawings of a person

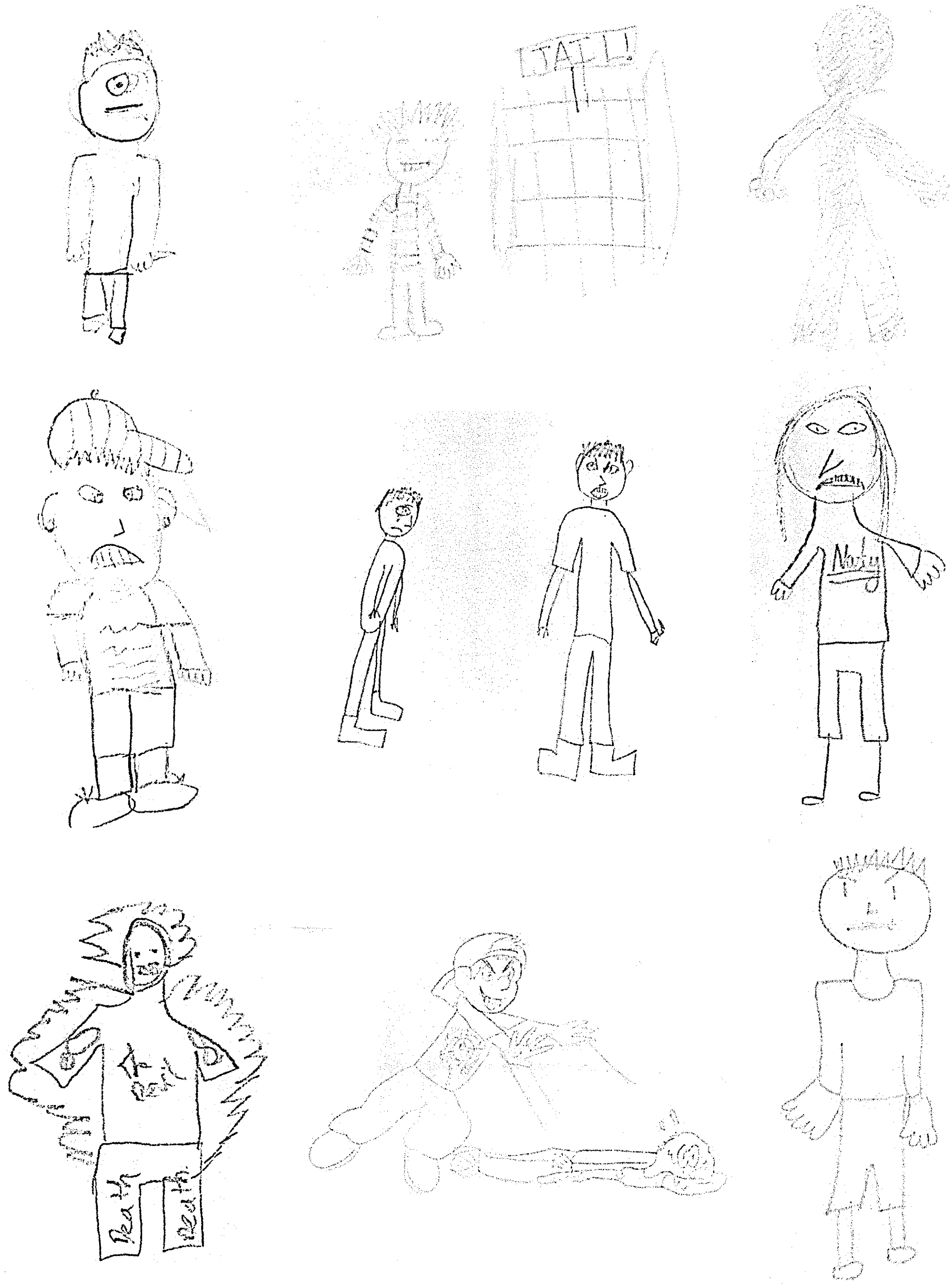
Younger children's drawing of a nice person



Older children's drawing of a nice person

Younger children's drawing of a nasty person

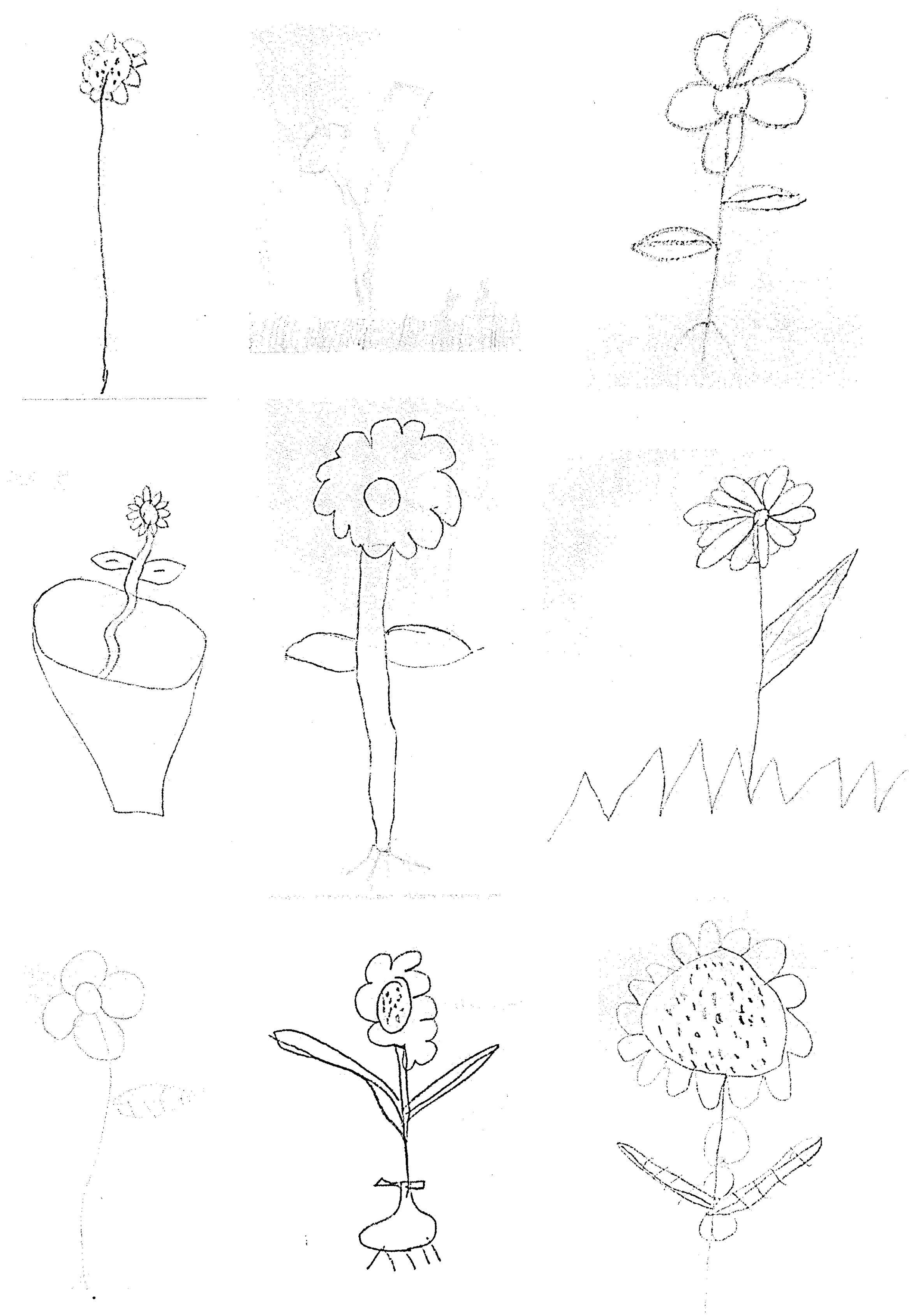
Older children's drawing of a nasty person



Younger children's drawing of a house

Older children's drawing of a house

Younger children's drawings of a flower



Older children's drawing of a flower