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Attention Bias for Negative Semantic Stimuli in Late Life Depression

and Clinical Research Portfolio

Volume I
(Volume II bound separately)

Sarah McIlwraith

Submitted in part fulfilment of the requirements for
Degree of Doctorate in Clinical Psychology

Faculty of Medicine Graduate School

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Dedicated to the memory of my gran Betty

Volume I

Table of Contents

	Pages
Chapter 1: Systematic Literature Review	**8-57**
Delayed Attentional Disengagement in Depression: A Systematic Review of the Literature	
Abstract	9
Introduction	10-17
Method	17-20
Results	20-30
Discussion	30-37
Footnotes	38-39
References	40-50
Tables and Figures	51-57
Chapter 2: Major Research Project Paper	**58-103**
Attention Bias for Negative Semantic Stimuli in Late Life Depression	
Abstract	59
Introduction	60-66
Method	67-77
Results	77-81
Discussion	82-90
References	91-99
Tables and Figures	100-103
Chapter 3: Advanced Practice I Reflective Critical Account (Abstract)	**104-105**
Multi-disciplinary Team Working: Experiences, reflections and professional development	
Abstract	105
Chapter 4: Advanced Practice II Reflective Critical Account (Abstract)	**106-107**
Reflections on the role of trainer	
Abstract	107

Appendices

	Pages
Systematic Review	**108-115**
Appendix A.1: Guidelines for contributors to Behaviour Research and Therapy	108-109
Appendix A.2: Quality assessment checklist	110-111
Appendix A.3: Justification of quality criteria	112-115
Major Research Project Paper	**116-177**
Appendix B.1: Guidelines for contributors to Behaviour Research and Therapy	116-117
Appendix B.2: Major Research Project Proposal	118-155
Appendix B.3: Changes to Protocol	156
Appendix B.4: Approval from Primary Care Ethics Committee	157
Appendix B.5: Approval from Primary Care Research & Development	158-159
Appendix B.6: Pilot Questionnaire	160-162
Appendix B.7: Word Stimuli	163
Appendix B.8: Participant Invitation Letter	164-165
Appendix B.9: Participant Information Sheet	166-170
Appendix B.10: Participant Consent Form	171
Appendix B.11: Mean RTs and standard deviations for each group (Original data)	172
Appendix B.12: Demographic and clinical characteristics of each sub-group of control and depressed participants	173

Volume II

(Separately bound)

Table of Contents

	Pages
Chapter 3: Advanced Practice I Reflective Critical Account	**4-22**
Multi-disciplinary Team Working: Experiences, reflections and professional development	
Abstract	5
Introduction	6-8
Reflections	8-18
Reflective review	18-20
Meta-reflections	20-21
References	22
Chapter 4: Advanced Practice II Reflective Critical Account	**23-35**
Reflections on the role of trainer	
Abstract	24
Introduction	25-27
Reflections	28-31
Reflective review	31-32
Meta-reflections	32-34
References	35

CHAPTER ONE: SYSTEMATIC LITERATURE REVIEW

Delayed Attentional Disengagement in Depression: A Systematic Review of the Literature

Prepared in accordance with the guidelines for Behaviour Research and Therapy (Appendix A.1)

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Abstract

Background: Depression is a prevalent, disabling disorder requiring the best treatments possible. The distinction between attentional shift, engagement and disengagement may be crucial in explaining mixed results seen in early research investigating attention biases in depression. A number of researchers now advocate that depressive disorders may be associated with specific difficulties disengaging selective attention from mood-congruent information. Given the theoretical and clinical significance of this proposal the current paper aims to systematically review the emerging body of research examining the "delayed disengagement" hypothesis. **Methods:** Studies were identified by searching six electronic databases, hand searching key journals, reviewing reference sections of relevant articles and by contacting experts in the field. Those studies including depressed or dysphoric participants aged between 18-65 years and employing information-processing paradigms allowing the investigation of the components of attention involved in depressive-related attention biases were included. **Main Outcomes & Results:** A total of eight studies were rated according to methodological criteria. Two studies rated as being of high methodological quality and three studies rated as being of moderate methodological quality found evidence for an impaired ability to disengage attention from negative material amongst depressed individuals. **Conclusions:** There is some preliminary evidence to support the delayed disengagement hypothesis and conflicting findings could be attributable to methodological differences between studies. The empirical and clinical and implications are discussed along with suggestions for future research.

Keywords: Attention bias; Depression; Disengagement

Introduction

Depression is a common psychological health problem. At any given time, around 5% of the population experience the disorder (Murphy et al., 2000) and lifetime prevalence rates are estimated to be between 15 and 17% (Bijl, 1998; Kessler, 2005). According to clinical nosologies, major depressive disorder (MDD) is characterised by persistent low mood and diminished interest in normally enjoyed activities. At least one of these key symptoms, and three or more ancillary symptoms, is required for diagnosis (APA, 2005). These include sleep disturbance, weight or appetite change, fatigue or loss of energy, psychomotor retardation or agitation, impaired concentration or decision making, feelings of guilt or worthlessness and suicidal thoughts, ideation or attempts. Left untreated it is a disabling condition associated with an increased risk of mortality and suicide, enhanced likelihood of developing medical illness and substantial impairments in daily and social functioning (Cassano, 2002; Ustun et al., 2004). Such personal consequences are also of concern from a community perspective given the substantial public health costs associated with the disorder (Murray & Lopez, 1998). Research exploring factors underlying the development, maintenance and recurrence of depressive disorders has therefore been a priority.

Cognitive perspectives are arguably the most influential and widely accepted models of the aetiology of emotional disorders. A core tenet of early cognitive models such as schema theory (Beck et al., 1979) and network theory (Bower, 1981) is that biases across all facets of emotional information processing cause and maintain affective psychopathology. The *content* of information processing biases (IPBs) is presumed to be disorder specific;

anxiety being characterised by selective processing of threat and vulnerability related information, depression being typified by biased processing of information relating to sadness, loss and failure. Thus, depressed individuals, and those vulnerable to developing depression, are posited to display processing preferences to perceive, attend to and remember negative stimuli. Such cognitive biases are postulated to exacerbate negative affect, which in turn, augments IPBs and a vicious circle of depression ensues.

The application of experimental methods derived from cognitive psychology has encouraged a wealth of empirical studies examining IPBs and the predictions made by early cognitive models. This body of research, by and large, supports the existence of both memory and interpretation biases in depressed and dysphoric adults (Williams et al., 1997; Matt et al., 1992; Mathews & MacLeod, 2005). Evidence for an attention bias towards threat-related stimuli in anxiety disorders is also robust (Mogg & Bradley, 2005; Bar-Haim, 2007) however, there has been less pervasive evidence for memory biases amongst anxious individuals (Dalgleish & Watts, 1990; Mathews & Macleod, 2005). Additionally, the existence of attention biases in depression has been more controversial. Early research findings were mixed: Some studies supported mood-congruent attention biases (e.g. Gotlib & Cane, 1987; Segal et al., 1995; Mogg et al., 1995; Nunn et al., 1997); others failed to replicate this predisposition (e.g. MacLeod et al., 1986; Mogg et al., 1993, 1995; Bradley et al., 1995; Mathews et al., 1996). Generally, reviews of these initial studies (e.g. Dalgleish & Watts, 1990; Williams et al., 1988) concluded that depressed individuals may not selectively attend negative material.

Overall, then, despite initial empirical evidence supporting many aspects of early cognitive theories, the lack of strong evidence both for memory biases in anxiety disorders and attention biases in depressive disorders was problematic as these theories predict disorder-congruent biases across all cognitive domains. This led Williams and colleagues (1988, 1997) to propose an integrative model which posits that depression and anxiety influence different stages of information processing. According to this model anxiety is characterised by biases towards threatening material in early, automatic stages of information processing, with a subsequent bias away from threat in later stages of processing. In contrast, depression is held to be associated with biases only in later controlled stages of processing and therefore, not with biases in selective attention.

More recently however, the conclusion that attention biases may not characterise depression has been challenged. Several authors have suggested that this position is premature given important methodological biases seen within early empirical studies (e.g. Bradley et al., 1997; Nunn et al., 1997). Threat-related stimuli, for example, drawn from research investigating IPBs in anxiety disorders, were often employed in initial studies on depression that yielded null findings (e.g. Hill & Dutton, 1989; MacLeod et al., 1986; Mathews et al., 1996). Furthermore, some earlier investigations failed to adequately match emotional and neutral stimuli on critical variables (e.g. Mogg et al., 1995). In addition, many early studies used non-clinical populations (e.g. Hill & Knowles, 1991) and evidence for cognitive biases in depression is more consistent when studies employ clinical populations (Matt et al., 1992; Williams et al., 1997). Moreover, assessing the potential confounding influence of co-morbid anxiety is essential in attention bias experiments and

many early studies failed to measure anxiety levels or to control for these in the statistical analysis (e.g. Mathews et al., 1996).

Further methodological limitations relate to the paradigms employed to examine selective attention, the most common of which amongst earlier investigations were the Emotional Stroop and Dot-Probe tasks. With regards to the Emotional Stroop task a number of researchers maintain that this paradigm precludes a pure measure of selective attention given that interference effects could arise from non-attention related processes (e.g. Macleod et al., 1986; Mogg & Bradley, 1998). Moreover, although the Dot-Probe task is generally considered to be a more reliable measure of selective attention, the results of many initial studies are likely to be contaminated with systematic biases. In early Dot-Probe investigations probes were more likely to occur following trials in which depressive stimuli were presented, thereby establishing a contingency between the target words and probes (e.g. MacLeod et al., 1986; Mathews et al., 1996). Overall therefore, a number of methodological weaknesses evident amongst earlier studies limit interpretation of their findings.

Bradley and colleagues (1997) however, noted that a distinct pattern of attention bias in depressed adults *does* emerge when studies accounting for the above mentioned methodological problems are considered. They reported that biased attention is more consistently demonstrated in studies where stimuli are presented for long durations, of one second or more, and that findings are more variable with shorter presentations. In addition, they noted that studies using subliminally presented stimuli consistently fail to detect attention biases. The authors proposed that this pattern of results could be reconciled by

drawing upon forefront models of selective attention which suggest that this aspect of cognition comprises distinct subsystems (Allport, 1989; Posner & Peterson, 1990; Laberge, 1995). One of the most influential models, put forward by Posner & Peterson (1990), suggests that selective attention operations consist of three interrelated components: shifting, engagement and disengagement. Using these distinctions, Bradley and colleagues (1997) proposed that the empirical literature dovetails with the idea that depressed individuals do not initially shift their attention towards negative stimuli; rather they have difficulties disengaging their attention from it, once it has been noticed.

Indeed, the most recent comprehensive review in the field (Mogg & Bradley, 2005) concurred with this view. The authors noted that depression appears to be associated with biased attention processing of negative stimuli presented for long durations and went on to conclude "the mechanism underlying the bias in clinical depression……..may be specifically associated with a difficulty disengaging from self descriptive, negative linguistic material"(Mogg & Bradley, 2005, p 38). However, this conclusion should be regarded as tentative given that the review predominantly evaluated studies employing the Emotional Stroop and Dot-Probe tasks. These paradigms, despite their significant contribution to contemporary knowledge, are ambiguous with regard to the component of selective attention being assessed (Fox, 2004). In both the Dot-Probe and the Emotional Stroop task, neutral and emotional stimuli are presented within the same stimulus presentation. In essence therefore, they cannot properly determine whether enhanced engagement or delayed disengagement processes account for the attention bias effects recorded (Fox et al., 2001). In addition, although Dot-Probe tasks that use long presentations of stimuli might be more likely to measure the disengage component of

selective attention, this very characteristic may result in both locations receiving attention processing, with the switching of attention between the stimuli. This again precludes determining whether emotional stimuli attract attention, or whether once an emotional stimulus has been detected, attention is maintained on that location (Fox et al., 2001; Broomfield & Turpin, 2005).

Since the publication of Mogg and Bradley's (2005) review researchers have continued to employ paradigms that *indirectly* examine the ability of depressed individuals to disengage their attention from negative material. Despite the majority of these studies providing further data *implying* disengagement difficulties (e.g. Gotlib et al., 2004a; Gotlib et al., 2004b; Rinck & Becker, 2005; Joorman et al., 2007; Donaldson et al., 2007; Koster et al., 2009), their use of indirect paradigms precludes a clear interpretation of their findings. However, there has been a corresponding increase in studies examining the delayed disengagement hypothesis *directly*. Two main experimental paradigms have been used: the emotional spatial cueing task and eye-tracking methodology. Using these paradigms, evidence that depressed individuals exhibit specific difficulties disengaging their attention from negative material has been accumulating (e.g. Ellenbogen & Schwartzman, 2008), but not unequivocally (e.g. Koster et al., 2006) and, as with earlier studies, these investigations appear to differ on a number of key methodological variables.

Importantly, if the delayed disengagement hypothesis is supported, it cannot be explained by prevailing cognitive theories. Although the models proposed by Beck (1979) and Bower (1981) assume biased attention processing of negative material, they also assume that negative-related biases operate *throughout* the cognitive system, i.e. in both the initial

orienting and later disengagement of attention (Bradley et al., 1998). Moreover, the model put forth by Williams and colleagues (1988, 1997) proposes that biased attention processing of negative material is not a feature of depression.

Furthermore, research investigating attention disengagement processes may offer new insights that are of high clinical importance. Despite a number of controlled trials attesting to the efficacy of cognitive behavioural therapy (c.f. Haby et al., 2006; Hollon et al., 2002 for reviews), a significant proportion of individuals continue to experience some degree of depressive symptoms (e.g. Westen & Morrison, 2001), pointing the need for more effective treatments for the condition being developed. Indeed, research on IPBs has led to the development of Cognitive Bias Modification (CBM) techniques, which have recently been shown to be effective in directly manipulating cognitive biases, and more importantly, in reducing clinical pathology (e.g. Schmidt et al., 2009; Joorman et al., 2009). Schmidt and colleagues (2009), for example, used a modified Dot-Probe task over eight sessions to train individuals with social anxiety to more effectively disengage their attention from threatening stimuli. Following treatment, nearly three quarters of individuals randomly assigned to the attention retraining condition no longer met diagnostic criteria for social phobia, compared to less than a quarter of individuals allocated to the control group. Further clinical developments in this area would undoubtedly benefit from a clearer account of the nature of attention biases in depression.

To summarise, the pattern of empirical evidence on attention biases in depression suggests that the disorder may be characterised by a specific difficulty disengaging attention from negative stimuli. Despite the delayed disengagement hypothesis emerging in the literature

over a decade ago, distinctions between different components of selective attention were largely ignored or were investigated indirectly. However, a promising body of research has began to directly examine the components of attention involved in depressive-related attention biases and the significance of these studies for theoretical conceptualisations and clinical practice requires systematic review.

Research Questions

- Do depressed individuals have difficulties disengaging their attention from negative material?
- Are conflicting findings attributable to methodological differences between studies?

Methods

Search Strategy

To identify relevant studies the following electronic databases were searched by the first author (SM) from inception until May 2009 week three: All Evidence Based Medicine reviews (Cochrane Database of Systematic Reviews, ACP Journal Club, Database of Abstracts of Reviews of Effectiveness, and Cochrane Central Register of Controlled Trials), EMBASE, Ovid Medline, PsychINFO, CINAHL and Web of Science. Duplicates were removed and searches were limited to the English Language. The electronic search was supplemented by searching reference sections of included papers. Key journals, Behaviour Research & Therapy, Cognition & Emotion and Cognitive Therapy & Research were hand searched between January 1996 and May 2009 to identify any further articles of

relevance. Additionally, seven authors with key papers in the field that were identified during the initial search, were contacted via electronic mail to identify studies that were either unpublished or in press.

Search Terms

The following terms were entered in key word searches:

- Atten$ Bias$ OR Select$ Atten$.
- Depress$ OR Dysthymi$ OR Mood Disorder$ OR Affective Disorder$ OR Dysphor$.
- Disengage$ OR Maint$.

The results of these searches were combined using AND.

Selection Criteria

Articles identified by the above search strategies were screened for relevance using the following inclusion criteria:

Inclusion Criteria

- The study was published in a peer-reviewed journal article by May 2009 week three.
- The study was written in the English language.
- Participants were between the ages of 18 and 65 years.
- Participants were selected on the basis of clinically diagnosed depressive disorders (MDD or dysthymia) or sub-clinical depressive symptoms.

- The study used an experimental task that permits the direct investigation of the delayed disengagement hypothesis[2].
- The study included neutral stimuli[3].

Exclusion Criteria

- Studies that experimentally induced low mood.
- Studies that focussed exclusively on patients diagnosed with Bipolar Affective disorder.
- Studies that used paradigms indirectly assessing whether depression is associated with difficulties disengaging attention from negative material.

Study Evaluation

All relevant studies were systematically examined and rated for quality using a quality assessment checklist developed by the first author (Appendix A.2). Quality criteria were based on items in the Scottish Intercollegiate Guidelines Network Methodology Checklist for the review of case-control studies (SIGN; 2004) and on consideration of methodological issues (see above) that have been highlighted as being important in the investigation of attention biases. The checklist included criteria for selection of participants, assessment of participants, the attention bias task and statistical analyses. The rationale for each quality criterion is provided in Appendix A.3. A total of 16 items was included and possible total scores ranged from 0-32. Scores assigned to each study were expressed as a percentage of this maximum score and converted into quality categories to give a general indication of study quality. These percentages were arbitrarily classified as:

High = ≥ 75% (all or most criteria have been fulfilled)

Moderate = 50-69% (an adequate number of the criteria have been fulfilled)

Low = ≤ 49% (very few of the criteria have been fulfilled)

Data Synthesis

Where possible, effect sizes (ES) were calculated to indicate the magnitude of the differences in disengagement from negative stimuli between depressed and control participants. ES were calculated as Cohen's d (Cohen, 1988) and were calculated based on group means and the pooled standard deviation for the disengagement measure, in addition to the sample size. These are included in Table 2. However, it was not appropriate to compare findings by combining effect sizes given the significant methodological heterogeneity between studies.

Results

Search Results

The initial electronic search yielded 400 potentially relevant articles (with duplicates removed). Titles and abstracts were examined by the first author (SM) and 14 studies of potential relevance were identified and retrieved in full test form. Sensitivity checks identified a further nine potentially relevant papers. The first author (SM) screened all retrieved (n = 23) studies, of which eight met all of the inclusion criteria. A summary of the study selection process, along with the rationale for study exclusion, is shown in Figure 1.

(Insert Figure 1 about here)

Quality ratings ranged from 41-78%. Of the eight studies reviewed, two were rated as high quality (Ellenbogen & Schwartzman, 2008; Eizenman et al., 2003), five were rated as moderate quality (Leyman et al., 2007; Kellough et al., 2008; Caseras et al., 2007; Koster et al., 2005, experiment 1; Koster et al., 2005, experiment 2) and one was rated as low quality (Koster et al., 2006) (see Table 1).

(Insert Table 1 about here)

Reliability of Quality Ratings

The quality assessment process was completed by the first author (SM) and was repeated by an independent reviewer (Graduate Psychologist). The proportion of agreement between the two raters was high (96.1%). Disagreements about ratings were resolved through discussion until 100% agreement was achieved. Disagreements were mostly regarding exclusion criteria and stimulus matching.

Review of Findings

The characteristics and main findings of the included studies can be found in Table 2. Findings presented in the reviewed papers are summarised below in order of allocated quality rating.

(Insert Table 2 about here)

High Quality Studies

Eizenman et al., (2003) – 78%

This study reported data from clinically depressed and non-psychiatric controls on an eye-tracking task. During the task participants were required to scan and re-scan simultaneously presented images portraying dysphoric, threat, social and neutral themes. Depressed individuals, as compared to controls, were found to fixate on, and glance at, dysphoric pictures for longer durations indicating difficulties disengaging attention from negative stimuli. No significant differences were found between the groups on fixation frequency to dysphoric pictures, indicating that depressed individuals did not direct (or re-direct) their attention towards dysphoric images more often than controls. No formal within-group comparisons were conducted for the depressed participants to allow statistical comparisons of the differences in eye movements between dysphoric, neutral, threat and social pictures. However, inspection of means provided for fixation times and average glance durations indicated longer fixations and glance durations on dysphoric pictures compared with all other picture categories.

This study's strengths included the recruitment of control and depressed participants from the same source, the use of a thorough assessment process and the employment of strict exclusion criteria, and led it to achieve a high quality rating. Nevertheless the external validity was reduced as anxiety levels differed significantly between the groups. In addition, despite matching emotional stimuli with regard to arousal level and matching all stimuli for size, pictures from each category did not appear to be matched on luminance levels. The study also employed a small (n = 17), self-selecting sample.

Ellenbogen & Schwartzman (2008) – 75%

This study compared clinically depressed, clinically anxious and non-psychiatric controls on an emotional spatial cueing task using subliminal and supraliminal exposure times. Participants from each group were randomly assigned to a stress induction procedure or a control procedure, to examine the prediction that a laboratory stressor would amplify attention biases. The authors reported that depressed participants, exposed to the control procedure, were slower than controls to disengage their attention from supraliminally presented dysphoric pictures as compared to neutral and threat-related pictures. However, these effects were not found for depressed participants assigned to the stress induction procedure or when stimuli were presented subliminally.

The study's strengths including the recruitment of participants from the same source, the exclusion of visual impairment in both groups of participants, the exclusion of control participants with a previous episode of depression and a rigorous diagnostic assessment process, led it to achieve a high quality rating. This rigour was however, compromised by the specificity of the sample, consisting of self-selecting young adults. Furthermore, a small proportion of the "depressed sample" (n = 4) had a diagnosis of bipolar 1 disorder, and despite being in a depressive phase of the disorder at the time of experimental testing, this confound may limit the validity of the findings. In addition, although statistical control was exerted to investigate the potential confounding influence of differences in anxiety levels between the groups, the authors failed to control for the significant differences in age reported among the depressed and control participants. Finally, although the attention bias task was, by and large, well controlled emotional stimuli (threat and dysphoric) differed in level of arousal, further reducing validity.

Moderate Quality Studies

Leyman et al., (2007) – 72%

This study compared clinically depressed and non-psychiatric controls on an emotional spatial cueing task. However, in contrast to findings from the above mentioned similar (Ellenbogen & Schwartzman, 2009), but higher quality study, the authors reported that depressed individuals and controls did not differ in their ability to disengage their attention from angry facial expressions. They did however note a depression-related bias in the shifting of attention towards angry faces.

A particular area of strength for the study was in the thorough assessment of participants. In addition, groups were adequately matched and the possible confounding influence of differences in anxiety scores between the groups was considered in the analysis. However, although participants were excluded from the control group if they had a previous history of depression, participants were not excluded from either group on the basis of visual impairment. Other weaknesses were that the sample was self-selecting and the residential status of the depressed participants may limit the degree to which the results can be generalised to the wider depressed population. Moreover, the spatial cueing task was not well-controlled; the authors employed threat relevant-stimuli, as opposed to depression-relevant, and stimuli were not matched on luminance. Thus, despite methodological strengths in basic design features, weaknesses in the configuration of the attention bias task are likely to have a major impact on the validity of this study and could account for its conflicting findings.

Caseras et al., (2007) – 72%

In a further eye-tracking study, Caseras and colleagues (2007) investigated the components of attention driving attention biases in sub-clinical dysphoric individuals and non-dysphoric controls. They found no differences in the direction of initial shift in eye gaze between groups, with both dysphoric and control participants initially orienting towards positive pictures. However, dysphoric individuals fixated on dysphoric images for longer durations relative to controls, suggesting a difficulty in disengaging from negative information. A within-group analysis also revealed that dysphoric individuals looked longer at negative as compared to neutral pictures.

The strengths of the study include recruiting groups from the same source, matching the groups with respect to age and gender, a rigorous assessment process and a well-controlled attention bias task. However, it was not clear whether the authors attempted to match the stimuli on luminance levels. Moreover, the authors did not exclude participants in both groups with visual impairment and those in the non-dysphoric group with a prior history of depression. Notably, participants were also self-selected. Despite receiving a moderate quality rating, the study was well designed; results appear credible and have the potential to add to the literature.

Koster et al., exp 1 and exp 2 (2005) – 66%

Two separate studies were conducted by Koster and colleagues (2005) at Ghent University and reported in their 2005 paper. In both experiments dysphoric and non-dysphoric participants performed an emotional spatial cueing task. In the first experiment dysphoric individuals were reported to be slower to disengage their attention from negative words as

compared to controls. In the second experiment the authors investigated the time course of this attention bias by using three stimulus exposure durations. They found that when words were presented for short exposure times no differences were observed between groups on attention engagement or disengagement indexes. At slightly longer stimulus durations, of 500-ms and 1500-ms, dysphoric individuals demonstrated difficulties disengaging their attention from negative material as compared to controls, with the strongest effects in the 1500-ms condition.

The following methodological points apply to both experiments: Strengths included the selection of cases and controls from a comparable population, matching participants with regard to age and gender and assessing participants with reliable and valid instruments. However, despite matching word stimuli on length and familiarity, they failed to assess, and therefore, match emotional stimuli with respect to arousal level. In addition, the external validity was reduced as the two groups were reported to differ in anxiety levels and this was not controlled for in the statistical analysis. In addition, the authors failed to adhere to strict exclusion criteria. Despite this, the results from both studies remain convincing and are consistent with those reported in similar, higher quality studies included in this review.

Kellough et al., (2008) - 56%

This study, aiming to replicate and extend the findings reported by Eizenman et al., (2003,) employed eye-tracking methodology to investigate the visual scanning pattern of depressed and non-psychiatric control participants. The authors employed a similar stimulus set as those used in the Eizenman et al., (2003) study; however they instructed participants to

view images *naturally* and they extended the stimulus presentation duration to 30 seconds. In line with Eizenman et al., (2003), depressed individuals were found to fixate on dysphoric pictures for longer durations as compared to controls. However, they reported that glance durations on dysphoric pictures were comparable between the groups. In addition, in contrast to Ezienman et al., (2003), who reported no effects of fixation frequency for dysphoric stimuli between the groups, Kellough and colleagues (2008) reported that depressed individuals displayed a significantly greater percentage of fixations on dysphoric stimuli as compared to control participants. The authors also examined the location of first fixations and reported no group differences, with participants in each group initially viewing threatening and positive images more often than dysphoric or neutral images. The finding that depressed individuals do not initially shift their attention to negative stimuli and rather spend longer fixating on this material is supportive of the delayed disengagement hypothesis. However, the findings of comparable glance durations on negative pictures combined with differing fixation frequencies towards such stimuli are challenging. This latter pattern of results suggests that the longer fixations on negative stimuli are caused by a repeated re-orienting of attention towards this material, rather than a difficulty in disengaging from it.

While the study was rigorous in the assessment and matching of participants and also in the selection processes, recruiting both samples from comparable groups and excluding controls with a previous history of depression, there were a number of methodological drawbacks. Many of these were related to poor reporting of information with little detail being provided on selection methods and the properties of the stimuli. In addition, the authors failed to set all participants with visual impairment as exclusion criteria and

emotional stimuli were poorly matched on arousal level. Lastly, the specificity of the sample limited the generalisiablity of the results to older depressed populations.

Low Quality Studies

Koster et al., (2006) – 41%

Using the emotional spatial cueing task, with short and longer stimulus durations, the authors examined attention disengagement amongst non-dysphoric individuals and sub-clinically depressed participants with varying levels of symptom severity. The authors initially employed correlation analyses to assess whether attention bias index scores were associated with anxiety, depression or stress scores. However, no significant effects were found. The authors went on to perform post-hoc analyses, comparing individuals with extreme scores (high versus low) on the depression scale on attention bias index scores. These analyses indicated that the groups did not differ on attention disengagement, or engagement, however it is not clear whether these analyses were performed on trials with short or long stimulus presentation durations.

While the study was satisfactory in recruiting participants from the same source, caution must be used in interpreting the results due to a number of methodological weaknesses. All participants were self-selected suggesting they represent highly motivated populations. Moreover, no details are given on recruitment methods and demographic information was not reported, leading the reader to question the comparability of groups. Also the authors did not state whether any participants were excluded for visual impairment or whether controls were excluded for a previous history of depression. Moreover, the analysis was

hampered by post-hoc subgroup comparisons. Overall, the findings presented in this investigation are not likely to constitute an important contribution to the literature.

Overall Quality

The studies included in this review ranged in methodological quality. Weaknesses were evident in the construction of the attention bias tasks and in more basic aspects of study design. With regards to the latter there were two common and important limitations. Firstly, across studies all participants were self-selected. Secondly, sample sizes were small and no study reported having performed a power calculation. Rigour was however noted in the assessment of depression and co-morbid anxiety, with all studies using standardised assessment tools. Strengths were also found in the analyses as most studies employed statistical tests clearly associated with the hypotheses. In addition, the majority of studies included in the review selected participants from comparable sources. However, variability amongst studies was evident in attempts to match groups with regard to important demographic variables. In relation to the assessment of attention bias, failure to adequately match all stimuli on crucial variables was common, as was a failure to match emotionally valenced stimuli with regard to arousal level. However, in line with recommendations from previous reviews, all but one study (Leyman et al., 2007), employed depression-relevant stimuli. Furthermore, all studies presented stimuli in a randomised fashion to ensure that order effects did not confound the results.

A further strength noted across studies was in the reporting of data from which effect sizes could be calculated. As shown in Table 2, studies that employed eye-tracking methodology demonstrated the largest effect sizes for both the magnitude of the difference in

disengagement between groups (1.65) and the magnitude of the difference in disengagement between negative and neutral material (1.41). Studies employing the emotional spatial cueing paradigm were shown to evidence small-to-medium effect sizes (0.39-0.52). Given that word stimuli were employed only in studies using the emotional spatial cueing task and pictorial stimuli were used only in tasks using eye-tracking methodology by default, larger effect sizes were demonstrated in studies employing pictorial stimuli. It is unclear therefore, whether the larger effect sizes seen in eye-tracking studies stem from the potency of the task itself in detecting biases or from the value of pictorial stimuli, or from a combination of both.

Discussion

Previous reviews of literature investigating emotional attention processing in depressed adults have concentrated on the detection of a *general* bias effect (e.g. Mogg & Bradley, 2005; Dalgleish & Watts, 1990; Williams et al., 1988). The present paper adds to the current knowledge base by critically examining the proposal that attention biases, recorded in depression, reflect an impaired ability to disengage attention from negative material.

Indeed, findings from the majority of studies included in the review support the delayed disengagement hypothesis (Ellenbogen & Schwartzman 2009; Koster et al., expt. 1 & 2, 2005; Eizenman et al., 2003; Caseras et al., 2007). Two studies evidencing this specific attention bias effect were rated as being of high quality. The remaining three studies were rated as being of moderate quality and despite some methodological limitations, their results appear credible.

On the other hand, three studies reported data that was wholly (Koster et al., 2006; Leyman et al., 2007), or partially (Kellough et al., 2008), inconsistent with the delayed disengagement hypothesis. However, Koster and colleagues (2006) received a low quality rating and the poor methodological rigour evidenced in this study limits any conclusions that can be drawn from its findings. Furthermore, the "negative" stimulus set employed by Leyman and colleagues (2006) consisted of images of angry facial expressions, which may be questionable in terms of their relevance to depression. Although the study demonstrated methodological strengths in basic design features, it may be that disengagement difficulties were absent because of this design feature. Recent studies, indirectly investigating disengagement processes in depressed individuals, offer credence to this suggestion (Gotlib et al., 2004a; Gotlib et al., 2004b). Using the Dot-probe task these studies reported depression-relevant disengagement difficulties with sad but not angry facial expressions.

Overall, in comparison to five studies (Ellenbogen & Schwartzman et al., 2009; Koster et al., expt. 1 & expt. 2, 2005; Eizenman et al., 2003; Caseras et al., 2007) providing data in support of the delayed disengagement hypothesis, only one methodologically adequate study (Kellough et al., 2008) failed to demonstrate that depressed individuals exhibit an impaired ability to disengage their attention from negative information. This specific attention bias was noted in studies employing both clinical (Ellenbogen & Schwartzman et al., 2009; Eizenman et al., 2003) and sub-clinical dysphoric populations (Koster et al., expt. 1 & expt. 2, 2005; Caseras et al., 2007) and also in studies using word (Koster et al., expt. 1 & expt. 2) and pictorial stimuli (Ellenbogen & Schwartzman et al., 2009; Eizenman et al., 2003; Caseras et al., 2007). Moreover, findings were replicated across differing attention bias paradigms. The studies included in this review, therefore, suggest that

depression is associated with difficulties disengaging attention from negative material. In addition, the current review suggests that eye-tracking paradigms and naturalistic, pictorial stimuli may be more powerful than emotional spatial cueing tasks and word stimuli in the assessment of visual-spatial attention biases amongst depressed individuals.

It is unlikely that differences in the quality of basic design features contributed to contradictory findings observed by Kellough and colleagues (2008) as the authors employed a comparable sample and attention bias task to that employed by Eizenman and colleagues (2003). Indeed, although the study by Kellough et al., (2008) received a moderate quality rating, a number of methodological weaknesses were related to the reporting of information. However, the two studies did differ on a number of more subtle design features. These included the stimulus presentation duration, the nature of the participant's task and the matching of stimuli on arousal level. It may be that these subtle differences in the configuration of the attention bias task account for the discrepancies across these two studies. For instance, in the Kellough et al., (2008) study, threatening images were significantly more arousing than dysphoric images. Given that the authors presented these images simultaneously it is possible to speculate that the continual reorienting of attention towards negative material evidenced amongst depressed participants could stem from a bias related to the greater level of arousal evoked by the threatening stimuli.

Alternatively, discrepant findings may relate to the heterogeneity of depression; it is well recognised that depressed individuals do not present as a homogonous clinical group with indistinguishable symptoms. Indeed, a recent study (Baert et al., in press) investigated the

relationship between attention biases, depressive-symptom severity and differing depressive-symptoms (cognitive, affective, somatic). The authors reported that maintained attention to negative stimuli was associated with greater symptom severity and more importantly, cognitive symptoms of depression. Similarly, Donaldson and colleagues (2007) noted that attention biases for negative material were related to measures of trait rumination in a sample of clinically depressed individuals. Biased attentional processing of negative stimuli may not therefore characterise all depressed individuals and may be dependent upon the presence of specific patterns of symptoms.

Limitations

Given the limited quantity and, in general, moderate quality of studies included in the review, conclusions should be interpreted cautiously. Although the former is thought to be due to the small number of published studies in the field, some potentially relevant studies may have been excluded due to the strict eligibility criteria and findings may have differed had the review encompassed a broader scope. In addition, due to the methodological heterogeneity of the studies, it was not possible to carry out meta-analytic techniques and conclusions could not therefore be drawn about the relative magnitude of findings with respect to potential moderating variables. For example, the heterogeneity prevented formal examination of the relative combined effect size of studies using pictorial stimuli vs. naturalistic stimuli, studies using clinical vs. sub-clinical populations and studies employing the emotional spatial cueing task vs. eye-tracking methodology. Lastly, one aspect not fully addressed by the present systematic review was the substantial variation in design within the differing attention bias tasks. Given the potential impact of subtle

differences in task configuration on the observed attention bias effects, it may have been useful for this review to have specifically examined these variations in the quality criteria.

Implications for research and clinical practice

Before definitive conclusions can be drawn regarding the delayed disengagement hypothesis further studies of a higher methodological quality are needed to replicate findings of studies reported in the current review. The exemplary study would recruit a sample of consecutively referred depressed individuals, along with a sample of well-matched control participants, and would use a power calculation to guide sample size. In addition, the attention bias task would be well-controlled via the use of stimuli tailored to the concerns of depressed individuals and rigorous stimulus matching processes.

There are also a number of generic methodological limitations inherent within attention bias studies that require to be addressed by future research. For example, as noted by Cisler and colleagues (2009), little information exists with regard to the psychometric properties of attention bias tasks, thereby limiting the conclusions that may be drawn from their use. Indeed, data that does exist suggest that traditional attention bias paradigms (Emotional Stroop and Dot-Probe tasks) exhibit low test-retest reliability and poor internal consistency (Schmukle, 2005; Seigrist, 1997). Notably, recent investigations also indicate that attention bias scores on traditional attention bias measures do not correlate when used within the same sample (Gotlib et al., 2004, Asmundson et al., 2005, Johansson et al., 2004, Dalgleish et al., 2003), suggesting that they measure different phenomena (Brosschot et al., 1999).

To date no published studies have examined the reliability of the emotional spatial cueing task or the reliability of eye-tracking methodology, highlighting the pressing need for studies in this area. Future research may also wish to investigate the convergent validity of these forefront attention bias tasks claiming to measure distinct components of selective attention.

In light of recent work suggesting that attention biases may be related to distinct symptoms of depression, another promising direction for future research would be to further elucidate the specific symptom profile associated with biased attention processing. It may also be useful for future studies to report on individual data, in addition to group means, to estimate the proportion of clinically depressed participants who evidence detected biases. In discussing this avenue for future research, recent work investigating the neurobiological mechanisms driving IPBs is noteworthy (e.g. Beevers et al., 2009; Fox et al., 2009). For example, Beevers and colleagues (2009) reported that carriers of the low-expressing variation of the serotonin transporter gene (5-HTTLPR) evidenced an impaired ability to disengaging selective attention from emotional stimuli. Given that this genotype is thought to confer depression risk (e.g. Caspi et al., 2003) future studies may wish to include genotyping methods and investigate whether this genetic risk factor is associated with attention biases for negative material amongst clinically depressed individuals.

The findings of studies included in the present review may have important implications for existing theories of depression. As mentioned previously, evidence for a specific difficulty in disengaging attention from negative material cannot be readily explained by prevailing cognitive theories. However, the model proposed by Williams and colleagues (1997) is not

completely at odds with evidence suggesting that depression is associated with an impaired ability to disengage visual selective attention (Rinck & Becker, 2005). According to this IPB account, depression is associated with biases in controlled, elaborative processes and as such IPB are posited to manifest in memory but not attention bias tasks. However, given the long stimulus durations used by studies included in this review it is likely that *controlled* attention processes were being assessed. Thus, with slight revision, findings from this review could be interpreted as being consistent with the framework outlined by Williams and colleagues (1997).

Nevertheless, cognitive theories of depression ascribe both a causal and a maintaining role to attention biases. Although studies presented in this review confirm the presence of an impaired ability to disengage attention from negative stimuli amongst depressed individuals, they fail to clarify whether this specific bias represents a marker for depression vulnerability, whether it maintains depressed mood or whether it merely represents a symptom of low mood. Carefully controlled longitudinal work in the field is therefore required.

The importance of the current review for clinical practice may be far-reaching. If a difficulty in disengaging attention does play a functional role in the development and recurrence of depression this specific bias may be a suitable target for therapeutic intervention. Indeed, Cognitive Bias Modification (CBM) techniques, aiming to retrain cognitive biases using information-processing tasks, have recently been developed. Moreover, CBM techniques designed to retrain biased attention processes have preliminary support for their therapeutic value in the treatment of anxiety disorders. Schmidt and

colleagues (2009), for example, noted that a Dot-Probe task, designed to train individuals with social anxiety to more effectively disengage their attention from threatening material, was effective in directly modifying this bias and crucially, in reducing clinical pathology (e.g. Schmidt et al., 2009). Although CBM techniques have been developed for, and found to be effective in, modifying memory biases amongst depressed individuals (Joorman et al., 2009) the findings of the current review point towards the value of investigating the therapeutic benefits of attention training programs in the treatment of clinical depression.

Conclusions

This review provides preliminary support to the delayed disengagement hypothesis and suggests that this emerging evidence base carries with it several important clinical and theoretical implications. However, it is acknowledged that this is a young field of study and that many of the investigations, from which conclusions are drawn, have methodological weaknesses. Therefore, it is imperative that further research, accounting for the methodological limitations identified within this review, is conducted to replicate and extend these initial findings.

Footnotes

[1] The emotional spatial cueing task typically involves participants fixating on a central fixation cross. A single cue is then presented, to the left or right of the fixation cross, followed by a to-be-detected target. Targets are either presented in the same location as cues (valid trials) or in the opposite location to the cue (invalid trials). Two versions of the task are commonly employed: Predictive designs (whereby there is a higher probability of the target appearing in the same position as the cue on; 75% valid trials vs. 25% invalid trials) and non-predictive designs (whereby targets appear equally often on valid and invalid trials; 50% valid trials vs. 50% invalid trials). Predictive designs result in faster responses on valid trials relative to invalid trials, a phenomenon commonly referred to as the *cue validity effect*. Non-predictive designs result in the cue validity effect at short intervals (< 300-ms) between the cue onset and target onset (stimulus onset asynchronies, SOAs) however, with longer SOAs the opposite effect occurs. Here participants are faster to respond on valid trials, a phenomenon commonly referred to as *inhibition of return* (IOR; Posner & Cohen, 1984). In both designs, attention bias indices are commonly calculated. The attention engagement index is calculated by comparing participants' reactions times on valid trials with neutral cues with those on valid trials with emotional cues. The attention disengagement index is calculated by comparing response latencies on invalid trials with emotional cues with response latencies on invalid trials employing neutral cues.

Eye-tracking studies typically involve recording the position of eye-gaze while viewing emotionally valenced and emotionally neutral pictures. Stimulus configurations,

participants' instructions and recordings vary across studies. However, a difficulty with attention disengagement is commonly calculated by comparing fixation durations with negative relative to neutral stimuli.

[2] Studies employing visual search tasks were excluded. In this task response latencies to detect negative stimuli in arrays of neutral distracter stimuli are thought to reflect the engagement of attention. These are compared to response latencies to detect neutral words in arrays of negative distracter stimuli, posited to reflect attentional disengagement. However, as with the Dot-Probe task, given the simultaneous presentation of emotional and neutral stimuli, this paradigm cannot discern whether facilitated attentional disengagement or delayed attentional disengagement accounts for the observed response latencies.

[3] Studies that compared negative stimuli only with another emotional stimulus were excluded. Studies employing such designs preclude a clear interpretation of their findings as any detected bias effects could be attributable to a bias related to the emotionally valenced, as opposed to negative, stimulus (Bar-Haim et al., 2007).

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	Eizenman et al (2003)	Ellenbogen & Schwartzman (2008)	Leyman et al (2007)	Caseras et al (2007)	Koster et al (2005) Expt. 1	Koster et al (2005) Expt. 2	Kellough et al (2008)	Koster et al (2006)
Selection of cases	1	1	1	1	1	1	0	0
Selection of controls	1	1	1	1	1	1	0	0
Source of case/controls	2	2	2	2	2	2	2	2
Matching of cases/controls	1	1	2	2	2	2	1	0
Visual impairment	2	2	0	0	0	0	0	0
History of depression	2	2	2	0	0	0	2	0
Measures reliable/valid	2	2	2	2	2	2	2	2
Co-morbidities (cases)	2	2	2	2	2	2	2	2
Co-morbidities (controls)	2	2	2	2	2	2	2	2
Negative stimuli	2	2	0	2	2	2	2	2
Matching all stimuli	1	2	1	1	2	2	0	1
Matching emotional stimuli	2	0	2	2	0	0	0	0
Presentation of stimuli	2	2	2	2	2	2	2	2
Power calculation	0	0	0	0	0	0	0	0
Analyses	2	2	2	2	2	2	2	0
Confounding demographics	1	1	2	2	1	1	1	0
Total	**25**	**24**	**23**	**23**	**21**	**21**	**18**	**13**
Percentage	**78**	**75**	**72**	**72**	**66**	**66**	**56**	**41**
Quality Rating	**High**	**High**	**Moderate**	**Moderate**	**Moderate**	**Moderate**	**Moderate**	**Low**

Table 1: Quality criteria ratings of included studies.

Study	Quality Rating	Attention Bias Paradigm	Depressed Sample Characteristics [a]	Control Sample Characteristics [a]	Stimulus Materials [b]	Stimulus Presentation Duration	Salient findings	Effect size
Eizenman et al. (2003)	High	Eye-tracking	1. n = 8 2. Clinical sample of depressed volunteers 3. SCID; BDI-II 4. Mean = 29.0 5. 2 males/ 6 females 6. Mean age = 36.9 7. BAI mean = 19.9	1. n = 9 2. Non-clinical population of volunteers 3. SCID; BDI-II 4. Mean = 1.9 5. 2 males/ 7 females 6. Mean age = 27.0 7. BAI mean = 1.3	Pictures (IAPS) - Dysphoric - Threatening - Social - Neutral	10 500-ms	Depressed individuals fixated longer on dysphoric pictures relative to controls. Depressed individuals glanced at dysphoric pictures for longer durations, relative to controls. No significant differences were found between the groups on average glance duration for social, neutral and threatening stimuli. Depressed individuals showed no significant differences in total fixation frequency for dysphoric, neutral, threatening and social stimuli, relative to controls.	d = 1.64 d = 1.23
Koster et al. (2005) Experiment 1	Moderate	Emotional spatial cueing task	1. n= 15 2. Non-clinical sample of undergraduate student volunteers 3. BDI 4. Mean = 16 5. 5 males/ 10 females 6. Mean Age = 19.1 7. STAI-T Mean = 46.3	1. n = 15 2. Undergraduate students volunteers 3. BDI 4. Mean = 3.8 5. 3 males/ 12 females 6. Mean age = 18.9 7. STAI-T Mean = 35.7	Words -Positive -Negative -Neutral	1500-ms	Dysphoric individuals were significantly slower than non-dysphoric control individuals to respond on invalid trials with negative pictures. No significant differences were found between dysphoric participants and controls on valid trials with negative pictures	d = 0.31

Study	Quality Rating	Attention Bias Paradigm	Depressed Sample Characteristics [a]	Control Sample Characteristics	Stimulus Materials	Stimulus Presentation Duration	Salient findings	Effect size
Koster et al. (2005) Experiment 2	Moderate	Emotional spatial cueing task	1. n = 20 2. Non-clinical sample of undergraduate student volunteers 3. BDI 4. Mean = 15.2 5. 20 females 6. Mean Age = 22.1 7. STAI-T Mean = 52.6	1. n = 20 2. Undergraduate students volunteers 3. BDI 4. Mean = 2.1 5. 20 females 6. Mean age = 21.4 7. STAI-T Mean = 32.0	Words -Positive -Negative -Neutral	250-ms 500-ms 1500-ms	250-ms: no significant differences between groups 500-ms: Dysphoric individuals were significantly slower than non-dysphoric control individuals to respond on invalid trials with negative pictures. No significant differences were found between dysphoric participants and controls on valid trials with negative pictures 1500-ms: Dysphoric individuals were significantly slower than non-dysphoric control individuals to respond on invalid trials with negative pictures No significant differences were found between dysphoric participants and controls on valid trials with negative pictures	d = 0.39 d = 0.45
Koster et al. (2006)	Low	Emotional spatial cueing task	1. n = 25 2. Non-clinical sample of dysphoric student volunteers 3. DASS 4. Classified as mild (n=11), moderate (n = 7), severe (n = 4) and extremely severe (n = 3) – overall mean score on DASS score not reported. 5. Proportion of male/females not stated 6. Mean age not stated 7. Mean anxiety score not presented	1. n = 119 2. Students volunteers 3. DASS 4. Classified as normal (n = 119); Overall mean DASS score not reported 5. Proportion of male/females not stated 6. Mean age not stated 7. Mean anxiety score not presented	Pictures (KDEF) - Angry - Happy - Sad - Neutral	200-ms 1000-ms	200-ms: No significant correlations were found on attention bias indices and depression scores. 1000-ms: No significant correlations were found on attention bias indices and depression scores. No significant differences were found between individuals with extreme high scores on the depression scale and those with low scores on attention bias indices.	

Study	Quality Rating	Attention Bias Paradigm	Depressed Sample Characteristics [a]	Control Sample Characteristics	Stimulus Materials	Stimulus Presentation Duration	Salient findings	Effect size
Caaeras et al. (2007)	Moderate	Eye-tracking	1. n = 23 2. Non-clinical population of depressed volunteers 3. BDI-II 4. Mean = 15.5 5. 10 males/ 13 females 6. Mean age = 22.6 7. STAIT-S mean = 40.9 STAIT-T mean = 45.7	1. n = 20 2. Non-clinical population of volunteers 3. BDI-II 4. Mean = 2.8 5. 8 males/ 12 females 6. Mean age = 22.1 7. STAIT-S mean = 29.6 STAIT-T mean = 32.3	Pictures (IAPS) -Negative -Positive -Neutral	3000-ms	Dysphoric individuals fixated longer on negative pictures relative to controls. Dysphoric individuals fixated longer on negative pictures relative to neutral pictures. Dysphoric individuals showed no significant differences in direction of initial shift in gaze relative to controls. Both controls and dysphoric participants initially oriented towards positive compared with neutral pictures and towards neutral relative to negative scenes. Dysphoric individuals showed no significant differences in latency of initial fixation relative to controls. Both controls and dysphoric participants were quicker to look at positive relative to neutral pictures, with no differences in latency of initial fixation between negative, relative to neutral pictures.	d = 0.35 d = 1.41

Study	Quality Rating	Attention Bias Paradigm	Depressed Sample Characteristics [a]	Control Sample Characteristics	Stimulus Materials	Stimulus Presentation Duration	Salient findings	Effect size
Leyman et al. (2007)	Moderate	Emotional spatial cueing task	1. n = 20 2. Clinical population of depressed psychiatric in and out patients 3. MINI; HRSD; BDI-II-NL 4. HRSD mean = 21.8; BDI mean = 34.9 5. 5 males/ 15 females 6. Mean age = 45.5 7. STAIT-T mean = 55.2	1. n = 20 2. Non-clinical population recruited from a government institution 3. MINI; HRSD; BDI-II-NL 4. HRSD mean = 1.6; BDI mean = 3.8 5. 6 males/ 14 females 6. Mean age = 43.2 7. STAIT-T mean = 34.1	Pictures (KDEF) - Angry - Neutral	1000-ms	No significant differences were found between depressed participants and controls on invalid trials with angry pictures Depressed individuals were significantly faster than controls to respond on invalid trials with negative pictures	d = 0.651
Ellenbogen & Schwartzman (2008)	High	Emotional spatial cueing task	1. n = 18 2. Clinical population of depressed volunteers 3. SCID; BDI-II 4. BDI-II mean =17.7 5. 8 males/ 10 females 6. Mean age = 24.7 7. STAIT-T mean = 55.5; STAIT-S mean = 40.8	1. n = 21 2. Non-clinical sample of volunteers 3. SCID; BDI-II 4. BDI-II mean = 4.9 5. 9 males/ 12 females 6. Mean age = 21.9 7. STAIT-T mean = 35; STAIT-S mean = 31	Pictures (IAPS) - Threat - Dysphoric - Neutral	17-ms 750-ms	17-ms: No differences between depressed individuals and controls 750-ms: Depressed individuals (in the neutral condition) were slower to respond on invalid trials with dysphoric pictures relative to controls. No differences were found between depressed individuals in the stressor condition and controls in relation to response latencies for invalid trials with dysphoric stimuli.	d = 0.54

Study	Quality Rating	Attention Bias Paradigm	Depressed Sample Characteristics [a]	Control Sample Characteristics	Stimulus Materials	Stimulus Presentation Duration	Salient findings	Effect size
Kellough et al. (2008)	Moderate	Eye-tracking	1. n = 15 2. Clinical population of depressed community volunteers 3. SCID; BDI-II 4. Mean = 29.5 5. 6 males/ 9 females 6. Mean age not stated 7. BAI mean = 22.9	1. n = 45 2. non-clinical population of volunteers 3. SCID; BDI-II 4. Mean = 2.71 5. 20 Males/ 25 females 6. Mean age not stated 7. BAI mean = 22.9	Pictures (IAPS) - Dysphoric - Threatening - Social - Neutral	30 000-ms	Depressed individuals fixated longer on dysphoric pictures relative to controls. Depressed individuals showed no significant differences on average glance duration for dysphoric, neutral, threatening and social stimuli, relative to controls. Depressed individuals showed a greater number of fixations towards dysphoric pictures relative to controls. No significant differences were found between the groups on location of first fixation for dysphoric, social, neutral and threatening stimuli. Both groups initially fixated threat and positive stimuli more frequently than neutral and dysphoric stimuli.	d = 0.84 d = 0.88

Table 2: Characteristics of studies included in the review.

Notes

[a] Characteristics of the depressed/control sample: 1 = Total number of participants per group; 2 = Source and selection of participants; 3 = Main assessment/screening tool determining casness: BDI (Beck Depression Inventory; Beck et al., 1961); BDI-II (Beck Depression Inventory-II; Beck et al., 1996); BDI-II-NL (Depression Inventory-II-Netherlands; Beck et al., 1996; Van Der Does, 2002); DASS (Depression Anxiety and Stress Scale; Lovibond & Lovibond, 1995); HRSD (Hamilton Rating Scale for Depression; Hamilton, 1967); SCID (Structured Clinical Interview for DSM-IV; First et al., 1997); MINI (Dutch version of the Mini International Psychiatric Interview; Pinninti et al., 2003); 4 = Mean score on screening tool determining caseness; 5 = Proportion of males/females; 6 = Mean age of group; 7 = Anxiety screening measure: BAI (Beck Anxiety Inventory; Beck et al., 1988); STAI-T (Trait version of the State-Trait Anxiety Inventory; Speilberger et al., 1983); STAI-S (State version of the State-Trait Anxiety Inventory; Speilberger et al., 1983).

[b] Stimulus Materials: IAPS = Picture stimuli from the International Affective Picture System (Lang et al., 1999); KDEF = Face stimuli from the Karolinska Directed Emotional Faces database (Lundqvist et al., 1999).

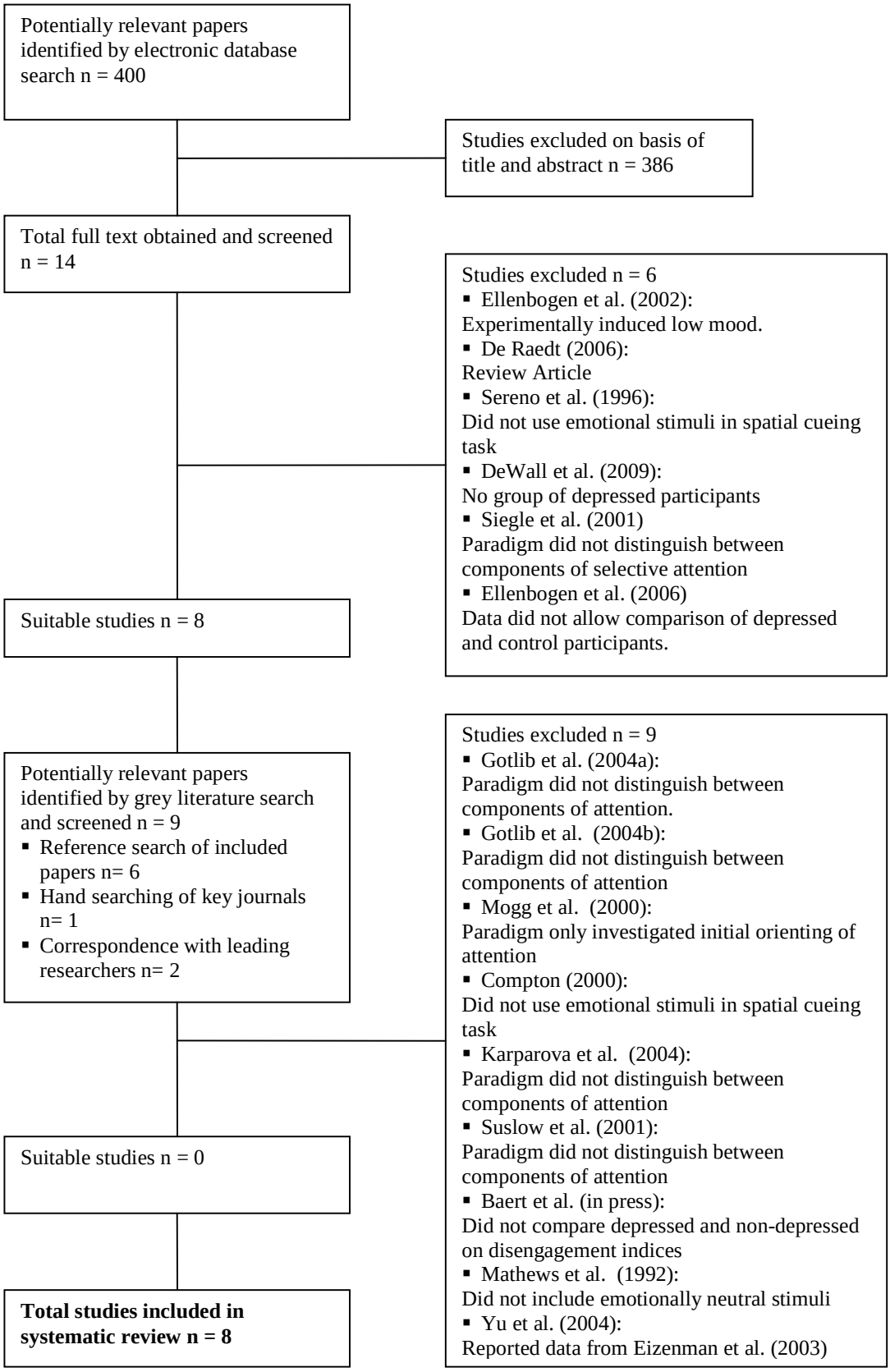

Figure 1: Summary of study selection and exclusion process.

CHAPTER TWO: MAJOR RESEARCH PROJECT

Attention Bias for Negative Semantic Stimuli in Late Life Depression*

Prepared in accordance with the guidelines for Behaviour Research and Therapy (Appendix B.1)

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***** The original protocol submitted to, and passed by the Doctorate in Clinical Psychology training course is included as Appendix B.2. Changes to this protocol are detailed in Appendix B.3

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Abstract

Background: Recent studies indicate that depressed individuals may have difficulties disengaging visual-spatial attention from negative information. Preliminary studies in depressed older adults provide evidence for the existence of biased attention to negative stimuli. However, the specific components of attention driving the detected bias effects in this population are not known. **Aims:** This study examined the mechanisms underlying attention biases in Late Life Depression (LLD). It was predicted that depressed older adults, like their younger counterparts, would demonstrate an impaired ability to disengage attention from negative stimuli relative to neutral and positive stimuli, as compared to non-depressed older adult controls. **Methods:** 16 clinically depressed older adults and 22 older adult controls matched for age, gender and pre-morbid verbal IQ performed an emotional spatial cueing task that required classifying a target stimulus. The location of the target was correctly or incorrectly cued by a neutral, positive or negative word. **Results:** Planned comparisons did not support the primary hypotheses. However, participants in the depressed group, in general, were slower to respond than participants in the control group. **Conclusions:** Results suggest that the ability to disengage attention from negative words is not impaired in LLD; however methodological limitations prevent firm conclusions being drawn. Possible explanations for the results are discussed along with directions for future research.

Key words: Attention Bias; Late Life Depression; Disengagement

Introduction

Depression is the most common psychological health problem affecting older people (Beekman et al., 1999), with approximately 10-15% of the over 60s experiencing clinically significant depressive symptoms (Blazer, 1989). In addition to being cited as a risk factor for the onset of dementia of the Alzheimer's type, Late Life Depression (LLD) is associated with functional impairment, an elevated risk of mortality, increased use of medical services and exacerbations in the course of co-morbid physical illness (Beekman et al., 1997; Cronin-Stubbs et al., 2000; Gatz et al., 2005). Moreover, depressive symptoms and prognosis are reported to differ between older and younger adults, with LLD being associated with higher rates of relapse, anxiety, sleep disturbance, somatic and psychotic symptoms, and lower rates of pervasive low mood (Gottfries, 1998; Fischer et al., 2003). The differential presentation of the disorder in the elderly, along with its personal consequences and our ageing population, warrants research investigating factors that underlie the development and maintenance of LLD.

Over the last three decades cognitive perspectives have been influential in attempts to understand depressive psychopathology. According to cognitive models (e.g. Beck et al., 1979) a prominent factor in the both the causation and maintenance of depression is biased attentional processing, such that depressed individuals, and those at risk of developing depression, selectively attend negatively toned information. This attention bias is postulated to exacerbate negative affect, which in turn, augments attention biases. However, despite a wealth of research investigating attention biases in depressed younger adults, studies examining biased attentive processing in older people are scarce.

Reviews of early studies investigating attention biases in depressed working-age adults, in general, concluded that depressed individuals do not selectively attend to negative material (e.g. Dalgleish & Watts, 1992; Williams et al., 1988, 1996). More recently however, several authors have suggested that the initial discrepant findings could be explained by important methodological biases (e.g. Bradley et al.., 1997; Nunn et al., 1997): Many initial studies employed threat-related stimuli, as opposed to depression-relevant material (Hill & Dutton, 1989; MacLeod et al., 1986; Mathews et al., 1996); some failed to adequately match emotional and neutral stimuli (e.g. Bradley et al., 1997; Mogg et al., 1995); the majority used non-clinical populations (e.g. Hill & Knowles, 1991), and many failed to either measure anxiety levels or control for these in the statistical analysis (e.g. Mathews et al., 1996).

Bradley and colleagues (1997) noted that studies accounting for the aforementioned methodological confounds provide support for a distinct pattern of attention biases in depressed adults. They noted that biased attention processing is more consistently demonstrated in studies using longer presentations (>1000-ms) of depression-relevant stimuli, whereas null findings are constantly reported in studies employing subliminal stimulus presentations. They went on to suggest that forefront models of selective attention which suggest that this aspect of cognition comprises several distinct sub-systems, may be crucial in explaining these mixed results (Allport, 1989; Posner & Peterson, 1990; Laberge, 1995). An influential model proposed by Posner and colleagues (1990) suggests that visual-spatial attention consists of three interrelated operations: shift, engagement and disengagement. Bradley and colleagues (1997) proposed that depressed individuals do not initially shift their

attention towards negative stimuli; rather they have difficulties disengaging their attention from it, once it has been noticed.

However, this “delayed disengagement hypothesis” was based on findings from studies employing traditional attention bias paradigms such as the Emotional Stroop task and the Dot-Probe task and despite their considerable contribution to the current knowledge base they are unclear with regard to the component of selective attention that is being measured (Fox, 2004). In both of these tasks participants are required to ignore stimuli that are spatially co-located. Given that it is regarded as impossible to ignore stimuli within about one degree of fixation, it is difficult to determine whether enhanced engagement or delayed disengagement processes account for the detected attention bias effects (Fox et al., 2001). In addition, although stimuli are spatially separated in the Dot-Probe task, both locations are “task relevant” and in depression studies, in particular, stimuli are presented for lengthy durations. Participants could therefore adopt a strategy whereby they attend to both stimulus locations or switch attention several times between the two locations. This again precludes investigating whether emotional stimuli attract attention, or whether once an emotional stimulus has been detected, attention tends to dwell on that location (Fox et al., 2001; Broomfield & Turpin, 2005).

To facilitate the direct examination of attention disengagement from emotional stimuli, researchers have adapted the spatial cueing task originally developed by Posner (1980). Emotional modifications of this task require participants to detect a target stimulus that appears in one of two spatial locations. An emotionally valenced cue highlights either the location at which the target will appear (valid trials) or the spatial location opposite to where

the target will emerge (invalid trials). Two versions of the task are commonly employed: Informative designs, where there is a higher probability of the target appearing in the same position as the cue (75% valid trials vs. 25% invalid trials) and non-informative designs, where targets appear with equal probabilities at the cued and uncued location (50% valid vs. 50% invalid trials). On informative tasks participants are faster to respond on valid trials, a phenomenon commonly referred to as the *cue validity effect* (Posner, 1980). Facilitation on valid trials is attributed to informative cues covertly orienting attention to the cued location. Targets subsequently presented at that location are then processed more efficiently as the attention system needs only to re-engage the stimulus (Posner et al., 1987). Slowing on invalid trials is attributed to the completion of all three attention operations. To detect targets on these trials participants are required to disengage attention from the cued location, shift attention and then engage with the contralateral location. Critically, differences in attention disengagement due to stimulus valence can be calculated by comparing response latencies on invalid emotional cues trials with response latencies on invalid neutral cue trials

On non-informative tasks cue validity effects occur at short intervals (< 300-ms) between the cue and target onset (stimulus onset asynchronies; SOAs). Longer SOAs result in an opposite phenomenon; participants are faster to respond on invalid trials. This is commonly known as *inhibition of return* (IOR; Posner & Cohen, 1984) and is posited to promote efficient search of the visual environment by preventing attention from returning to a previously attended location (Klein, 2000). A number of researchers have employed non-predictive designs to examine attention biases in clinical disorders on the premise that mood-congruent stimuli may lead to a reduction in IOR and if so will provide evidence of *maintained* attention to a cue.

Attention disengagement is then calculated using the same method as in predictive designs. However, a potential confound of using non-informative tasks to measure disengagement is that IOR effects would result in faster responding on invalid neutral cues trials relative to valid neutral cue trial. This could then exaggerate the likelihood of detecting slowed responding on invalid trials containing emotional material if IOR is also reduced on these trials (Koster et al., 2005).

A number of studies have now used the emotional spatial cueing task to investigate the delayed disengagement hypothesis, initially proposed by Bradley and colleagues (1997), in younger depressed adults (e.g. Koster et al., 2005, Ellenbogen & Schwartzman, 2008). These studies, by and large, suggest that an impaired ability to disengage attention from negative material characterises depressed and dysphoric adults (McIlwraith, unpublished manuscript). Complementary attention bias paradigms have also corroborated these findings, pointing towards the stability of the phenomenon. For example, data from eye-tracking studies indicate that depressed and dysphoric individuals tend to maintain their gaze for longer durations on negative pictures, with no evidence of an initial shifting or orientating towards negative scenes (e.g. Caseras et al., 2007, Eizenman et al., 2003).

As mentioned, however, research on information processing biases (IPBs) in depressed older people lags behind. To date only two studies have investigated attention biases in the depressed elders (Broomfield et al., 2007; Dudley et al., 2002). Both studies employed the Emotional Stroop paradigm and reported an attention bias to negative words in depressed older adults relative to elderly controls. However, it has been debated whether the Emotional

Stroop task is a reliable measure of selective attention. MacLeod and colleagues (1986), for example, note that the interference effect observed on the Emotional Stroop task may reflect an input (stimulus) selection problem, or an output (response) selection problem. Moreover, as outlined above, the Emotional Stroop paradigm assumes an over-simplified, unitary view of selective attention processes, and is unable therefore to determine the precise attention mechanism underlying the detected biases (disengage, shift, engage).

To summarise, the pattern of empirical evidence on attention biases in depressed working-age adults suggests that the disorder may be characterised by a specific difficulty in disengaging selective attention from mood-congruent information. Although recent studies provide preliminary evidence for the existence of an attention bias to negative stimuli amongst older depressed people, the specific components of attention driving the detected bias effect in this population are not known. Given the uncertainty about the degree of symptom overlap between adult and elderly presentations of depression, the current study aims to extend these preliminary findings by examining the precise mechanisms of attention underlying attention biases in LLD.

Aims and Hypotheses

In view of the limited research on attention biases in depressed elders, the present investigation aims to examine the components of attention underlying the attention biases detected in LLD. Based on research in younger depressed people the following specific hypotheses were generated:

1. Overall reaction times will be faster on valid trials than on invalid trials regardless of group (Demonstrating the cue validity effect).

2. On *invalid trials*, depressed older adults will be slower to respond to targets following negative cues relative to non-depressed older adult controls. (Demonstrating between-group difficulties in disengaging attention from negative stimuli).

3. On *invalid trials* depressed older adults will be slower to respond to targets following negative cues relative to neutral and positive cues (Demonstrating within-group difficulties disengaging attention from negative stimuli).

4. On *valid trials* there will be no difference between depressed older adults and older adult control in reactions times to targets following negative relative to neutral and positive cues (Demonstrating no within or between group facilitated attention engagement for negative stimuli).

Method

Approval

Ethical approval was obtained from NHS Greater Glasgow and Clyde Primary Care Ethics Committee (Appendix B.4). Management approval for the protocol was granted by NHS Greater Glasgow and Clyde Research & Development Directorate (Appendix B.5).

Participants

Two groups of participants volunteered to take part in the study: depressed older adults and non-psychiatric older adult controls. Participants included in the depressed group were recruited from Older People's Community Mental Heath Teams across Glasgow. Staff from these services referred individuals with clinically significant depressive symptoms, who wished to receive further information about the study. Non-psychiatric controls were recruited through advertisements and flyers inviting individuals aged 65 and over who had "good mental health" to contact the researcher.

Eligibility Criteria

To be included in the depressed group, participants were required to satisfy Diagnostic and Statistical Manual for Mental Disorders (4^{th} ed; DSM-IV; American Psychiatric Association, 1994) criteria for a current episode of unipolar major depressive disorder (MDD) or Dysthymia. In addition, they were required to score >5 on the Geriatric Depression Scale (GDS-15; Shiek & Yesavage, 1986). Exclusion criteria for the depressed group included meeting DSM-IV criteria for psychotic disorder or a manic episode at the present time, or in

the past, and meeting DSM-IV criteria for current anorexia or bulimia nervosa. The control participants were required to meet no criteria for lifetime or current DSM-IV Axis I conditions and were required to score < 5 on the GDS and < 7 on the Beck Anxiety Inventory (BAI; Beck et al., 1988). Given that epidemiological studies indicate that a high proportion of depressed older people also have co-morbid anxiety diagnoses (Gottfries, 1998, Fischer et al., 2003) it was deemed impractical and ecologically unjustifiable to exclude depressed older adults with concurrent anxiety. Thus, meeting DSM-IV criteria for an anxiety disorder and scoring above the cut-off for anxiety on the BAI did not lead to exclusion for depressed participants.

Exclusion criteria for both groups included: meeting DSM-IV criteria for alcohol or drug dependence/abuse; medical conditions affecting motor control of the hands; self-reported history of severe head trauma (as defined by admission to hospital for >48 hours as a result of head injury); severe cognitive impairment as defined by a score of < 24 on the Mini Mental State Examination (MMSE; Folstein et al., 1975), an error rate above the 10% threshold on the emotional spatial cueing and an outlier response rate above the 15% threshold. Finally, all participants were required to be aged 65 years or older, to have English as their first language and to have normal to corrected-to-normal vision.

Of the 28 potentially depressed participants referred, 24 (85.7%) agreed to participate following a detailed discussion of the study with the researcher. All 24 interested participants were considered potentially suitable following a telephone screen and were invited to participate in the experimental procedure. Of these, eight participants were excluded from all analyses. Reasons for exclusion were: meeting criteria for a previous manic episode (one);

failure to meet DSM-IV criteria for MDD or dysthmia (three); failure to meet the threshold of >24 on the MMSE (one); failing to complete the emotional spatial cueing task in full (two); having an error rate above the 10% threshold (one).

All 28 (100%) controls agreed to participate and were assessed as being potentially suitable following the telephone screen. Of these, a total of six participants were excluded for the following reasons: failing to meet the cut-off of < 7 on the BAI (two); failing to score > 24 on the MMSE (one); failing to complete the attention bias task in full (three).

Therefore, the final sample consisted of 16 depressed older adults and 22 non-depressed older adult controls. Prior to the study a power calculation was conducted, to estimate how many participants would be required in each group. Given that no literature existed on the use of the emotional spatial cueing task with older depressed people, calculations were based on several related studies. Broomfield and colleagues (2007), using Cohen's (1988) effects size conventions for means (d), obtained an effect size (d) of 0.85 and Dudely and co-workers (2002) obtained an effect size (d) of 0.91 between depressed older adults and controls on Emotional Stroop means and interference indices respectively, for negative stimuli. Furthermore, Koster et al. (2005) obtained an effect size, partial eta squared (η_p^2) of 0.11 between dysphoric and non-dysphoric young adults on the emotional spatial cueing task. Ellenbogen and colleagues (2008) using this paradigm, obtained an effect size (η_p^2) of 0.12 between clinically depressed working age adults and non-psychiatric controls. Thus, a medium to large effect size of d = 0.6 was thought to be reasonable for the current study. A power calculation, using G * Power 3 software program (Faul et al., 2007), with an effect size of 0.6

revealed an estimated 36 participants per group would be necessary for the present study to detect significant differences at an alpha level of 0.05, with power of 0.8 (one-tailed).

Measures

The Mini International Neuropsychiatric Interview (MINI 5.0; Sheehan et al., 1998) was used to detect the presence of psychological disorders. This is a brief structured interview based on DSM–IV and International Classification of Diseases (ICD-10; World Health Organisation, 1992) criteria for the diagnosis of psychiatric disorders. The interview consists of a series of close-ended questions and screens for 17 Axis 1 disorders, as well as the presence of suicidality, melancholic features and antisocial personality. For the purpose of the current study all but one module (antisocial personality) was administered. The MINI has good correlation with the Structure Clinical Interview for DSM-III-R (SCID-P), where kappa values for most psychiatric diagnoses have been demonstrated to be 0.70 or above. It also has acceptable test-retest and inter-rater reliability (Sheenan et al., 1997). However, no psychometric data are available on its use with older adults.

To further confirm diagnosis, and to assess symptom severity, all participants completed the 15-item Geriatric Depression Scale (GDS-15; Shiek & Yesavage, 1986) and the Beck Anxiety Inventory (BAI; Beck et al., 1988). The GDS-15 is a widely used scale recommended for screening depression in older people (Williams & Wallace, 1993). The questionnaire contains 15 items, requiring a “yes” or “no” response, scored on a 2-point scale (0 = “no”; 1 = “yes”). Total scores range from 0-15, where higher scores indicate a greater number of depressive symptoms. A cut-off score of between 5 and 6 is indicative of depression (e.g. D’Ath, 1994;

Lyness et al., 1997). The GDS shows acceptable internal consistency, test/retest reliability and face validity (e.g. Van Marwijk et al., 1995; Knight et al., 2004). The BAI is a well established 21-item questionnaire measuring the intensity of anxiety symptoms. Each item is scored on a 4-point scale (0 = "not at all"; 3 = "severe"). Total scores range from 0-63 with higher scores indicating higher levels of anxiety. The BAI shows good internal consistency and acceptable construct validity when used with older adults (e.g. Kabacoff et al., 1997; Wetherall & Arean, 1997).

The Mini Mental State Examination (MMSE; Folstein et al., 1975) was administered to screen for cognitive impairment. It assesses a range of cognitive domains including orientation, memory, attention, language and calculation. It shows good test/retest reliability and internal consistency and has been well validated for use in research (Ihl et al., 1992). A strict cut-off score of > 24 was selected to exclude depression related cognitive dysfunction.

Participants were also assessed with the Wechsler Test of Adult Reading (WTAR; Wechsler, 2001) to provide a measure of pre-morbid verbal ability. This is an up-to-date and commonly used measure of pre-morbid intelligence and comprises 50 irregularly pronounced words which participants are asked to read aloud. Reliability and validity have been well established. Given that the emotional spatial cueing task utilised word stimuli, and is dependent on word meaning being processed, it was important to ensure that the groups were matched on verbal ability.

Materials

An independent sample of seven older people were asked to rate 120 words selected from a previous study investigating attention biases in depressed young adults (Donaldson et al., 2007). This pilot was conducted to assess the suitability of the word stimuli in an older adult population. Participants were asked to categorise words with respect to their relevance to positive, neutral and negative emotions. In addition, participants were required to rate each word on emotional intensity using a scale ranging from one (not at all emotive) to ten (extremely emotive) (see Appendix B.6). This procedure was adapted from stimulus selection methods used in other attention bias studies (e.g. Mogg et al., 2000; Leyman et at., 2007) and only words with >85% agreement on categorisation were selected for inclusion. In addition, emotional words (positive and negative) were selected if they had a mean emotionality score of ≥ 4 and neutral words were selected if their emotionality score was ≤ 2. This resulted in the inclusion of 16 positive, 16 negative words and 16 categorised neutral words (Appendix B.7).

Mean ratings of emotionality, word frequency (using English language norms developed by Carroll et al., 1971) and mean length for each word valence category are shown in table 1. Analysis-of-variance (ANOVA) across the three word stimuli categories showed no significant differences in terms of word frequency ($F(2, 45) = 0.19$, $p = .828$), or word length ($F(2, 45) = 0.00$, $p = 1.0$). Due to the non-parametric nature of the data, Kruskal-Wallis and Mann-Whitney U analyses were used to compare word stimuli categories in terms of ratings of emotionality. The result of the Kruskal-Wallis test is reported in terms of the Chi-Square distribution and the level of significance is reported for the follow-up Mann-Whitney U tests. As expected there were significant differences between word stimuli categories on ratings of

emotionality (χ^2 = 33.4, df = 2, p = < 0.001). Neutral words were significantly less emotional than both negative (p = < 0.001) and positive words (p = < 0.001). However, crucially, positive and negative words did not differ significantly in terms of emotionality (p = 0.93).

(Insert Table 1 about here)

Emotional Spatial Cueing Task

The emotional spatial cueing task was programmed by the researcher on Super Lab Pro software (Version 4.5; Cedrus Corporation) and was presented on a Compaq laptop computer with a 14-inch colour monitor. Reactions times were recorded via Super Lab Pro and an external response box (Model RB-730) ensuring accuracy to within 1-ms. Each trial began with a fixation screen consisting of a white background, a central black fixation cross and two frames (15 cm high and 8 cm wide). Frames were positioned 1cm to the left and 1cm to the right of the fixation cross. Cues and targets were presented centrally in the frames at a distance of 5cm from the fixation cross. Piloting with older people demonstrated that words presented at this visual angle could be viewed whilst maintaining fixation on the central cross. Targets were either two horizontal (..) or two vertical (:) black dots (r = 1.4 cm).

Participants were required to categorise the orientation of the target by pressing one of two correspondingly labeled buttons on the external response pad. The two response buttons were arranged one behind the other in the participant's midline. This was to ensure that the response and target position did not overlap spatially and thus to minimise the "Simon Effect" (Simon & Rudell, 1969). A categorisation task was selected over a localisation task (where

participants are asked to press either a left or right-hand button to identify the location of a target on the screen) as the latter could result in participants monitoring one side of the screen and then responding based on whether or not the target is present or absent in that spatial location (Bradley et al., 1998). Categorisation based tasks offset this confounding influence, as to make an accurate response the participant must process each target (Fox et al., 2002).

The sequence of events within each experimental trial (shown in Figure 1) consisted of the fixation screen being displayed for 500-ms followed by the stimulus cue screen, where word stimuli were presented in one of the frames, for 1500-ms. The stimulus presentation was immediately followed by a mask screen for 50-ms, where the stimulus was blanked out. Lastly, the target was presented and remained on the screen until the participant responded after which the next trial started immediately. Thus, there was a cue stimulus-target asynchrony of 1550-ms.

(Insert Figure 1 about here)

The relatively long stimulus presentation was selected in line with the aforementioned literature indicating that attention biases are more commonly found in depressed individuals with stimulus exposure durations of > 1000-ms (see Bradley et al., 1997). In addition, Koster and colleagues (2005; expt 2) examined the time course of attention biases in depressed younger adults using the emotional spatial cueing task. They reported that words presented for short exposure times (250-ms) resulted in no attention bias effects. However, at slightly longer stimulus durations of 500-ms and 1500-ms, dysphoric individuals showed difficulties

disengaging their attention from negative material as compared to controls, with the strongest effects at the 1500-ms. Therefore, a stimulus exposure duration of 1500-ms may be considered optimum when investigating attention disengagement processes amongst depressed individuals.

In total the task comprised 384 experimental trials and 72 catch trials. Catch trials, employed to prevent participants developing an automated response set (Broomfield & Turpin, 2005), consisted of trials where a cue is presented and no target follows and were not included in the experimental analyses. 288 (75%) of the experimental trials were valid and 96 (25%) were invalid. This uneven ratio of valid and invalid trials is critical in cueing tasks with longer stimulus presentation durations to ensure that participants continue to orient towards the cued location (Posner et al., 1987). Experimental and catch trials were divided into four blocks consisting of 114 trials (96 experimental, 18 catch). The four blocks were presented in a fixed order; however, the order of trials within each block varied randomly for each participant. There was an optional rest period between each block that ended when the participant pressed a button on the response pad. Each word was presented a total of eight times in the experimental trials: Six times on the valid trials (3 on the left, 3 on the right); twice in invalid trials (1 on the left, 1 on the right). Target types appeared equally often with each word category and in each target location.

Procedure

As stated previously, staff from Older People's Community Mental Heath Teams initially invited participants in the depressed group to take part in the study (see Appendix B.8).

Control participants were accessed through advertisements that invited them to contact the researcher. The researcher discussed the purpose of the study and what it would involve with interested participants via a telephone screen. In addition, basic inclusion criteria including the participant's age, first language, eyesight and current medical conditions affecting upper limb movements were obtained via the telephone screen. Qualified participants were then sent a copy of the participant information sheet (Appendix B.9) and were invited to attend, individually, to complete the experimental procedure. The experimental appointment was conducted in clinical rooms at three NHS resource centres. To prevent the differential setting confounding the results efforts were made to standardise test rooms with regards to sound and illumination levels.

On the day of testing participants were given the opportunity to discuss any questions relating to the study with the researcher and were required to give written informed consent (Appendix B.10). Demographic data were then collected (gender, marital status, ethnicity, number of years in education and details of regularly taken medication) after which the study measures were administered in the following fixed order: GDS, BAI, MINI, MMSE and WTAR. On completion of the measures participants were seated approximately 50cm from the computer screen to perform the emotional spatial cueing task. Standardised instructions were presented on the computer and were repeated by the experimenter. These guided the participant to maintain their focus on the central cross and to identify as fast as possible the orientation of two dots without sacrificing accuracy. It was emphasized that word cues would precede the target dots and that words would predict the target dots location on most, but not all, of the trials. Participants were also requested to place the fingers used to respond near the

appropriate buttons to minimise the confounding influence of gross motor movements. Participants completed 16 practice trials followed by the 4 blocks of test trials with the experimenter present in the room. The entire task took approximately 30 minutes. Following the emotional spatial cueing task participants were fully debriefed.

Design

Overall, the study involved a mixed factorial design with Group (2; Depressed, Control) as the between-group factor and word valence (3; positive, negative, neutral) and cue validity (2; valid, invalid) as within-group factors. Reaction time of a categorisation response to target stimuli acted as the dependent variable.

Data Analysis

Data were analysed using SPSS 15.0 for windows. Continuous data were inspected visually to examine statistical distributions and to check for assumptions of normality. Kolmogorov-Smirnov tests were also carried out to formally assess normality.

Results

Demographic and clinical characteristics of each group of participants are summarised in Table 2. Fisher's Exact tests indicated that the groups did not differ in the ratio of males: females ($p = 0.547$), marital status ($p = 0.35$) and ethnicity, as all participants were White British. As shown in Table 1, control participants had slightly higher pre-morbid IQ scores as

compared to depressed participants. An Independent-samples t-test however, indicated that groups did not differ significantly in pre-morbid verbal ability ($t(36) = -0.66$, $p = 0.51$).

Due to the non-parametric nature of the data, Mann-Whitney U analyses were used to compare groups in terms of age and BAI, GDS and MMSE scores. These analyses indicated that the groups did not differ significantly in terms of age ($U = 121.50$, $z = -1.62$, $p = 0.11$) or MMSE score ($U = 143.50$, $z = -0.99$, $p = 0.32$). However, as shown in Table 1 significant differences were found between groups on the BAI and the GDS measures. The depressed participants, as expected, scored significantly higher than controls on measures of current depression (GDS: $U = 0.00$, $z = -5.26$, $p = < 0.001$). The depressed participants' anxiety levels were also significantly higher than control participants' anxiety levels (BAI: $U = 3.50$, $z = -5.12$, $p = < 0.001$).

(Insert Table 2 about here)

The depressed sample compromised of one (6.2%) in-patient and 15 (93.8%) out-patients. Nine depressed participants (56.2%) were experiencing at least one co-morbid anxiety disorder. Of these, eight participants had co-morbid panic disorder (50.0%), three had co-morbid agoraphobia (18.8%) and six were experiencing co-morbid generalised anxiety disorder (37.5%). Nine depressed participants (56.2%) reported experiencing no previous episode of depression. At the time of experimental testing only three depressed participants (18.8%) were medication free, the remaining 13 (81.2%) were receiving anti-depressant medication.

Preparation of Reaction Time Data

Consistent with other studies in the field all practice trials and trials with errors were removed. Across groups few errors were made (M = 2.22%, SD = 1.62%). An independent-samples t-test was conducted to compare erroneous responding between the groups. This revealed a significant difference in the proportion of errors made between the depressed group, M = 3.22%, SD = 1.64 % and the control group, M = 1.50%, SD = 1.18%; t (36) = 3.79, p = .001.

In order to determine the appropriate cut-off value for outliers, the curve of the entire RT data distribution was plotted on a histogram. Following visual inspection, RTs which were less than 300-ms were considered anticipation errors and were excluded. Similarly, the histogram was observed to flatten out at 2500-ms and as a result RTs more than 2500-ms were excluded as these were considered to be likely to reflect lapses in concentration. In addition, RTs 2.5 SDs above each participant's mean were excluded given that variability in RT data was large (Ratcliff, 1993). Given the non-parametric nature of the data a Mann-Whitney U test was conducted to compare outlier responses between the groups. This revealed no significant differences in the proportion of excluded outliers between the depressed group, Md = 3.25%, n = 16 and the control group, Md = 2.78%, n = 22; U =140.00, z = -1.06, p = .29. Overall, analyses were performed on 94.4% of the original data. This is comparable to previous research employing the emotional spatial cueing task with depressed individuals (c.f. Leyman et al., 2007).

Main Analyses

A summary of mean RTs and standard deviations for each group is provided in Table 3. RT data were subject to a 3 (Word Valence: positive, negative, neutral) x 2 (Cue validity: valid, invalid) x 2 (Group: Depressed, Controls) mixed ANOVA. However, in contrast to hypothesis one, the main effect of cue validity was not significant, $F(1, 36) = 0.00$, $p = 0.997$; $\eta_p^2 = 0.00$. Collapsed across groups mean reaction times were 817.9-ms (SD = 223.0) for valid trials and 818.0-ms (SD = 221.6) for invalid trials, indicating comparable overall response latencies for targets on both trial types.

(Insert Table 3 about here)

From the three-way ANOVA, detailed above, the only the main effect to reach significance was for group ($F(1, 36) = 8.043$, $p = 0.007$; $\eta_p^2 = 0.183$). As shown in Table 3, depressed participants' overall responses were significantly slower (M = 912.5, SD = 256.7) than control participants' overall responses (M = 723.4, SD =153.5). Hypotheses two and three were not supported; the Group x Cue Validity x Word Valence interaction was not significant, $F(2, 35) = 0.107$, $p = 0.899$; $\eta_p^2 = 0.006$. As shown in Table 3, reaction times to targets on positive, neutral and negative invalid trials were comparable for both depressed and control participants. In addition, all lower order interactions failed to reach significance (all $p > 0.1$). Although the non-significant three-way interaction is in line with hypothesis 4, the lack of the predicted cue validity effect implies that the data are not reliable. Therefore, hypothesis four was not supported.

To examine the influence of excluding short and long reaction times on the present findings, the original data, including outlier responses, were re-analysed using a 3 (Word Valence: positive, negative, neutral) x 2 (Cue validity: valid, invalid) x 2 (Group: Depressed, Controls) mixed ANOVA. The inclusion of this data did not change the findings; the main effect of cue validity remained non-significant, $F (1, 36) = 2.59$, $p = 0.614$; $\eta_p^2 = 0.007$, the main effect of group continued to reach significance, $F (1, 36) = 10.25$, $p = 0.03$; $\eta_p^2 = 0.222$ and the Group x Cue Validity x Word Valence interaction remained non-significant, $F (2, 35) = 0.394$, $p = 0.677$; $\eta_p^2 = 0.022$. A summary of mean RTs and standard deviations for the original data is provided in Appendix B.11.

Of note however, closer inspection of individual data indicated that half of participants in the control group (n=11) and half of participants in the depressed group (n=8) evidenced the cue validity effect with faster responding on valid as compared to invalid trials. The other half of participants in each group showed the opposite pattern; faster responding on invalid as compared to valid trials. The small number of participants in the depressed and control groups who did and who did not show the cue validity effect prevented formal comparisons of the demographic and clinical characteristics of these sub-groups. However, inspection of descriptive statistics suggested no clear distinguishing characteristics between the groups. Demographic and clinical characteristics of each sub-group of participants are summarised in Appendix B.12.

Discussion

An impaired ability to disengage visual-spatial attention from negative material has recently been implicated in the maintenance of depression (Bradley et al., 1997; Koster et al., 2005). While a number of studies attest the delayed hypothesis in depressed younger adults, no study has investigated the processes underlying attention biases in depressed older people. Therefore, the current study employed an emotional spatial cueing task to address the question of whether attention biases, recently recorded in LLD, are driven by difficulties disengaging attention from negative material.

In contrast to the study's preliminary hypothesis no significant differences were found between participants' detection of targets on valid as compared to invalid trials. Inspection of mean reaction times did not reveal a trend towards this prediction and instead revealed comparable response latencies for both trial types. The absence of a cue validity effect in the present study is somewhat surprising; in theory when cues are informative, attention should exogenously (automatically) shift to the cued location and with longer stimulus presentation durations, attention should then be endogenously (voluntarily) maintained at that location, given that participants are aware that the target will appear with a high probability at this location (Bartolomeo, 2007). It is also inconsistent with previous studies demonstrating a relatively robust cue validity effect with the emotional spatial cueing task in younger adults (c.f. Fox et al., 2001; Amir et al., 2003; Ellenbogen & Schwartzman, 2008).

An age-related account is unlikely to explain this null result; current consensus from experiments using the traditional spatial-cueing paradigm is that no significant differences exist between younger and older adults in the exogenous or endogenous control of attention (c.f. Parasuraman et al. 1992; Tales et al., 2002). Nevertheless, it should be noted that a degree of controversy does exist with some researchers (e.g. Greenwood et al., 1993; Hartley et al., 1990) reporting significant age-related changes for endogenously cued shifts of attention in participants over 85. However, given that only one participant in the current study was within this oldest-old age group, potential differences in attention function in the over 85s are not likely to explain the current results. What then may account for the discrepant findings?

This unexpected finding may be explained by certain limitations of the study. Specifically, the sample size was substantially lower than that required to allow sufficient power for the hypothesised cue validity effects to be detected. Although this explanation is impossible to refute, the large p-value and the extremely low effect size obtained from the two-way interaction implies that a very large sample would have been needed for significance to be found. Indeed, given these values it was considered inappropriate to perform post-hoc power calculations for this data. It is not clear therefore that a lack of statistical power is responsible for the current findings.

Another explanation may relate to comments made by a number of participants during debriefing where they reported having “ignored” the word cues. It is possible to speculate that, at least for these participants, that the initial exogenous shift towards the stimuli would not be replaced by later endogenous orienting processes. This, in turn, may result in attention no

longer being maintained at the cued location which would then give rise to conditions necessary for IOR. Indeed, this may explain the interesting observation that half of all participants within each group demonstrated the cue validity effect, while half evidenced the IOR phenomenon. Although it is appreciated that this finding was merely an observation and not a significant effect, it is notable that the only other study (Henry, Unpublished manuscript) employing the emotional spatial cueing task with older people also failed to demonstrate a predicted cue validity effect. Moreover, this was thought to be a result of an equal proportion of participants demonstrating facilitation *and* inhibition effects, thereby negating the predicted cue validity effect (Henry, Unpublished manuscript) as seen here.

However, using the traditional spatial cueing task, Bartolomeo and colleagues (2007) demonstrated that significant facilitation effects for valid trials emerge even when participants are unable to subsequently describe the cue–target relationship. Therefore, when cues are highly informative, as was the case here, even if participants verbalise a failure to recognise the predictive cue-target relationship, they are unlikely to be able to ignore this information and may employ an 'unconscious' response strategy based on cue predictiveness. Taken together it is unclear therefore, whether a response strategy and/or IOR account is entirely appropriate.

A further potential explanation relates to the visual angle of presentation of cues. To ensure that participants were able to read word cues, whilst also maintaining fixation with the central cross, the presentation angle was narrowed from that employed in traditional spatial cueing tasks (1.7° vs. 7°). As noted by Broomfield and Turpin (2005) this variation from the original

design could feasibly eradicate the cost of shifting attention from the cue to the target on invalid trials. Indeed, in line with this account, Stormack and colleagues (1995) failed to find a cue validity effect for trials with neutral word cues when the visual angle separating the two locations was reduced to 1.6°.

A final explanation may relate to the absence of an inter-stimulus interval (ISI) between trials. When two stimuli are presented close together, the response time to the second stimulus is lengthened as the interval between the stimuli becomes shorter. This is referred to as the psychological refractory period (PRP; Welford, 1952). The PRP could explain the lack of the predicted cue validity effect given that the phenomenon may independently influence reaction times on both valid and invalid trials, thereby confounding any influence of cue validity. Indeed, previous studies demonstrating a reliable cue validity effect have employed relatively long ISIs (>1500-ms; Ellenbogen & Schwartzman, 2008; Amir et al., 2003), adding credence to this suggestion.

In addition to the non-significant cue validity effect, the current study failed to replicate findings from previous studies employing the emotional spatial cueing task in depressed younger adults. In contrast to their younger counterparts clinically depressed older people, as compared to older adult controls, did not demonstrate difficulties disengaging attention from negative material, relative to neutral and positive material. Again, the low sample size may explain this finding. However, given that present investigation was carefully conducted; the depressed sample was recruited from a clinical treatment seeking population, rigorous diagnostic assessment procedures were employed to define groups and groups were matched

on important demographic variables, and in light of the p-value and effect size obtained from the three-way interaction, it is not clear that a lack of statistical power is responsible for the current findings.

The absence of the predicted attention bias effect in LLD could however, be explained within the context of age-related changes in the processing of emotional information. Although findings are mixed (c.f. Murphy & Isaacowitz, 2008), a number of studies have reported a "positively effect" with maturation whereby older adults, as compared to younger adults, show an attention bias *away* from negative stimuli. This has been demonstrated using a number of paradigms including the Dot-Probe task, eye-tracking studies and visual search tasks (e.g. Mather et al., 2003, Hahn et al., 2006, Rosler et al., 2005, Isaacowitz et al., 2006). Moreover, it has been suggested that an enhanced ability to disengage attention from negative information may drive this bias (Rosler et al., 2005). Using eye-tracking methodology, Rosler and colleagues (2005) reported that although age did not influence the direction of initial shift in eye gaze, older people demonstrated shorter dwell times on negative images, as compared to their younger counter parts. Therefore, if older adults, in general, exhibit an *enhanced* ability to disengage their attention from negative information it follows that this age-related bias could result in the attenuation of depressive-related bias in LLD.

Alternatively, it is possible to speculate that the stimulus materials used in the current investigation were not sufficiently tailored to the concerns of older depressed adults. Despite word stimuli being assessed for their relevance to negative and positive emotions amongst healthy older adults, they were not rated by the older depressed participants themselves. In

addition, words were selected from Donaldson and colleagues (2007) who generated their stimulus list by asking clinicians to rate words for their relevance to depression and not specifically with regards to their relevance to depression in late life. Moreover, within the attention bias literature it has been argued that word stimuli, in general, may not be sufficiently salient to detect processing biases (e.g. Gotlib et al., 2004).

Another explanation relates to the possible confounding influence of anti-depressant medication; only three depressed participants were not in receipt of anti-depressant medication at the time of experimental testing. Recent investigations have demonstrated reduced attentional bias to negative words following SSRI supplementation in healthy volunteers (e.g. Murphey et al., 2006), suggesting that attention biases should be examined in medication free participants.

In line with studies investigating attention biases in depressed younger adults (c.f. Caseras et al., 2007, Eizenman et al., 2003), findings from the current study suggest that depressed older people do not selectively engage negative words. Taken together however, the absence of mood-congruent engagement and disengagement effects may suggest that attention bias does not play a central role in the development and maintenance of depression in later life. Against this view point are the findings from recent studies using the Emotional Stroop paradigm (Broomfield et al., 2007; Dudley et al., 2002). However, as mentioned previously it has been debated whether the Emotional Stroop task is a reliable measure of selective attention (e.g. MacLeod et al., 1986) and positive findings in these studies may reflect non-attention processes.

However, it is of course possible that the failure to demonstrate the cue validity effect explains the absence of the predicted depression-related differences in attention disengagement and the predicted absence of depression-related differences in attention engagement. As mentioned previously, methodological limitations may account for the non-significant cue validity effect, however, it also may be the case that the emotional spatial cueing paradigm does not provide a valid or sensitive measure of attention processes in an older adult population. In any case given that the cue validity effect was not demonstrated attention bias data derived from the present study should be treated with caution.

A final notable finding that emerged from the current study was the significantly slower reaction times within the depressed group in comparison to controls. Given that the error rates also differed significantly between the two groups, with the depressed participants making more errors than control participants, it is unlikely that a speed-accuracy trade off accounts for this finding. Alternatively, impairments in cognitive processing or general motor slowing, which are common symptoms of depression, (Caligiruri, 2000; Hammar, 2003) may explain this overall slowing effect. Indeed, a number of studies employing computerised attention bias tasks have revealed slower overall response latencies within depressed participants relative to controls, despite comparable error rates between groups (e.g. Leyman et al., 2007).

In summary, the emotional spatial cueing task was employed to investigate the delayed disengagement hypothesis in a carefully selected sample of older people diagnosed with MDD. Results suggest that, in contrast to younger depressed adults, the ability to disengage attention from negative words is not impaired in depressed older people. However, given that

this is the first study to employ the emotional spatial cueing task with older people and in light of its methodological shortcomings, replication is needed before strong conclusions can be drawn.

A number of avenues for future research are suggested by the current study. Of particular interest was the failure to demonstrate a significant cue validity effect. Further empirical evaluation of the emotional spatial cueing task within an older adult population is therefore warranted. Prospective studies may wish to consider employing post-task measures to probe strategies employed by participants in addition to broadening the angle of stimulus cue presentation and incorporating an ISI between trials. Given the possibility of age-related changes in emotional processing and the possible attenuation of attention bias effect in LLD, it may be beneficial for future studies to attempt to enhance the sensitivity of the emotional spatial cueing task through the use of pictorial stimuli. A number of researchers have highlighted the poor ecological validity of word stimuli (e.g. Gotlib et al., 2004) and have recommended the use of naturalistic, pictorial stimuli to maximise the salience of stimuli and increase the likelihood of detecting processing biases.

In addition, while the primary focus of this study was on the broader group of older people (e.g. 65 and older) the majority of participants in the sample were between 65 and 75 years. The old-old and, in particular, the oldest-old were underrepresented thus limiting the generalisability of the results. Given that depressive symptoms are reported to be more frequent among community dwelling oldest-old adults (Blazer, 2000), coupled with the potential differences in attention control amongst the oldest-old, it may be beneficial for future

studies investigating attention biases in LLD to recruit representative samples from each age category and to examine the influence of age on findings.

Alternatively, given that the slower reaction times and increased reaction time variability may have clouded the effects of emotionally salient stimuli on attention, future studies may wish to consider alternatives to reaction time paradigms. In particular, the modified emotional spatial cueing task (Van Damme, 2008), in which perceptual accuracy for emotionally valenced relative to neutral cues acts as the dependent variable and eye-tracking paradigms may be more advantageous in detecting attention biases in older depressed populations.

Finally, as this is the first study to investigate the components of attention underlying attention biases in depressed older people, and in light of the methodological shortcomings of the study, it would be premature to suggest any clinical implications arising from the results. However, if future studies do report similar findings insights of high clinical importance may be gained. Recently, Cognitive Bias Modification (CBM) techniques, aiming to retrain cognitive biases using information-processing tasks, have been developed and shown to be effective in directly manipulating cognitive biases and in reducing clinical pathology (e.g. Schmidt et al., 2009; Joorman et al., 2009). If the findings presented here are replicated it may be that other IPBs, such as memory or interpretation biases, are more central to the aetiology and maintenance of LLD and therefore more suitable targets for CBM techniques. However, clearly this requires to be determined by further investigation.

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Word Valence	Word Length (M)	Frequency (M)	Emotionality (Md)
Negative	7.5 (2.3)	46.6 (10.1)	6.1 (4 .0 – 7.6)
Positive	7.5 (2.3)	47.9 (7.4)	5.5 (4.0 – 6.5)
Neutral	7.5 (2.3)	46.2 (8.0)	1.2 (0.9 – 1.9)

Table 1. Characteristics of word stimuli used in emotional spatial cueing task.
Notes: M = Mean, standard deviation shown in parenthesis; Md = Median, range shown in parenthesis.

	Group	
	Depressed	**Controls**
Age (Md)	72.0 (66-88)	68.5 (65-84)
Age category (n)		
Young-old (65-75)	11 (68.75)	17 (77.27)
Old-old (75-85)	4 (25.00)	5 (22.73)
Oldest-old (85+)	1 (6.25)	0 (0.00)
Gender (n)		
Male	3 (18.75)	5 (22.7)
Female	13 (81.25)	17 (77.3)
Ethnicity (n)		
White British	16 (100)	16 (100)
Marital status (n)		
Single	2 (12.5)	0 (0.0)
Married	5 (31.25)	10 (45.5)
Separated	0 (0.0)	1 (4.5)
Widowed	8 (50.0)	8 (36.4)
Divorced	1 (6.25)	3 (13.6)
WTAR (M)	99.4 (17.7)	103.2 (13.4)
MMSE (Md)	28.5 (25-30)	29 (25-30)
BAI (Md)*	14.5 (5-59)	2.0 (0-6)
GSD (Md)*	9.5 (6-14)	1.0 (0-3)

Table 2. Demographic variables for depressed and control participants:
Notes: M = Mean, standard deviation shown in parenthesis; Md = Median, range shown in parenthesis; n = number, proportion of group shown in parenthesis
*Medians are significantly different at $p < 0.001$ based on Mann-Whitney U tests

		Group			
		Depressed		**Controls**	
		M	SD	M	SD
Overall Response		912.5	256.7	723.4	153.5
Cue valence	Validity				
Negative	Valid	923.1	261.2	725.4	157.9
	Invalid	917.1	268.1	721.2	146.5
Positive	Valid	913.0	257.8	722.6	155.8
	Invalid	916.0	255.8	724.7	161.9
Neutral	Valid	906.6	252.9	716.9	154.2
	Invalid	899.4	262.2	729.3	156.5

Table 3. Mean RTs and standard deviations (in ms) for each group.

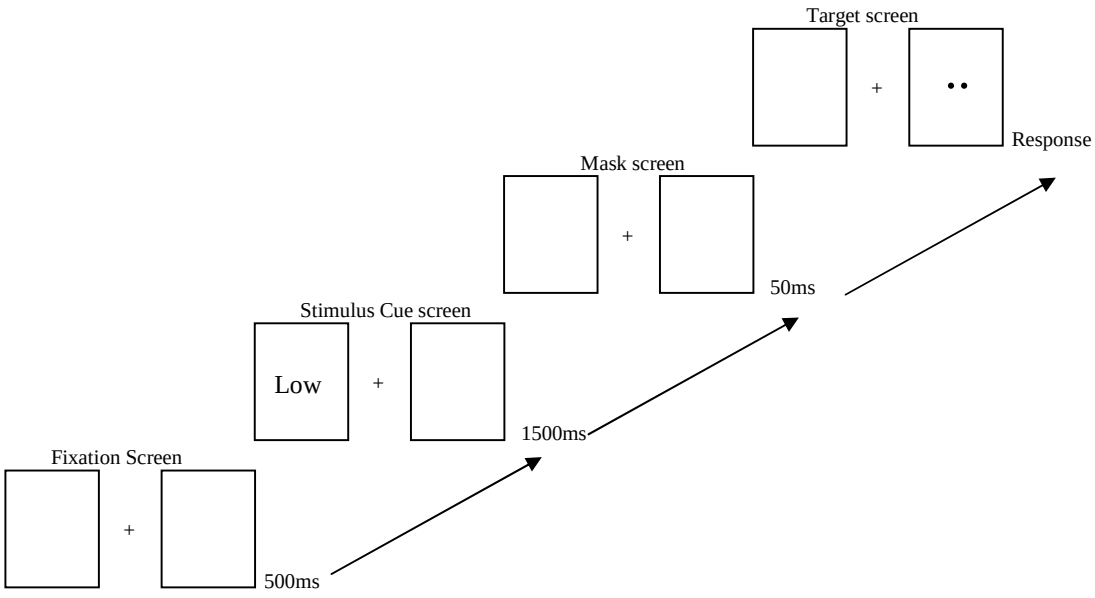

Figure 1. Presentation sequences of a typical invalid trial in the emotional spatial cueing task.

CHAPTER THREE
ADVANCED CLINICAL PRACTICE I REFLECTIVE CRITICAL ACCOUNT

Multi-disciplinary Team Working: Experiences, reflections and professional development

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Submitted in partial fulfilment of the requirements for the degree of Doctorate in Clinical Psychology (D.Clin.Psy)

Abstract

Clinical Psychologists are increasingly required to work in Multi-disciplinary teams (MDTs). Gibbs's (1988) model of structured reflection is employed to look in depth at two contrasting experiences observing Clinical Psychologists in MDT meetings. These specific learning experiences were chosen as they evoked a great deal of emotion and stimulated my thoughts with regard to the role of the Clinical Psychologist within a team setting. They were also selected because they prompted a change in my perception of, and approach to, MDT working and because they served as a platform to consider my broader professional development. Overall, my experiences led me to conclude that while an appropriate knowledge base is necessary to enhance the value of input offered by Clinical Psychology, an *understanding* of the team and the team dynamics is of equal, if not more, importance. My experiences also led me to realise that training equips us with key competencies needed to work effectively within teams which, in turn, resulted in me feeling more confident about working within a MDT setting.

CHAPTER FOUR:
ADVANCED CLINICAL PRACTICE II REFLECTIVE CRITICAL ACCOUNT

Reflections on the role of trainer

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Submitted in partial fulfilment of the requirements for the degree of Doctorate in Clinical Psychology (D.Clin.Psy)

Abstract

The government's commitment to improving access to psychological therapies, coupled with our small professional mass, means that we will be increasingly required to take on training roles. This account focuses on an experience of delivering a training workshop to a multi-disciplinary team (MDT). I make use of the model of reflective practice offered by Boud and colleagues (1985) to structure my account and to guide my reflections. This learning environment was chosen as it evoked a number of mixed emotions and brought to the fore my personal anxieties in relation to this role. Overall, my experiences and reflections have helped me to consider how my confidence and skills in imparting psychological knowledge have developed over training. In addition, this experience highlights changes in my thoughts with regards to new ways of working for Clinical Psychologists.

Appendix A.1: Guidelines for contributors to Behaviour Research and Therapy

BEHAVIOUR RESEARCH AND THERAPY

Information for Contributors

Submission of Papers

Authors are requested to submit their original manuscript and figures with four copies. Manuscripts should be sent to Professor G. T. Wilson, Psychological Clinic at Gordon Road, Rutgers, The State University of New Jersey, 41C Gordon Road, Piscataway, New Jersey 08854-8067, USA. E-mail: brat@rci.rutgers.edu.

Submission of a paper implies that it has not been published previously, that it is not under consideration for publication elsewhere, and that if accepted it will not be published elsewhere in the same form, in English or in any other language, without the written consent of the publisher.

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General: Manuscripts must be typewritten, double-spaced with wide margins on one side of white paper. Good quality printouts with a font size of 12 or 10 pt are required. The corresponding author should be identified (include a Fax number and E-mail address). Full postal addresses must be given for all co-authors. Authors should consult a recent issue of the journal for style if possible. An electronic copy of the paper should accompany the final version. The Editors reserve the right to adjust style to certain standards of uniformity. Authors should retain a copy of their manuscript since we cannot accept responsibility for damage or loss of papers. Original manuscripts are discarded one month after publication unless the Publisher is asked to return original material after use.

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[continued opposite

Appendix A.1: Guidelines for contributors to Behaviour Research and Therapy (continued)

Information for Contributors—continued

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Appendix A.2: Quality assessment checklist

Study Identification			
Title			
Author			
Year of publication			
Journal Title			
Assessor			
SELECTION OF PARTICIPANTS			
1	Selection of cases	Random/consecutive referrals Convenience/Self-selecting Unclear	2 1 0
2	Selection of controls	Random/consecutive referrals Convenience/Self-selecting Unclear	2 1 0
3	Source of cases and controls comparable	Yes Partially No	2 1 0
4	Demographic matching of cases and controls	Matched for 2 of sex, age, education Matched for 1 of above Not matched/unclear	2 1 0
5	Visual impairment excluded	Excluded in all groups Excluded in depressed group only Excluded in control group only Not excluded /not stated	2 1 1 0
6	Prior history of depression excluded in controls	Yes No/not stated	2 0
ASSESSMENT			
7	Main assessment/screening tool to determine caseness reliable and valid **Subjective opinion = considered to be an appropriate measure of depression/depressive symptoms*	Yes - Reference to published information or subjectively considered reliable and valid measure * No/Unclear	2 0
8	Assessment of co-morbidity (cases)	Yes - with reliable and valid measure (reference to published information or subjectively considered reliable and valid measure) No/Unclear	2 0

9	Assessment of co-morbidity (controls)	Yes - with reliable and valid measure (reference to published information or subjectively considered reliable and valid measure) No/Unclear	2 0
ATTENTION BIAS TASK			
10	Negative stimuli dysphoric related	Yes Mix of dysphoric and threat No/Unclear	2 1 0
11	Matching of all stimuli	Matched for at least two variables (Words; length and frequency: Pictures; size and luminance) Matched on one variable Unmatched/unclear	2 1 0
12	Matching of emotional stimuli (e.g. positive vs. threat vs. dysphoric)	Matched for arousal or emotionality/not necessary (only 1 category of emotional stimuli) Not matched/not stated	2 0
13	Presentation of stimuli	Randomized Counterbalanced Non-randomised/unclear	2 1 0
STATISTICAL ANALYSIS			
14	Power calculation	Performed and achieved Performed and not achieved Not performed/not stated	2 1 0
15	Analysis clearly associated with hypotheses	Yes No	2 0
16	Main potential confounding factors considered in the analysis	Yes all required/not necessary (groups well matched) Partially – only some required Unclear/No	2 1 0

TOTALS: Selection of participants	/12
TOTALS: Assessment	/6
TOTALS: Attention bias task	/8
TOTALS: Statistical Analysis	/6
Overall total	/32
%	
Quality Rating: Poor (<50%), Moderate (50-74%, High (>75%)	

Appendix A.3: Justification for quality criteria

Selection of cases and controls

Mass canvassing through poster advertising or screening samples results in a self-selecting population of participants who may not be truly representative of the wider depressed or non-depressed population. The selection of participants from consecutive admissions or referrals to a clinic was considered to generate the most representative samples in clinical studies. The selection of participants using random sampling methods was considered to generate the most representative samples in studies employing sub-clinical populations.

Source of cases and controls

Cases and controls should be selected from similar populations; control participants selected from undergraduate student populations, for example, are likely to be qualitatively different from cases who are clinic attendees.

Cases and controls well-matched

Cases and controls should be matched in terms of demographic variables to ensure that results have not been influenced by any significant differences between the groups. For example, there is evidence to suggest that differences exist between men and women in relation to cognitive biases (Giloba-schechtman et al., 2002).

Visual impairment excluded in all participants

The review focuses on tasks that assess biases in visual-spatial attention. It is therefore important to exclude participants with visual impairment to ensure that results are due to the effects of depression and not this confounding variable.

Prior history of depression excluded in controls

The presence a previous affective disorder amongst controls would present as a confounding variable when attempting to compare depressed and non-depressed populations. This is particularly important as there is evidence to suggest that formerly depressed individuals continue to selectively attend negative material (c.f. Joormann & Gotlib, 2007).

Main assessment/screening measure determining caseness considered reliable/valid

In order to increase homogeneity within the sample it is important to ensure that cases are true cases and that controls are disorder free. It is essential therefore, that the measures used to determine caseness are reliable and valid.

Assessment of co-morbidity in depressed/control groups

Other psychological disorders, for example, anxiety, are known to influence the processing of emotional material (e.g. Bar-Haim, 2007). To ensure that the observed effects are not due to these factors, studies should measure the presence of co-morbid disorders in each group of participants. As with the main assessment/screening measure, this should be carried out with reliable and valid instruments.

Power calculation carried out

A power calculation provides the required sample size to detect a significant difference in data if one exists. This increases the probability of rejecting the null hypothesis when it is false or accepting the alternative hypothesis when it is true (Cohen 1992).

Analysis clearly associated with hypotheses

It is important that any analysis is clearly associated with a study hypothesis and that findings are not hampered by unplanned analyses which increase the probability of making a type-II error (whereby the null hypothesis is incorrectly accepted).

Potential confounding factors considered in the analysis

Potentially confounding variables should be controlled for in the statistical analysis to be sure that the observed effects are not due to the presence of differences reported between the groups.

Negative material dysphoric related

Less consistent findings of attention biases in depression are found when threat-related negative material is employed (e.g. Donaldson et al., 2007)

Matching of all stimuli

Word frequency and length can influence attentional biases, as can the luminance and size of pictorial stimuli. Thus, emotional and neutral stimuli should be matched in terms of these

factors to ensure that findings have not been influenced by any significant differences between the stimuli.

Matching of emotional stimuli

The emotionality/arousal level of a stimulus can influence attentional biases. Emotional stimuli should therefore be matched in terms emotionality to ensure that results have not been influenced by any significant differences between emotionally valenced stimuli.

Presentation of stimuli

It is important that stimuli used in attention bias tasks are presented in a randomised fashion to ensure that order effects do not confound results.

Appendix B.1: Guidelines for contributors to Behaviour Research and Therapy

BEHAVIOUR RESEARCH AND THERAPY

Information for Contributors

Submission of Papers

Authors are requested to submit their original manuscript and figures with four copies. Manuscripts should be sent to Professor G. T. Wilson, Psychological Clinic at Gordon Road, Rutgers, The State University of New Jersey, 41C Gordon Road, Piscataway, New Jersey 08854-8067, USA. E-mail: brat@rci.rutgers.edu.

Submission of a paper implies that it has not been published previously, that it is not under consideration for publication elsewhere, and that if accepted it will not be published elsewhere in the same form, in English or in any other language, without the written consent of the publisher.

Manuscript Preparation

General: Manuscripts must be typewritten, double-spaced with wide margins on one side of white paper. Good quality printouts with a font size of 12 or 10 pt are required. The corresponding author should be identified (include a Fax number and E-mail address). Full postal addresses must be given for all co-authors. Authors should consult a recent issue of the journal for style if possible. An electronic copy of the paper should accompany the final version. The Editors reserve the right to adjust style to certain standards of uniformity. Authors should retain a copy of their manuscript since we cannot accept responsibility for damage or loss of papers. Original manuscripts are discarded one month after publication unless the Publisher is asked to return original material after use.

Abstracts: A summary, not exceeding 200 words, should be submitted on a separate sheet in duplicate. The summary will appear at the beginning of the article.

Keywords: Authors should include up to six keywords with their article. Keywords should be selected from the APA list of index descriptors, unless otherwise agreed with the Editor.

Text: Follow this order when typing manuscripts: Title, Authors, Affiliations, Abstract, Keywords, Main text, Acknowledgements, Appendix, References, Vitae, Figure Captions and then Tables. Do not import the Figures or Tables into your text. The corresponding author should be identified with an asterisk and footnote. All other footnotes (except for table footnotes) should be identified with superscript Arabic numbers.

References: All publications cited in the text should be present in a list of references following the text of the manuscript. In the text refer to the author's name (without initials) and year of publication, e.g. "Since Peterson (1993) has shown that . . ." or "This is in agreement with results obtained later (Kramer, 1994)". For 2–6 authors, all authors are to be listed at first citation, with "&" separating the last two authors. For more than six authors, use the first six authors followed by et al. In subsequent citations for three or more authors use author et al. in the text. The list of references should be arranged alphabetically by authors' names. The manuscript should be carefully checked to ensure that the spelling of authors names and dates are exactly the same in the text as in the reference list.

References should be prepared carefully using the *Publication Manual of the American Psychological Association* for style as follows:

Birbaumer, N., Gerber, D., Miltner, W., Lutzenberger, W., & Kluck, M. (1984). Start with biofeedback and continue with behavior therapy in migraine. *Proceedings of the 15th Annual Meeting of Biofeedback Society of America* (pp. 33–36) Albuquerque.

Gray, J.A. (1976). The behavioral inhibition system: a possible substratum for anxiety. In M. P. Feldman & A. Broadhurst. *Theoretical and experimental bases of the behaviour therapies* (pp. 3–41). London: Wiley.

Taber, I.I., McCormick, R.A., Russo, A.M., Adkins, B.J., & Ramirez, L.F. (1987). Follow-up of pathological gamblers after treatment. *American Journal of Psychiatry, 144*, 757–761.

Illustrations: All illustrations should be provided in camera-ready form, suitable for reproduction (which may include reduction) without retouching. Photographs, charts and diagrams are all to be referred to as "Figure(s)" and should be numbered consecutively in the order to which they are referred. They should accompany the manuscript, but should not be included within the text. All illustrations should be clearly marked on the back with the figure number and the author's name. All figures are to have a caption. Captions should be supplied on a separate sheet.

Line drawings: Good quality printouts on white paper produced in black ink are required. All lettering, graph lines and points on graphs should be sufficiently large and bold to permit reproduction when the diagram has been reduced to a size suitable for inclusion in the journal. Dye-line prints or photocopies are not suitable for reproduction. Do not use any type of shading on computer-generated illustrations.

[continued opposite

Appendix B.1: Guidelines for contributors to Behaviour Research and Therapy (continued)

Information for Contributors—continued

Photographs: Original photographs must be supplied as they are to be reproduced (e.g. black and white or colour). If necessary, a scale should be marked on the photograph. Please note that photocopies of photographs are not acceptable.

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Tables: Tables should be numbered consecutively and given a suitable caption and each table typed on a separate sheet. Footnotes to tables should be typed below the table and should be referred to by superscript lowercase letters. No vertical rules should be used. Tables should not duplicate results presented elsewhere in the manuscript (e.g. in graphs).

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Author enquiries

Authors can also keep a track on the progress of their accepted article, and set up email alerts informing them of changes to their manuscript's status, by using the "Track a Paper" feature of Elsevier's Author Gateway (http://authors.elsevier.com).

Appendix B.2: Original Major Research Project Proposal submitted to and passed by the Doctorate in Clinical Psychology training course

MAJOR RESEARCH PROJECT PROPOSAL

Attention bias to negative semantic stimuli in Late Life Depression: Enhanced engagement versus delayed disengagement

Name: Sarah McIlwraith

Academic Supervisor: Professor Tom McMillan

Field Supervisor: Dr Niall Broomfield

Submitted in partial fulfilment of the requirements for the degree of Doctorate in Clinical Psychology (D.Clin.Psy)

Abstract

Background: Despite a wealth of research examining information processing biases in depressed working age adults, a paucity of equivalent research exists with the older adult population. It has been suggested that a distinct pattern of attentional bias for negative information is present depressed working age individuals. Recent studies indicate that such biases are related to an impaired ability to disengage the visual attention system from negative information. Only two studies have investigated attentional biases in depressed older adults, both of which provide evidence for the existence of biased attention to negative stimuli. However, the specific components of attention driving the detected bias effects in this population are not known. **Aims:** The present study proposes to examine the mechanisms underlying attentional biases in late life depression. It is predicted that depressed older adults, like their younger counterparts, will show evidence of impaired disengagement from negative stimuli. **Methods:** Clinically depressed older adults and older adult controls will perform a modified spatial cueing task, where the location of a target will be correctly or incorrectly cued by a neutral, positive or negative word. *T*-test analyses will determine if the groups differ in response to incorrectly cued targets following a negative cue, relative to positive or neutral cues. **Applications:** This work shall advance understanding of the role of information processing biases in the maintenance of depression in late life and may provide further empirical support for the use of Cognitive Behavioural Therapy (CBT) with this population. In addition, a focus on the mechanisms underlying attention biases could support the development of more effective cognitive based treatments.

Introduction

Depression is the most common psychological disorder affecting older adults (Beekman et al., 1999) with approximately 10-15% of the over 60's experiencing clinically significant depressive symptoms (Blazer, 1989). In addition to being cited as a risk factor for the onset of dementia of the Alzheimer's type, Late Life Depression (LLD) is associated with functional impairments, an elevated risk of mortality, increased use of medical services, and exacerbations in the course of co-morbid physical illness (Beekman et al., 1997, Cronin-Stubbs et al., 2000, Gatz et al., 2005). Depressive symptoms and prognosis are often reported to differ between older and younger patients, with LLD being associated with higher rates of relapse, anxiety, sleep disturbances, somatic and psychotic symptoms, and lower rates of pervasive low mood (Gottfries, 1998, Fischer et al., 2003). Given the fact that more people are now living for longer (add ref), research into the factors that may underlie the development and maintenance of depressive disorders in the elderly is essential.

Over the past 20 years cognitive models of depression have dominated attempts to understand its psychopathology. A key feature of such models (e.g. Beck et al., 1979) is that depression is caused and maintained by biases across all aspects of information processing. Thus, the depressed individual and those at risk of developing depression will exhibit processing preferences to perceive, attend to and remember negative schema congruent information. Although research on cognitive processes in depression in working age adults is voluminous, there is a paucity of equivalent research within the older adult

population. As such, a brief synopsis of the general adult literature offers a theoretical context for the current investigation.

A wealth of studies provide evidence supporting the existence of memory and interpretation biases in depressed and dysphoric adults of working age. Depressed individuals are consistently reported to show enhanced recall of negative information (Williams et al., 1997) and to interpret ambiguous information in a negative way (Nunn et al., 1997). Initial evidence for attention bias is however, equivocal. Where some studies evidence a depression related attentional bias (e.g. Segal et al., 1995, Mogg et al., 1995) others have failed to find such effects (e.g. Mogg et al., 1993, Bradley et al., 1995, Mogg et al., 2000, see Mogg & Bradley, 2005 for a review). Methodological variability between studies, such as the employment of different attention tasks and differences in the type and duration of stimuli utilised, have been cited as potential explanations for the discrepant pattern of results (Mogg et al., 2000). For example, short stimulus presentations, similar to those used for anxiety disorder research, have often been employed yielding null findings (Bradley et al., 1995, MacLeod et al., 1986, Mogg et al., 1993). In addition, many initial studies employed threat related stimuli, as opposed to dysphoric material, again producing negative findings (Hill & Dutton, 1989, MacLeod et al., 1986, Mathews et al., 1996). Moreover, the use of different attention tasks may account for mixed findings across studies. The Stroop and Dot-Probe tasks have traditionally been employed in attention bias research and, when used within the same samples, attention bias indexes reveal a consistent lack of significant association (Gotlib et al., 2004, Asmundson et al., 2005, Johansson et al., 2004, Dalgleish et al., 2003). Thus, it has been argued that these tasks measure different phenomena (Brosschot et al., 1999).

Studies accounting for the aforementioned methodological considerations offer more consistent support for the existence of an attention bias in depressed adults of working age. A considerable number of investigations demonstrate both a bias in attentional processing with longer presentations (>1000-ms) of depression related stimuli (Bradley et al., 1997, Mogg et al., 1995, Donaldson et al., 2007) and an absence of early automatic attention bias at shorter stimulus durations (Bradely et al., 1997, Mogg et al., 1995, Mathews et al., 1996, Gotlib et al., 2004). Many authors suggest that this pattern of findings can be explained by the distinction between different components of attention processing. It has increasingly been recognised that visual selective attention operations consist of three interrelated components: shifting, engagement and disengagement (Posner & Peterson 1990). Accordingly, it is posited that depressed individuals do not initially shift their attention towards negative stimuli; rather they have difficulties disengaging their attention from it once it has been attended to (Bradley et al., 1997, Joorman, 2004).

Despite their considerable contribution to the current knowledge base, traditional attention bias paradigms are unsuited to directly examining the precise attentional processes driving the detected bias effects. In both the Dot-Probe and the Stroop tasks, neutral and emotional stimuli are presented within the same stimulus presentation. This makes it difficult to determine whether enhanced engagement or delayed disengagement processes account for longer naming on the Stroop, and longer latencies on the Dot-Probe for negative material (Fox et al., 2001). Additional concerns with the Dot-Probe include the relatively long presentation of stimuli and the fact that both locations are “task relevant”, which may result in both locations receiving attentional processing. This again precludes investigating

whether emotional stimuli attract attention, or whether once an emotional stimulus has been detected, attention tends to dwell on that location (Fox et al., 2001).

The emotionally modified spatial cueing task originally developed by Posner (1980), aids in the disentangling of selective attention components involved in attention biases (Fox et al., 2001). During this task participants are asked to detect a target that appears in one of two spatial locations. Roughly two thirds of trials are valid, during which an emotionally valenced cue highlights the location at which a target will appear. Approximately one third of trials are invalid, where the emotionally valenced cue highlights the spatial location opposite to where the target will emerge. Overall, participants are faster to respond on valid trials as the cue results in the covert orienting of attention to the cued location, such that subsequent stimuli presented at that location are processed more efficiently than stimuli at the non-attended location (Posner at al., 1987). This is commonly referred to as the *cue validity effect*. Slowing on invalid trials has been attributed to attentional disengagement, as participants have to disengage their attention from the cued location, shift attention and then engage with the contralateral location. Thus, on valid trials comparisons of reaction times to targets for neutral versus emotional stimuli can be used to assess any differences in attentional engagement due to stimulus valence. On the other hand, on invalid trials differences in reaction times due to stimulus valence can be taken to reflect differences in attentional disengagement.

A number of studies have applied this paradigm to investigate attention components underlying biases in depressed working age adults. One study has evidenced facilitated attentional engagement (Leyman et al., 2007), however there are a number of

methodological inadequacies associated with this investigation. For example, the use of threat stimuli may account for the unpredicted findings. However, two recent investigations, using both clinical and non-clinical populations have found that depression related attentional biases are due to difficulties disengaging from negative stimuli (Koster et al., 2005, Ellenbogen et al., in press). Koster and co-workers (2005) investigated dysphoric and non-dysphoric individuals' performance on the modified spatial cueing task. They used negative, positive and neutral words at both short and longer stimulus presentations. In line with the delayed disengagement hypothesis, dysphoric individuals showed an enhanced cue validity effect and impaired attentional disengagement for negative words at longer stimulus presentations. These effects were not reported at the shorter stimulus durations, again suggesting that later, but not early stages of attentive processing are affected in dysphoric mood. Ellenbogen and colleagues (in press) examined the mechanisms underlying attention biases in clinically depressed individuals using the spatial cueing task. The authors found evidence of difficulties with disengaging from pictures depicting themes of sadness and loss amongst the depressed group relative to controls. Evidence for delayed disengagement hypothesis has also been corroborated in recent studies employing complementary attentional bias paradigms. For example, eye tracking studies have reported that both depressed and dysphoric individuals tend to maintain gaze longer on negative pictures with no evidence of an initial shifting or orientating towards negative scenes (Caseras et al., 2007, Eizenman et al., 2003).

As previously mentioned, research on information processing biases in older adults significantly lags behind research carried out with younger adults. To date, only two investigations have addressed attentional biases in the elderly (Broomfield et al., 2007;

Dudley et al., 2002). Both studies employed the emotional Stroop paradigm and found evidence for the presence of an attentional bias to negatively valenced words in depressed older adults relative to elderly controls. However, given that it has been debated whether the Stroop task is a reliable measure of selective attention (e.g. MacLeod et al., 1986) and as it does not examine the precise attentional mechanism underlying detected biases, further investigations are warranted to confirm and extend these preliminary findings amongst older adults.

Biased attentive processing in the depressed elderly must also be considered within the context of the effects of ageing on attention bias. A body of research examining attentional biases in maturation indicates that older adults are better able to disengage from negative stimuli than their younger counterparts. This effect has been demonstrated using a number of paradigms including the Dot-Probe task, eye tracking studies and visual search tasks (e.g. Mather et al., 2003, Hahn et al., 2006, Rosler et al., 2005, Isaacowitz et al., 2006). Thus, on the whole, while depression in adulthood appears to be associated with an *impaired* ability to disengage from negative information, older adults, in general, seem to exhibit an *enhanced* ability to disengage their attention from negative information. If LLD does indeed involve an attention bias to negative stimuli, this pattern of results may suggest that either attention biases in depressed older adults are attenuated, or, on the other hand, that depression may override this age related bias. Fox and co-workers (2005) recently reported attentional bias to threat in anxiety-induced older adults on the Dot-Probe task and noted that this bias was at least as large as those found in younger adult samples. Thus suggesting, at least for anxiety, that attentional biases in disordered older adults approximate those found in younger adults.

In view of the current ambiguity about the possible role of attentional biases in LLD, the present investigation proposes to further investigate this area by examining the precise mechanisms of attention underlying detected bias effects. This work shall advance understanding of the role of information processing biases in the maintenance of depression in late life. Given uncertainty about the degree to which symptoms overlap between elderly and adult presentations of depression, it is important to investigate empirically the underlying nature of late life depressive symptomatology to provide empirical support for the use of Cognitive Behavioural Therapy (CBT) in the treatment of LLD. Furthermore, a focus on the mechanisms underlying attention bias in LLD could support the development of more effective cognitive based treatments.

Aims and Hypotheses

Aims & Research Question

The aim of the present investigation is to examine the components of attention underlying attentional biases in LLD by using a spatial cueing paradigm. The main research question is whether negative semantic information enhances attentional engagement and/or delays attentional disengagement in LLD. Based on research in adults of working age the following hypotheses were generated:

Hypotheses

1. On *invalid trials*, depressed older adults will be slower to respond to targets than non-depressed older adult controls, following a negative cue, relative to positive or

neutral cues. (Demonstrating difficulties disengaging attention from negative stimuli).

2. On *valid trials* there will be no difference between depressed older adults and controls in reaction times to targets following negative, positive or neutral cues. (Demonstrating no enhanced attentional engagement).
3. Reaction times following valid trials will be faster than those following invalid trials for both depressed older adults and controls (Demonstrating the cue validity effect).

Plan of Investigation

Participants

Two groups of volunteers will be used in the study: older adult participants diagnosed with depression (DEP) and non-depressed older adults controls (CON). Controls will be selected to match the depression group as closely as possible on age, gender, and vocabulary and education level.

Eligibility Criteria

Inclusion criteria for the depressed group will be participants meeting DSM-IV criteria for major depressive disorder (MDD) who are not currently receiving psychological intervention. Inclusion criteria for the control group will be an absence of persistent depressed mood or associated symptoms during the three months prior to the investigation and no previous history of emotional disorders. An absence of severe cognitive impairment is required for both the control and depressed group.

Additional eligibility criteria for both groups are that participants will be over 65 years of age, native English speakers and have normal or corrected-to-normal vision. In addition, the absence of a current diagnosis and/or history of; epilepsy, head injury (as defined by admission to hospital for >48 hours as a result of head injury), substance abuse/dependence and major medical conditions is required for participation. Such basic eligibility criteria will be screened via a telephone interview to complete a basic eligibility screening form which will ask participants to self report on such information.

A high proportion of those in the depressed group will also have co-morbid anxiety diagnoses, which is commonly reported in epidemiological studies (Gottfries, 1998, Fischer et al., 2003). Thus, it will not be practical or ecologically justifiable to exclude depressed older adults with concurrent anxiety. As anxiety is known to result in biased attentional processing, independent of mood (Broomfield & Turpin, 2005), a measure of anxiety will be included and statistical control exercised to assess its potential confounding influence.

Procedure for diagnostic ascertainment

It is envisaged that majority of those in the depressed group will have been diagnosed with unipolar major depressive disorder by an old age psychiatrist. Depressed participants will be selected for inclusion following a brief telephone screening interview to assess basic eligibility criteria. A face-to-face interview will then be conducted where depression status will be ascertained by the Mini International Neuropsychiatric Interview (MINI; Sheehan et al., 1998). Participants will also be required to exhibit a score of >5 on the Geriatric Depression Scale (GDS; Sheik and Yesavage, 1986). Controls will be selected following

an initial telephone screen which will establish basic eligibility criteria. A face-to-face clinical interview will then be conducted where the absence of current emotional disorders will be confirmed by the MINI and the completion of the GDS and Beck Anxiety Inventory (BAI; Beck et al., 1988). Controls will be required to score < 5 on the GDS and < 7 on the BAI. All participants will be required to score > 24 on the Mini Mental State Examination (MMSE; Folstein et al., 1975) to confirm absence of severe cognitive impairment.

Recruitment

Experimental group

It is envisaged that a meeting will be held with each of the 10 Elderly Community Mental Health Teams in Glasgow that are to be involved in the recruitment of depressed participants. The criterion for suitable depressed participants and the expected role of staff will be discussed fully. Staff will be asked to approach individuals identified as suitable and briefly outline the nature and purpose of the research, in addition to providing them with a detailed information sheet. Staff will ask participants to consider consenting to their contact details being passed on to the researcher. Individuals who are interested will be contacted by the researcher via the telephone to discuss the research in more depth and to obtain further details on basic eligibility criteria. Interested individuals, who are assessed to be potentially suitable, will be invited to meet the researcher to take part in the study.

Control group

Non-depressed control elders will be recruited via advertisements in local churches and community organisations. Interested parties will be asked to contact the researcher by telephone to conduct a brief telephone interview to discuss the study and to screen basic eligibility. Those who meet basic eligibility criteria, who are wishing to participate, will be sent a detailed information sheet and an appointment will be arranged for them to meet with the researcher.

Measures/Materials

Basic eligibility screening form: This form was constructed for the purpose of the study. It consists of a series of questions for potential participants to self- report on basic eligibility criteria and will be completed by the researcher (see Appendix 1).

Demographic details collected will include age, gender, ethnicity, marital status, number of years in education, and regularly taken medication. This latter factor is important as recent investigations have shown reduced attentional bias to negative words following SSRI supplementation in healthy volunteers (e.g. Murphey et al., 2006). Participants will also complete the following measures and tasks:

The Mini International Neuropsychiatric Interview (MINI; Sheehan et al., 1998). This is a structured diagnostic interview for DSM-IV and ICD-10 psychiatric disorders. It covers 17 axis I categories in a shortened format. It has good correlation with the Structure Clinical Interview for DSM diagnoses (SCID-P) and the kappa values for most psychiatric diagnoses with SCID-P have been found to be 0.70 or above (e.g. Sheenan et al., 1997).

Beck Anxiety Inventory (BAI; Beck et al., 1988). This is a well established 21 item questionnaire measuring the intensity of anxiety symptoms. Each item is scored on a 4 point scale and total scores range from 0-63. The inventory has well documented reliability and validity (e.g. Hewitt et al., 1993)

Geriatric Depression Scale (GDS-15; Shiek & Yesavage, 1986). This is a widely used 15 item scale recommended for screening mood in the elderly (Williams & Wallace, 1993). Each item is scored on a 2 point scale and total scores range from 0-15. A cut-off score of between 5 and 6 is indicative of depression. The GDS shows acceptable internal consistency, retest reliability and face validity (e.g. Van Marwijk et al., 1995; Knight et al., 2004).

Mini Mental State Examination (MMSE; Folstein et al., 1975). This is a widely used brief screening tool to measure cognitive function. It assesses a range of cognitive domains including orientation, memory, attention, language and calculation. It shows good test/retest reliability and internal consistency and has been well validated for use in research (Ihl et al., 1992).

Wechsler test of adult reading (WTAR; Wechsler, 2001). This provides a measure of premorbid verbal ability. This measure comprises 50 irregularly pronounced words of increasing difficulty, which participants are asked to read aloud. Reliability and validity have been well established.

Modified Spatial cueing Task

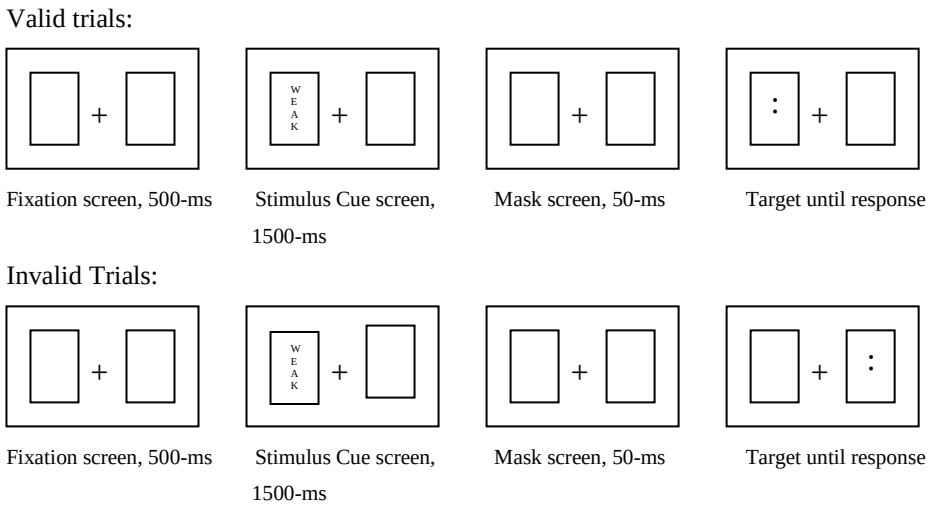
Each trial will begin with a fixation screen consisting of a black background and a central white cross flanked by two white frames. The frames will be matched for size and distance to the central cross. Cue stimuli and targets will be presented centrally in the frames. Stimuli will be drawn from Koster and colleagues (2005) and will consist of 15 positive, 15 negative and 15 neutral words matched for frequency of usage and word length (see Appendix 2). Negative stimuli will be adjectives related to failure and loss. It is envisaged the stimulus set will be piloted with older adults to confirm their valence with this population (see Appendix 3). Targets will be a vertical (:) or horizontal (..) colon.

The participant's task is to *categorise* the orientation of the target by pressing one response key if it is vertical and another response key if it is horizontal. Previous research has relied on localisation tasks where participants are asked to press either a left or right-hand sided button according to the location of a target. During such tasks however, the cue might directly activate a response (left or right) and therefore a motor preparation effect. In addition, since the information required for detecting the targets location exists equally in both potential locations, responses can be made by attending to one side of the screen and making a "presence/absence" response. Categorisation based tasks counter act these confounding influences by requiring the participant to process the target itself to obtain the information needed to make the appropriate response, in addition to ensuring that the locations of cues are not associated with correct responses (Fox et al., 2002).

The sequence of events for each trial is depicted in Figure 1. Initially the fixation screen will be presented for 500-ms after which the cue stimuli screen, where the stimulus cue is presented centrally in one of the frames, will appear for 1500-ms. The stimulus will then

be blanked out by a masking screen for 50-ms. Finally, one of the two targets will appear centrally in one of the frames until the participant responds or a period of time elapses. Once the participant has responded the next trial will start immediately. Thus, there will be a cue stimulus-target asynchrony of 1750-ms. It is envisaged that the task will be piloted with older adults to ensure that time intervals used with younger adults are acceptable for older adults to complete the task.

Figure 1: Example of stimulus presentations valid and invalid trials



Two thirds of the trials will be valid (where the target will appear in the same frame as the cue) and one third invalid (where the target will appear in the opposite frame as the cue). The total stimulus set will be 45 words each presented on 4 occasions. Thus, each participant will complete 210 experimental trials consisting of 60 negative, 60 positive and 60 neutral trials and 30 catch trials. Catch trials are employed to prevent participants developing an automated response set. They consist of trials where a cue is presented and no target follows. Digit trials, where the fixation cross is replaced with a digit that participants are asked to report, will be included to ensure maintenance of fixation to the

central cross. Trials will be balanced for hemisphere of stimulus cue and target presentations.

Design

A 2X3X2 mixed factorial design will be employed. Group (2; Dep, Con) will act as the between group variable and stimulus valence (3; positive, negative, neutral) and cue validity (2; valid, invalid) will act as within group variables. Reaction time of a categorisation response to one of 2 possible target stimuli will act as the dependent variable.

Procedure

Following the initial telephone screening, participants will be invited to meet with the researcher. Upon arrival all participants will be given another copy of the plain language information sheet and given the opportunity to discuss the study further with the investigator. Interested participants will then be required to give written consent. Phase 1 will then be carried out where demographic data will be collected and emotional symptoms will be screened via a brief clinical interview. The GDS, MMSE, WTAR and BAI will then be administered. Participants who meet eligibility criteria will be then asked to complete the phase 2, the computer task. Participants not meeting eligibility criteria will be thanked for their participation but not be asked to contribute further.

The computer task will last approximately 40 minutes. Participants will be seated at a distance of 60cm from the computer monitor and given standardised instructions, both verbally by the experimenter, and on the computer screen. These will instruct them to

maintain their focus on the central cross at all times and to identify as fast as possible the orientation of targets, by pressing a corresponding response key. They will also be informed that the cue stimulus will precede the target and that it will correctly predict the targets location on most but not all of the trials. Participants will complete 20 practice trials followed by the 210 experimental trials.

Justification of sample size

No previous investigations measure attention bias to negative material using the spatial cueing task in depressed older adults. Two previous studies have however, examined attentional bias in late life depression using the Stroop paradigm and found that depressed older adults were slower to colour name negative words relative to older adult controls. Broomfield and colleagues (2007) obtained an effect size of 0.85 Dudely and co-workers (2002) obtained an effect size of 0.91 between depressed older adults and controls on Stroop means and interference indexes respectively, for negative stimuli. In agreement with Cohen's (1988) effects size conventions for means (d) such figures correspond to large effects.

The spatial cueing task has been used to assess attentional biases in clinically and sub-clinically depressed working age adults. Koster and colleagues (2005) reported a significant difference in attentional disengagement away from negative words between dysphoric and non-dysphoric participants, where dysphoric individuals had more difficulty disengaging attention from negative words. An estimate of effect size of this attentional effect, partial eta squared (η_p^2) was calculated by the authors to be 0.11. Ellenbogen and colleagues (in press), using this paradigm, also reported that clinically depressed

participants showed difficulties disengaging from negative words, relative to controls. The authors provide an estimate of effect size of this attentional effect, η_p^2 to be 0.12. In line with Cohen's (1988) guidelines for effects size a η_p^2 of .01, .10 and .25 correspond to small, medium and large effects respectively. As such, a η_p^2 of 0.12 and 0.11 indicates medium effect sizes.

The current investigation's primary hypotheses relates to between group differences. Based on the effect sizes demonstrated in the above investigations, a suggested medium to large effect size of 0.6, related to effect size conventions appropriate for a *t*-test on means (d), would therefore seem reasonable for the proposed investigation. A series of power calculations were conducted using G * Power 3 software program (Faul et al., 2997). Such calculations revealed an estimated 36 participants per group will be required to detect significant differences at an alpha level of 0.05, with power of 0.8 (one tailed). Given that it is intended to use demographically well matched samples and strictly differentiated clinical and non-clinical groups, it is proposed that this sample size will be more than sufficient to detect differences if they exist.

Settings and Equipment

It is envisaged that participants will be tested in suitable clinical rooms in four elderly mental health teams across the city. Locations will be matched as closely as possible with regards sound and illumination levels. Each private room will have a desk upon which the computer will be located. The spatial cueing task will be implemented using a standard laptop computer. Software will be required to allow the investigator to programme and run

the spatial cueing task. The project will also require an external response box. Access to a telephone will be required for recruitment purposes.

Data Analysis

Data analysis will be conducted using SPSS. Data on all trials with errors will be omitted. Initial descriptive statistics and visual inspections of all data will be performed to examine statistical distributions and to check for assumptions of normality. Baseline demographic and clinical characteristics of each group will be presented. If differences appear to exist between groups these will be examined using independent *t*-tests or chi-squared analyses. Prior to data analysis for the spatial cueing task results appropriate methods, depending on the data set, will be used to deal with any reaction time outliers e.g. calculation means from medians or removing RT's >2 standard deviations above the mean (Ratcliff, 1993). It is envisaged that RT's will then be subject to a 3x2x2 mixed ANOVA. If the expected significant main or interaction effects emerge (main effect of cue validity and a significant group X cue validity X stimulus valence interaction) several indices will be calculated to simplify analyses, further explore any group differences and to control for overall group differences. RT data will be transformed into index scores using the following formulas:

1. Cue validity: RT invalid cue – RT valid cue
   (A positive value indicates the normal cue validity effect. To allow comparison of the cue validity effect between different stimuli valences these calculations will be made separately for each valence group)
2. Attentional engagement: RT valid/neutral cue – RT valid/ emotional cue

(A positive score indicates enhanced attentional engagement at the location of the emotional cue compared with neutral cues)

3. Attentional disengagement: RT invalid/emotional cue – RT invalid/neutral cue (A positive score indicates difficulties in attentional disengagement at the location of the emotional cue compared with neutral cues).

The cue validity effects for neutral, positive and negative words will be examined within groups and between groups for both the DEP and CON groups using paired and independent *t*-tests respectively. The attentional disengagement effects for negative and positive stimuli will be examined between the DEP and CON groups using independent-samples *t*-tests. In addition, the attentional engagement effects for both negative and positive stimuli will be examined between the DEP and CON groups using independent-samples *t*-tests. In terms of the confounding influence of anxiety it is assumed that the distributions of BAI scores between groups would be too disparate to employ an ANCOVA. As such, the depressed group will be split into high versus low BAI scores and paired samples *t*-test performed on the attentional disengagement and engagement effects for these groups with both negative and positive stimuli. The significance level will be set at $p < \text{or} = 0.05$ for all analyses.

Health and Safety Issues

Researcher Safety Issues

The study will adhere to the following procedures to ensure that there are no risks to the researcher in conducting this study. Firstly, telephone contacts details given to participants will be clinical or University research contacts to ensure that the potential participants do not have access to personal information about the researcher. Telephone contacts initiated by the researcher will be made from clinical or University research settings. The participant samples are not normally associated with dangerous or unpredictable behaviour, and it is unlikely that the procedure used in the study will be associated with the production of significant distress. The researcher will meet participants in a clinical setting in a secure building, and the researcher will ensure that this will be at a time when colleagues are present. The clinical settings have procedures in place to minimise the risk to staff and these are thought to be adequate in the context of the proposed study.

Participant Safety Issues

There are minimal risks associated with the administration of questionnaires. There does not appear to be any risks identified with the completion of the attention bias task. Interviews will be conducted by the researcher, who is an experienced interviewer able to deal effectively and sensitively with subject distress. Any potential control participants identified as experiencing psychological distress will be provided with relevant self-help information booklets, signposted to their GP and asked if they would like the researcher to facilitate this by writing to their GP. Individuals with scores on the mini-mental state

indicative of severe cognitive impairment will also be signposted to their GP and offered the opportunity of the researcher writing to the GP.

Ethical Issues

Participants will be fully informed of the experimental procedure, will be made aware of their rights during advertisement, screening and participation and will be offered the opportunity to be provided with a summary of the outcome of the research. Informed consent will be obtained. The information sheet will state that there are two phases to the study (Phase 1: Interviews and questionnaires; Phase 2: Computer task) and that some participants will only be required to contribute to phase 1 of the investigation. This is to ensure that participants are aware that they might not have to complete all phases of the study and thus do not feel frustrated if they are excluded. Following the experimental procedure they will be fully debriefed given the opportunity to ask questions. Individual data will not be reported as it will be analysed, thus it will be made clear that it will not be possible to report or feedback individual findings and that there would be no direct individual benefits to participation. Methods will be employed to ensure confidentiality during data input as participants will be assigned a number and subsequent information stored under this number. Consent forms and notes on interview sessions will be stored in the participant's clinical file as will clinical questionnaire data.

Financial Issues

Equipment & Costs

It is envisaged that questionnaire and administration costs will being covered by the Section of Psychological medicine. This department already possess the required equipment so no financial cost will be incurred in this area. Travel costs incurred by the researcher will be claimed from Greater Glasgow & Clyde Health Board. It is envisaged that Greater Glasgow & Clyde Research and Development Department will reimburse participant travel costs.

Timetable

Ethical approval submission:	August 2008
Recruitment and data collection:	September 2008 - April 2009
Analysis and write up:	May 2009 - July 2009

Practical Applications

The investigation will add to the knowledge about the relevance of attentional biases in LLD and whether cognitive theories about cognition and depression in younger adults apply to the older adult population. Evidence for the validity of the delayed disengagement hypothesis would also provide empirical support for the use of Cognitive Behavioural Therapy (CBT) in the treatment of LLD and could be of value in developing more effective and specific cognitive based treatments.

Ethical and Management Approval Submissions

Ethical approval will be sought from Greater Glasgow Local Research Ethics Committee and management approval from Greater Glasgow Research and Development Department.

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Appendix 1: Basic eligibility screening form

All participants

Age of potential participant_____

Is English their 1st language? YES NO

Do they have normal or corrected- to –normal vision? YES NO

Have they ever been admitted to hospital for >48 hours as a result of a head injury?

YES NO

If yes please specify _____

Have they ever experience problems with substance abuse/dependence?

YES NO

Control participants only

Have they experienced persistent depressed mood YES NO

or associated symptoms in the last three months?

Have they ever experienced any problems of a psychological nature? YES NO

Appendix 2: Word Stimuli

Negative words	Positive words	Neutral words
Worthless	Beloved	Crane
Loser	Skillful	Screen
Failure	Successful	Paper
Weak	Competent	Office
Inferior	Powerful	Petrol
Rejected	Strong	Paperclip
Lonely	Friendly	Pencil
Desperate	Sociable	Frame
Useless	Independent	Dictionary
Vulnerable	Enjoyable	Hallstand
Incompetent	Optimistic	Space bar
Unwanted	Well-liked	Wallpaper
Dependant	Winner	Light switch
Hopeless	Popular	Sunglasses
Lost	Kind	Toothbrush

Appendix 3: Pilot Questionnaire

Below is a list of words that you have to assign a rating. The rating that you have to assign is positive, negative or neutral. Try not to think about your responses too much, just put down the initial response that comes to you. Please mark your response by ticking the corresponding column.

For the last column please estimate how emotional would you rate each of these words: 1 being not emotional and 10 being very emotional

	Positive	**Neutral**	**Negative**	**Emotionality 1-10**
Worthless				
Skilful				
Successful				
Loser				
Crane				
Failure				
Competent				
Paper				
Office				
Screen				
Weak				
Powerful				
Petrol				
Inferior				
Beloved				
Paperclip				
Friendly				
Kind				
Rejected				
Pencil				
Frame				
Dictionary				
Sociable				
Independent				
Optimistic				
Enjoyable				
Lonely				
Hallstand				
Desperate				
Useless				
Vulnerable				
Space bar				
Wallpaper				

Light switch				
Incompetent				
Well-liked				
Winner				
Unwanted				
Sunglasses				
Dependent				
Popular				
Hopeless				
Toothbrush				
Lost				

Appendix B.3: Changes to protocol

In order to increase participant numbers, depressed older adults currently in receipt of psychological intervention were included. In addition, digit trials were removed from the emotional spatial cueing task following a pilot with older people which resulted in a large number of errors when digit trials were employed. Word stimuli were also changed as those from Koster and colleagues (2005) originally detailed in the protocol were English translations from Dutch and thus not matched for frequency in the English language.

Appendix B.4: Approval from Primary Care Ethics Committee

Primary Care Division

NHS Greater Glasgow and Clyde

Research Ethics
Primary Care, Community & Mental Health REC
R&D Directorate
1st Floor – The Tennent Institute
Western Infirmary
38 Church Street
Glasgow G11 6NT
www.nhsggc.org.uk

Miss Sarah McIlwraith
Trainee Clinical Psychologist
University of Glasgow
Dept Psychological Medicine,
Gartnavel Royal Hospital
1055 Great Western Road
Glasgow G12 0XH

Date 07 November 2008
Your Ref
Our Ref
Direct line 0141 211 2123
Fax 0141 211 2811
E-mail Liz.Jamieson@ggc.scot.nhs.uk

Dear Miss McIlwraith

Full title of study: **Do negative words draw or hold attention in Late Life Depression (LLD)? Version 1**

REC reference number: **08/S0701/119**

Thank you for your letter dated 22nd October in response to my letter of 7th October 2008.

I would advise that you have now met the conditions of the approval letter and that your approval is now valid. I have copied all the paperwork to R&D to keep them advised.

Good luck with your research.

08/S0701/119	Please quote this number on all correspondence

Yours sincerely

Liz Jamieson

[redacted]

Appendix B.5 – Approval from Primary Care Research & Development

Acute Services Division

Research & Development Directorate
NHS Greater Glasgow and Clyde
The Tennent Institute
WIG, 38 Church Street
Glasgow
G11 6NT

NHS Greater Glasgow and Clyde

Miss Sarah McIlwraith
Trainee Clinical Psychologist
Department of Psychological Medicine
Gartnavel Royal Hospital
1055 Great Western Road
G12 0XH

Date 7th January 2009
Your Ref PN08CP403
Our Ref BR/EC/approve

Direct Line 0141 211 8551
Fax 0141 211 2811
Email: emma.cuthbertson@ggc.scot.nhs.uk

Dear Miss McIlwraith

Reference Number: **PN08CP403**
Project Title: **Do negative words draw or hold attention in LLD?**

I am writing to confirm that Greater Glasgow and Clyde Health Board ***is willing to undertake to role of Sponsor and that you have management approval for the above research study.***

This approval covers: Woodlands Mental Health Resource Centre; Parkview Mental Health Resource Centre; Glenkirk Mental Health Resource Centre; Mansion House Unit; and Shawmill Mental Health Resource Centre.

Under the Scottish Executive's Research Governance Framework for Health and Community Care the Sponsor must ensure:

- The proposed work is consistent with the Research Governance Framework
- The research is appropriately managed and monitored
- Other stakeholder organisations are alerted of any significant developments that occur as the study progresses, whether in relation to safety of individuals or to scientific direction
- There is a clear statement provided concerning the arrangements for compensation in the event of non-negligent.

You are Chief Investigator and have agreed to ensure:

- The research has appropriate ethical and R&D management approval
- The researchers have the necessary expertise and access to the resources required to conduct the proposed research
- That any intellectual property (IP) arising from the research is identified and protected, where appropriate
- Arrangements are proposed for disseminating the research finding
- To advise R&D office of any changes i.e. to the protocol, recruitment numbers, staff.

Appendix B.5 – Approval from Primary Care Research & Development (continued)

Acute Services Division

NHS
Greater Glasgow and Clyde

I wish you every success with your study. Please don't hesitate to contact me should you require any further assistance.

Yours sincerely,

Brian Rae
R&D Manager

Delivering better health

www.nhsggc.org.uk

40389

Appendix B.6: Pilot Questionnaire

Below is a list of words. You have to decide if these words are positive, negative or neutral. Try not to think about your responses too much, just put down the initial response that comes to you. Please mark your response by ticking the corresponding column.

For the last column please estimate how emotional you rate each of these words:

1 being not at all emotive and 10 being extremely emotive

Word	**Positive**	**Neutral**	**Negative**	**Emotionality 1-10**
Agitated				
Bookcase				
Carpet				
Softness				
Guilty				
Vulnerable				
Spotlights				
Hearty				
Porcelain				
Exhausted				
Ceiling				
Gratifying				
Foolish				
Delicious				
Toothbrush				
Distressed				
Heater				
Winning				
Sickly				
Bedspread				
Furnishings				
Incapable				
Unfortunate				
Washout				
Miserable				
Couches				
Beneficial				
Treats				
Inferior				
Congenial				
Cooperative				

Irrational				
Ecstasy				
Flawed				
Nervous				
Extension				
Ornament				
Desirable				
Unstable				
Luxury				
Kindness				
Silverware				
Goodness				
Weary				
Lounge				
Bedroom				
Worthless				
Cushions				
Spoon				
Sweetness				
Talent				
Sluggish				
Staircase				
Valance				
Volatile				
Inadequate				
Entertaining				
Moody				
Weak				
Banister				
Blooming				
Low				
Fatigued				
Agreements				
Gaiety				
Crazy				
Distressed				
Tablecloth				
Vases				
Helpful				
Tense				
Troubled				
Dish				
Lonely				
Serenity				
Grace				
Wholesome				

Adorable				
Amicable				
Bed				
Flooring				
Pathetic				
Unattractive				
Sleepless				
Broom				
Mattress				
Stupid				
Entrance				
Compassion				
Wasted				
Charming				
Benevolence				
Tasty				
Doors				
Bathroom				
Wardrobe				
Confused				
Restless				
Poster				
Nice				
Gardens				
Win				
Fittings				
Comfort				
Soothing				
Fabulous				
Helpless				
Incompetent				
Unhappy				
Grand				
Mantelpieces				
Tenderness				
Fabric				
Lucky				
Domestic				
Glorious				
Cupboard				
Clocks				
Floorboards				
Gentle				

Appendix B.7 - Word stimuli used in the emotional spatial cueing task

No.	Negative word	Positive word	Neutral word
1	Miserable	Desirable	Extension
2	Unhappy	Helpful	Bedroom
3	Volatile	Amicable	Banister
4	Weak	Nice	Dish
5	Inadequate	Tenderness	Tablecloth
6	Tense	Lucky	Doors
7	Stupid	Talent	Poster
8	Pathetic	Soothing	Fittings
9	Troubled	Glorious	Bathroom
10	Unattractive	Entertaining	Mantelpieces
11	Nervous	Comfort	Gardens
12	Exhausted	Delicious	Porcelain
13	Distressed	Beneficial	Toothbrush
14	Low	Win	Bed
15	Fatigued	Fabulous	Flooring
16	Lonely	Gentle	Fabric

Appendix B.8 – Participant Invitation letter

Ms Sarah McIlwraith
Department of Psychological Medicine
Gartnavel Royal Hospital
1055 Great Western Road
G12 0XH

12th September 2008

Do negative words draw or hold attention in late life depression?

Invitation Letter

My name is Sarah McIlwraith and I am a final year trainee in Clinical Psychology. I would like to invite you to take part in a research study. I am interested in finding out more about the effects of depression on attention in older adults. Depression is one of the most common psychological problems amongst older adults and it can have many negative consequences. This study aims to understand more about the effects of depression on attention in older adults. Having a better understanding of this may lead to better treatments for depression being designed in the future.

By taking part in the study, you would be invited to attend for one appointment in one of 6 NHS resource centres across Glasgow depending on which is most convenient for you. The appointment will last approximately 1 hour 30 minutes and you will be given a break. During the appointment, you will be asked questions about your physical and mental health. You will also be asked to

complete some questionnaires about your feelings and to complete assessments of mental functioning. You will also be asked to complete a computer task to measure aspects of your attention.
If you would like to hear more about the study, please contact me in one of the following ways:

1. Email me: 0002843m@research.gla.ac.uk
2. Telephone me: 0141 201 0607
3. Complete and return the reply slip in the envelope provided so that I can telephone you.

You are not committed to taking part in this study just because you contact me. You are free to withdraw whenever you like and this will not affect your future care in the NHS.

Thank you for reading this information and considering taking part.

Many thanks,

Ms Sarah McIlwraith
Trainee Clinical Psychologist

REPLY SLIP

Do negative words draw or hold attention in depressed older adults?

I would like to hear more about the study

Name:_____

Telephone number: _____

Appendix B.9: Participant Information Sheet

PARTICIPANT INFORMATION SHEET

Do negative words draw or hold attention in late life depression?

INTRODUCTION

You are being invited to take part in a research study. Before you decide whether to take part, it is important for you to understand why the research is being done and what it will involve for you. Please take some time to read all of the following carefully and discuss it with others if you wish. Please ask the researcher if you would like more information or if there is anything that is not clear. Take time to decide whether or not you wish to take part.

WHAT IS THE PURPOSE OF THE STUDY?

Depression is one of the most common psychological problems amongst older adults and it can have many negative consequences. This study aims to understand more about the effects of depression on attention in older adults. It is hoped that the findings from this study will contribute to better treatments for depression being developed in the future.

WHY HAVE I BEEN CHOSEN?

You are being asked to participate in this research study because you over 65 years of age and are someone who has no current or prior mental health problems OR you are someone who is currently

experiencing depression. All together around 70 people in Glasgow will be taking part in this study.

DO I HAVE TO TAKE PART?

It is entirely up to you whether you take part or not. You will be given this information sheet to keep. If you decide to take part you will be asked to sign a consent form. The consent form is simply to indicate that you have read this information sheet and to show that you have agreed to take part. You will be given a signed copy of this to keep. If you decide to take part you are still free to withdraw at any time without giving a reason and any data collected from you will be destroyed. A decision to withdraw at any time or a decision not to take part will not affect the standard of care you receive.

WHAT WILL HAPPEN IF I TAKE PART?

If you decide to take part, you will be asked to attend for one appointment to meet the researcher which will last approximately 1 hour. This appointment will be at one of 6 NHS resource centres across Glasgow, depending on which is most convenient for you. The study itself will be running for around 9 months.

The appointment will have two stages. During stage 1 you will be asked to take part in an interview that will ask you questions about your physical and mental health. You will also be asked to complete some questionnaires about your feelings and to complete assessments of mental functioning. This data will be used to establish in greater detail if you are suitable to participate in part two of the study and it will be used as background information. If you are suitable, you will continue to complete part two of the study. If you are not suitable your participation with the study will end and you will be free to go about your day.

If you are invited to take part in stage two of the study you be asked to complete a task on a computer. This task measures aspects of your attention. It will involve you reacting to some words and symbols that appear on the computer screen. You will be given simple to follow instructions and you will have the chance to practice with help from the researcher. Once this is finished your participation with the study will end and you will be free to go about your day.

WHAT WILL THE RESEARCHER DO WITH THE INFORMATION?

All of the information collected about you during the study will be kept strictly confidential and stored securely. Most of your information will be kept in an anonymised form. This means that it is transferred to numbers and stored safely in a computer system so that you can not be identified from it. Only the research team will have access to this information. Some personal information about you will be kept in written form, such as your address and contact details. This kind of information will be held in a locked cabinet and only the research team will have access to it.

WHAT ARE THE POSSIBLE DISADVANTAGES OF TAKING PART?

Answering some questions in the interview and on the questionnaires may make you feel uncomfortable and may be upsetting for you. You do not have to answer any questions you do not want to. If you do become upset you can choose to end the appointment. You will be offered the opportunity to talk to the researcher who is well trained and capable of dealing with such issues if they arise.

It is possible that results from one of your assessments may indicate a mental health or mental functioning problem that you did not

know about before. If such difficulties are highlighted you will be encouraged to contact your GP. The researcher can help you to contact your GP by writing to them if you want. You may still take part in the study if you do not wish the researcher to contact your GP for you.

WHAT ARE THE POSSIBLE BENEFITS OF TAKING PART?

There are no direct benefits to you from taking part in this study. We hope the information learned from this study will help to better understand late life depression and design better treatments in the future.

WHAT WILL HAPPEN TO THE RESULTS OF THIS STUDY?

If you wish, the researcher will provide you with a summary of the results of the study. The researcher will aim to publish the final results in a scientific journal. It is also intended that the results will be used as part of the researcher's qualification in Clinical Psychology. Your identification will not be included in any publication or report.

WHO HAS REVIEWED THE STUDY?

This study has been reviewed by the Glasgow Universities department of Psychological Medicine to ensure that it meets important standards of scientific conduct. It has also been reviewed by NHS Greater Glasgow and Clyde Research Primary Care Ethics Committee to ensure that it meets important standards of ethical conduct.

WHAT IF I WISH TO COMPLAIN?

If you have a concern about any aspect of the study, you can contact the researcher. If you remain unhappy and wish to make a formal complaint, you can do this through the NHS Greater Glasgow and Clyde complaints procedure at the following address:
Complaints Office
Dalian House
350 St Vincent Street
GLASGOW
G3 8YZ
Tel: 0141 201 4477

WHO CAN I CONTACT IF I WANT MORE INFORMATION?

If there is anything you are not clear about, or if you have any questions, please feel free to contact the researcher:

Sarah McIlwraith
Trainee Clinical Psychologist
University of Glasgow
Section of Psychological Medicine
Gartnavel Royal Hospital
1055 Great Western Road
Glasgow
G12 0XH
Email: 0002843m@student.gla.ac.uk
Telephone: 07549232689

Thank you very much for reading this information

Appendix B.10: Participant Consent Form

PARTICIPANT CONSENT FORM

Title of study: Do negative words draw or hold attention in late life depression?

Name of researcher: Ms Sarah McIlwraith

Please initial box

I confirm that I have read and understood the information sheet dated 12/09/08 (Version 1) for the above study. I have had the opportunity to ask questions and have had satisfactory answers to these. ☐

I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason. I understand that my medical care or legal rights will not be affected. ☐

I understand that my assessments may show a mental health or mental functioning problem that I did not know about. I give permission for the researcher to inform my GP if this is the case. ☐

I agree to take part in the above study. ☐

_____	_____	_____
Name of participant	Date	Signature
_____	_____	_____
Name of researcher	Date	Signature

Appendix B.11: Mean RTs and standard deviations (in ms) for each group (Original data)

		Group			
		Depressed		Controls	
		M	SD	M	SD
Overall Response		1028.9		751.5	
Cue valence	Validity				
Negative	Valid	1037.0	383.3	753.4	166.6
	Invalid	1029.6	400.62	738.10	148.3
Positive	Valid	1046.5	378.1	739.6	160.5
	Invalid	1037.1	365.4	765.0	188.3
Neutral	Valid	1020.9	341.4	760.2	179.1
	Invalid	1002.4	364.5	752.7	169.6

Appendix B.12: Demographic and clinical characteristics of each sub-group of control and depressed participants.

	Group			
	Depressed Cue validity effect	**Depressed IOR**	**Controls Cue validity effect**	**Controls IOR**
n	8	8	11	11
Age (Md)	72.0 (68-88)	71.5 (66-84)	68.0 (66-82)	69.5 (65-84)
Age category (n)				
Young-old (65-75)	6 (75.0)	6 (75.0)	10 (90.9)	8 (72.7)
Old-old (75-85)	1 (12.5)	2 (25.0)	1 (9.1)	3 (27.3)
Oldest-old (85+)	1 (12.5)	0 (0.00)	0 (0.00)	0 (0.00)
Gender (n)				
Male	3 (37.5)	0 (0.00)	4 (36.4)	2 (18.2)
Female	5 (62.5)	8 (100.0)	7 (63.6)	9 (81.8)
Ethnicity (n)				
White British	8 (100)	8 (100)	11 (100)	11 (100)
Marital status (n)				
Single	1 (12.5)	1 (12.5)	0 (0.0)	0 (0.00)
Married	3 (37.5)	2 (25.0)	5 (45.4	4 (36.4)
Separated	0 (0.0)	0 (0.0)	2 (18.2)	0 (0.00)
Widowed	1 (13.5)	0 (0.0)	1 (9.1)	2 (18.2)
Divorced	3 (37.5)	5 (62.5)	3 (27.3)	5 (45.4)
WTAR (M)	107.5 (13.4)	93.75 (17.3)	100.4 (13.3)	105.5 (13.6)
MMSE (Md)	26.5 (25-30)	29 (25-30)	28.5 (27-30)	29 (25-30)
BAI (Md)*	14.0 (5-34)	15.0 (7-59)	3.0 (0-6)	2.0 (0-6)
GSD (Md)*	10.0 (6-14)	8.5 (6-14)	1.0 (0-3)	1.0 (0-3)

Notes: IOR = Inhibition of return; M = Mean, standard deviation shown in parenthesis; Md = Median, range shown in parenthesis; n = number, proportion of group shown in parenthesis.