MOOD-AS-INPUT THEORY AND SPECIFIC NEGATIVE MOODS FOR PERSEVERATIVE CHECKING AND WORRYING

Frances Meeten

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Statement

I hereby declare that this thesis has not been and will not be, submitted in whole or in part to another University for the award of any other degree.

Frances Meeten

30th September 2009

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Summary

The mood-as-input hypothesis predicts that perseveration at an open-ended task is determined by "stop rules" for the task and by the valency of the mood. Stop rules define a person's goals in task attainment, e.g. stopping after doing as much as they can, or stopping when they no longer feel like continuing. This thesis will examine the combined effects of stop rules and specific negative moods (sadness, anxiety, anger) on perseverative worrying and checking tasks, and the influence of specific negative moods on personal performance standards. The final study explores the impact of experimentally induced mood on a worry task when the mood source is made highly salient i.e. attributed to an obvious event or source.

On a perseverative checking task, different negative mood and stop rule combinations were found not to affect participant performance. However, using a personally-relevant worry task, participants in each specific negative mood condition persevered for longer using an "as many as can" rule compared with those using a "feel like continuing" rule. The opposite was found for participants in a happy mood. The effects of sadness and anxiety on personal performance standards and stop rule preference were also examined. Findings suggest a positive relationship between sad and anxious moods and "as many as can" stop rule preference. An attempt to manipulate mood attribution after inducing an angry mood showed marginally significant differences in attribution by the high and low manipulation groups, but no effects of mood attribution on task performance.

These findings suggest that with a catastrophic worry task, participants in each specific negative mood condition using an "as many as can" stop rule persevered for longer compared with those using a "feel like continuing" stop rule. The implications of this work are discussed in relation to mood-as-input accounts of perseveration and models of mood.

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1 Emotions: What are they and how are they defined?

1.1 General overview

The present chapter opens the thesis with a broad examination of emotion, its definition, and structure. Chapters two and three explore informational models of mood, focusing on the mood-as-input theory (Martin, Achee, Ward, & Wyer, 1993; Martin & Davies, 1998) and specifically, mood-as-input explanations of perseverative psychopathologies (e.g. MacDonald & Davey, 2005,a,b; Startup & Davey, 2001, 2003, & Watkins & Mason, 2002). Chapter four discusses methodological issues relating to work described herein. Chapters five to eight detail experimental work performed for this thesis. Chapter ten provides an overview of the experimental findings, discusses theoretical implications of the current work, limitations, and ideas for future research.

1.2 Introduction

In order to examine the role of affect in perseverative psychopathologies, it is first necessary to clarify common terms used to describe affective phenomena. For example, what is meant by the term ‘mood’? And, how can mood and emotions be differentiated? A complex issue in an examination of specific negative moods on perseverative tasks is how emotion can be defined and how its structure can be conceptualised. This chapter will examine definitions of emotion and key differences between moods and emotions. Theoretical accounts of the structure of emotion will be discussed, examining evidence for the existence of a set of basic emotions, such as sadness, anger, and anxiety etc. Evidence for dimensional accounts of emotion, which suggest that discrete emotions are reducible to more basic elements of valence and arousal will be examined. Finally, more recent theorising on how specific negative moods can be constructed from more fundamental properties will be discussed.

1.3 Defining Emotion

Given that emotional responding is such a fundamental part of everyday life, it is interesting that the scientific study of emotion has produced a wealth of literature, but with little consensus on how to define emotion. Siemer (2005) highlights some of the core features that differentiate moods from emotions, namely that in comparison with emotions, moods are diffuse and global, and lacking in intentionality. Thus unlike emotions, moods tend not to be directed at a specific object. However, while there are easily identifiable ways in which moods and emotions differ, a single definition of emotion is more difficult, mainly as there is little consensus within the literature on the structure and definition of emotion. This debate will be explored below.

1.4 The Structure of Emotion

A lay approach to the question of 'What is the structure of emotion?' would most likely involve recourse to how we describe our feelings. We believe we can identify what it is to feel angry, sad, happy, anxious, or fearful. However, an examination of the emotion literature reveals a lively debate on the structure of and thus the nature of emotions. Central to the debate is to answer the question 'What are the irreducible building blocks of emotion?' (Barrett, 2006b). Traditionally, the debate focuses on whether emotion is more usefully understood and examined as a set of irreducible discrete, or basic emotions that correspond to commonly used emotion labels. One such example being evolutionary accounts of emotion (e.g. Izard, 1977; Johnson-Laird & Oately, 1992; Plutchik, 1980), or whether emotion is more usefully understood by measuring structural accounts of affect, for example dimensional accounts of emotion (e.g. Russell, 1980; Thayer, 1996; Watson & Tellegen, 1985).

1.5 Basic Emotions

Viewing the structure of emotion as a set of basic irreducible emotions centres around two main theoretical positions. One view asserts that emotions have a biological basis, whereby they have been shaped through natural selection during evolution (e.g. Izard, 1977; Izard & Malatesta, 1987; Johnson-Laird &

Oatley, 1992; Plutchik, 1980; Tooby & Cosmides, 1990). This approach assumes that there is a small set of basic emotions that are biologically or evolutionarily hardwired, which have corresponding innate neural substrates (Izard, 1977, 1972). The second approach proposes that some emotions are psychologically irreducible. Thus an emotion is considered basic when it is not comprised of any other emotion and can be combined to form more complex emotions (Ortony & Turner, 1990).

Traditionally, indirect evidence for neural structures that correspond to discrete basic emotions comes from data examining facial expressions. It was assumed that if there is a set of basic or primary emotions that have corresponding innate neural structures, these would trigger certain motor responses, corresponding to universally recognisable facial expressions. Early emotion recognition studies rested upon the assumption that "there exist discrete fundamental emotions common to all mankind; and each of these emotions has a characteristic expression or pattern which conveys particular meaning or information for the expressor or perceiver" (Izard, 1971, p. 251). Evidence for the existence of basic emotions as signalled by facial expressions has been discussed for more than 40 years.

Early work by Tomkins & McCarter (1964) examined within culture recognition of facial expressions. They showed 24 American firemen 69 facial photographs of models simulating expression of either a neutral expression, or one of eight primary emotions of interest, enjoyment, surprise, distress, fear, shame, contempt and anger. One of the key findings in this early research was that all participants were able to identify the 8 primary emotions with above-chance accuracy. The importance of recognition of facial expressions as evidence for hardwired, innate basic emotions has led to cross cultural examination of emotion expression. Izard (1971) examined 592 participants from 9 different cultures. Participants were shown 32 pictures representing 8 different emotions. On presentation of each photograph, participants were asked to select one emotion (from a list of 8) which best described it. Results showed 78% agreement of emotion recognition across cultures. Izard concluded that this supported the concept of expression and recognition of fundamental facial expressions being

determined by evolutionary processes. However, it should be noted that recognition was not uniform across cultures, with Japanese participants being less successful at recognising disgust and anger. Furthermore, Izard notes that African participants were excluded from much of the data analysis as they were not tested in their first language. However, importantly for Izard, overall agreement was markedly above chance, which would have been 12.5% agreement.

One criticism of Izard's work is that participants were constrained to interpret the facial expression within limits of emotions provided by the researcher (Russell, 1994). The forced-choice design inherent in Izard's work was avoided by Ekman et al. (1987). They tested 10 cultures on judgements of facial expressions by asking participants to rate which emotions were strongest while providing multiple emotions for each facial expression judgement. Their results also showed a high level of cross cultural agreement, finding that 177 of 180 times the predicted emotion was the one rated as being the strongest (Ekman et al.)

While the above evidence suggests support for the concept of universally innate facial expressions, there are both theoretical and methodological critiques of facial expression data. For example, Ortony & Turner (1990) highlight the lack of agreement about the number and identity of basic emotions. They examine work by a number of theorists who support the existence of basic or primary emotions and note that the number of basic emotions cited ranges from 2 – 18, one example of which being Panksepp (1982) who proposed 4 basic emotions of expectancy, fear, rage and panic, whereas Tomkins (1984) proposed 9 basic emotions and Izard (1977) suggested 10. Ortony & Turner also highlight a lack of consensus concerning the identity of basic emotions, with some theorists citing basic emotions that are not cited by any other theorists, for example Plutchik (1980) uniquely includes acceptance and anticipation as basic emotions. Ortony & Turner propose that such theoretical disagreement mars the ability to study basic emotions.

Russell (1994) highlights a number of methodological problems with facial expression studies. For example, previewing an entire set of facial expressions and direct comparison between facial expressions when using a

within subjects design effects the ecological validity of results. Further, Russell notes that facial expressions used are often pre selected and posed. This is problematic for facial expression studies as posed expressions are culturally influenced and are believed to originate in different areas of the brain than naturally occurring spontaneous facial expressions (Rinn, 1984, cited Russell, 1994).

More recently, evidence for biologically basic emotions has focused on using direct techniques such as positron emission tomography (PET) or functional magnetic resonance imaging (fMRI). However, Murphy, Nimmo-Smith, & Lawrence (2003) note that these techniques have various limitations. Thus no single study can fully examine a neural basis for discrete emotions as they are often limited to a certain emotion condition, or certain population subset. Further, low sample size means that statistical power is often limited (Murphy et al., 2003). One way of addressing these problems is to conduct meta-analyses.

Barrett & Wager (2006) compared findings from two meta-analyses by Murphy et al. (2003) and Phan, Wager, Taylor, & Liberzon (2002), both of which examined evidence for emotion–category-brain-location for the basic emotions of anger, sadness, disgust, fear, and happiness. Barrett & Wager concluded that both analyses found evidence of brain location regions for some discrete emotions. For example, fear was found to be related to the amygdale in both meta-analyses, sadness to the anterior cingulated cortex and disgust to the basal ganglia. While meta-analyses by Murphy et al. and Phan et al. seem to suggest neurological evidence for emotion specificity of at least some of the basic emotions, Barrett & Wager call into question the consistency of such studies, proposing that correspondences between neural areas and specific emotions such as the amygdale-fear and sadness-anterior cingulated correspondence can be affected by the method used to induce emotions. For example, Barrett & Wager note that the amygdale is particularly responsive to faces, thus in studies where participants viewed fearful faces, the fear-amygdale correspondence was “increased by about 20% in each meta-analysis” (Barrett & Wager, p.81), thus calling into question the amygdale as a neurological fear site.

1.6 Core Affect

Barrett, Mesquita, Ochsner, & Gross (2007) examine core affect and the role of neurobiological processes within the emotion experience. As discussed above there is little conclusive evidence that specific neural structures exist that correspond to discrete emotions. However, while it is not possible to distinguish a causal relationship between neurobiological activity and felt unpleasant or pleasant discrete emotional states, there is neurobiological evidence to support the existence of core affect (Barrett et al.). Barrett et al. suggest that there is evidence for activation in the temporal lobe, orbitofrontal cortex and ventromedial prefrontal cortex, these brain areas being reliably linked to mental representations of emotion, "which are constructed from more basic affective and conceptual representations" (Barrett et al. p. 390). Core affect can be conceptualised as the most elementary components of emotion experience such as pleasure or displeasure, depression or elation (Russell & Barrett, 1999). In contrast, the discrete emotion view proposes that there exists a set of irreducible basic emotions such as anger, fear, or joy, that are either evolutionarily hardwired (e.g. Plutchick, 1980; Izard, 1977), or basic such that the emotions are psychologically irreducible and thus combine to form more complex emotions (Ortony & Turner, 1990). Studies such as those examined by Barrett et al., Barrett & Wager (2006), and Phan et al. (2004) all seem to support the hypothesis that discrete emotions are constructed from more fundamental valence-based elements.

Thus the question arises as to whether there is enough evidence to conclude that basic emotions exist as 'natural kinds' (Barrett, 2006a). That is, do basic emotions exist in nature as measurable, biological constructs with specific causal mechanisms in the brain? Evidence reviewed by Barrett & Wager (2006) suggests some cross-cultural recognition of facial expressions, implying the possibility of corresponding underlying neural structures for discrete emotions. However, there is little consensus on the number of basic emotions and direct evidence from PET and fMRI studies find some agreement on sites of emotions such as sadness and fear, yet there is no clear evidence to suggest neurological specificity or a behavioural marker for each basic emotion category (Barrett).

Barrett (2006b) supports the hypothesis that the core element of emotion experience is valence by examining the concept of emotional granularity, suggesting that individuals differ in their ability to report and define distinct emotional experiences. Barrett (2006b) suggests that those high in emotional granularity often categorize their experiences in discrete emotion terms which reflect a distinctive differentiation between each term, whereas those low in emotional granularity use distinct emotion labels which reflect more broader dimensions such as pleasantness or unpleasantness (Barrett, 2006b). For example, Barrett (1998) examined participants' valence focus (the degree to which individuals report feeling pleasant or unpleasant) and arousal focus (the degree to which individuals used specific affect words) when labelling their subjective emotional states. Results indicated that individuals who were high in valence focus displayed less distinction between specific emotions of the same valence than those who were high in arousal focus (Barrett, 1998). Further evidence of emotional granularity is reported in a study by Barrett, Gross, Conner, & Benvenuto (2001), they examined whether emotion differentiation (i.e. emotional granularity) was related to emotion regulation. Participants were asked to complete an emotion differentiation measure where they rated nine affect terms on a Likert scale raging from 0 – 4 over 14 days. Correlations were then calculated between all the positive affect terms, and separately between all the negative affect terms. Barrett et al. concluded that large correlations between affect terms of the same valence reflected low emotional granularity, with low correlations reflecting high emotional granularity. Further, Barrett et al. found that greater negative emotion differentiation (i.e. greater active discrete emotional knowledge) was positively related to the frequency of negative emotion regulation. Barrett (2006b) suggests that individual differences in emotional granularity imply that not everyone can differentiate between discrete emotional experiences, but everyone can differentiate between feeling pleasant or unpleasant. Barrett (2006b) thus concludes that rather than looking at discrete emotion categories as the basic structure of emotion, the focus should be on an affect system with valence as the basic emotion experience.

1.7 Dimensional Accounts of Emotion

Core affect is commonly represented by dimensional accounts of affect (e.g. Larsen & Diener, 1992; Russell, 1980; Thayer, 1996; Watson & Tellegen, 1985; Yik, Russell, & Barrett, 1999). The most common form of interpretation is of a two-dimensional structure. However, as noted by Watson & Tellegen, (p. 219) there is "a striking lack of consensus concerning the dimensional structure of affect". Historically, dimensional theories of affect have focused on valence, activation, or both. For example, Russell's (1980) circumplex model emphasised valence and activation as a two-dimensional structure, whereas Watson and Tellegen's (1985) model emphasised valence with positive and negative affect as the two main dimensions with high positive affect and high negative affect at a 45° angle. Yik et al. (1999) examine four structures of affect including those of Russell and Watson & Tellegen as discussed above, a structure presented by Larsen & Diener (1992) which cites valence and activation as the two main dimensions, and finally Thayer's (1996) two-dimensional structure of activation and deactivation (cited Yik et al.). Figure 1.1 shows a schematic representation of each of the four structures as presented by Yik et al.

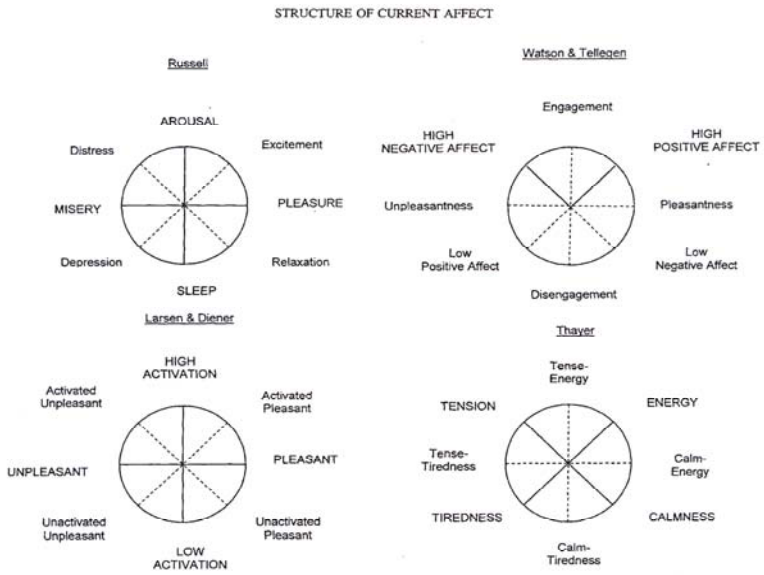


Figure 1.1 Taken from Yik et al. (1999, p. 601) shows four structures of affect by Russell (1980), Larsen & Diener (1992), Watson & Tellegen (1985), and Thayer (1996).

Yik et al. (1999) examined data from two separate samples of participants. Both sets of participants completed the Current Mood Questionnaire (Feldman-Barrett & Russell, 1998). One sample then completed the Positive and Negative Affective Schedule (Watson, Clark, & Tellegen, 1998). The other sample completed Larsen & Diener's (1992) Activated Unpleasant, Unactivated Unpleasant, Activated Pleasant, and Unactivated Pleasant Affect variables test and Thayer's (1996) Energy, Tiredness, Tension, and Calmness variables test. Using confirmatory factor analysis and structural equation modelling to examine the data, Yik et al. proposed that while the data supported each of the four original structures separately, nearly all the variance in the four structures can actually be accounted for by the Pleasant-Unpleasant and Activated-Deactivated axes. Yik et al. propose that the four differing dimensional structures of affective space are actually alternative descriptions of the same two-dimensional space. Figure 1.2 shows the four structures from Figure 1.1 in a two-dimensional space. Yik et al. highlight the need for these two dimensions to be studied simultaneously and suggest that where other approaches have emphasised one dimension over the other, there has been a lack of conceptual clarity. Despite this attempt to unify some of the traditional models of dimensional affect, Yik et al. note that there remain certain controversies in modelling the structure of affect. Unresolved issues relate to whether dimensions of affect are independent of each other, or bipolar in nature; whether affect is best represented as a circumplex or simple structure, and the proper rotation of the axes.

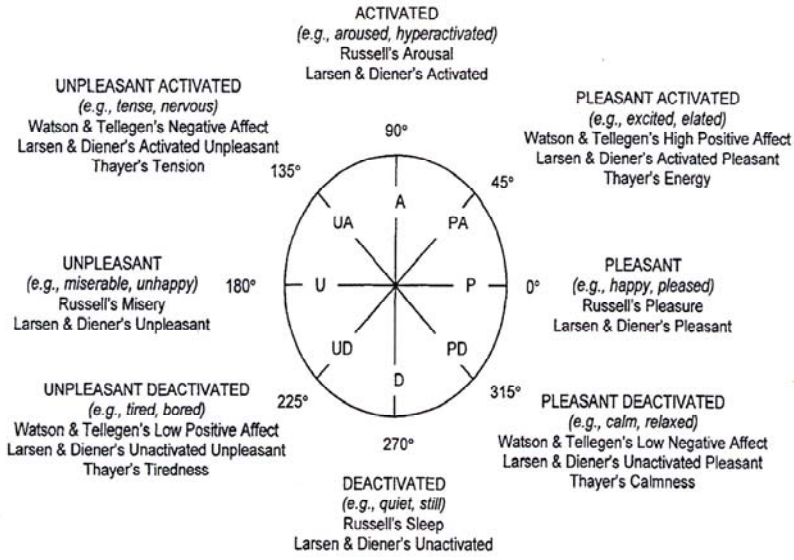


Figure 1.2 Taken from Yik et al. (1999, p. 602). A 2-dimensional structure incorporating structural descriptions of affect presented by Russell (1980), Larsen & Diener (1992), Watson & Tellegen (1985), and Thayer (1996).

1.8 Emotions as Constructed Experiences

Neurophysiological findings do not appear to provide clear evidence for a set of basic emotions with corresponding biological bases given that there are no consistent or specific correspondences between discrete emotions and neurological locations (Barrett & Wager, 2006). Barrett (2006b) proposes that individual difference in emotional granularity implies that valence is the elementary construct of emotion. While one could argue that evidence of discrete emotions as natural kinds may arise over time in the wake of new, more advanced experimental techniques (e.g. Barrett, 2006c), the lack of empirical evidence would suggest that emotion experience is better understood with valence and activation as its core properties (Barrett, 2006b).

Similarly, Frijda (2001) proposes that the core elements of emotions are pleasure and pain and that emotions arise from responses to events. Thus Frijda deems emotions to be subjective experiences. Russell (2003) also proposes emotions to be subjective experiences. Using fear as an example, Russell demonstrates how fear can be experienced in may different ways, for example, walking in a wood and unexpectedly meeting a bear would result in the individual reporting that they felt fear, yet also watching a scary film can result in experiencing fear. However, these two fearful experiences have very different underlying constructions and appraisals. It is from this position that Russell suggests that individual emotions such as fear or anger are actually just emotionally charged events, and asserts that “an emotion is typically about something” (Russell, 2003, p.146) and at the heart of emotion experience is core affect. Russell suggests that the experience of emotions are actually psychological constructs, which he terms prototypical emotional episodes. These episodes occur due to the experience of core affect and other component parts such as appraisal, emotion regulation, perception of affective quality, attribution to object, action, and emotional meta-experience; all these result in the emotion being a subjective experience. Thus Russell proposes that it is fluctuations in core affect and elements such as those listed above that result in the experience of specific emotions such as anger and fear.

The view that emotions are events constructed from more fundamental elements is similarly expressed by Barrett (2006c). Barrett postulates that while valence and arousal are reliable properties of emotion experience, discrete emotion categories such as anger or fear are not observational or measurable elements in themselves, but actually exist only as experiences which occur "when conceptual knowledge about an emotion is brought to bear during the act of categorization" (Barrett 2006c, p. 27). This means that a person will experience or feel an emotion when they categorise their internal state using their knowledge about emotion. Barrett proposes that for emotion categorisation to occur there must be at least two basic components, namely affect and conceptual knowledge about emotion. These elements together result in what Barrett terms a highly flexible system that then accounts for the aforementioned existence of range in emotional granularity, individual, and cultural differences in emotion experience. This is a similar concept to Russell's (2003) view that emotions are subjective experiences with core affect as the basic element.

Further evidence supporting the hypothesis that emotions are actually psychological events that are constructed from core affect and conceptual knowledge is provided by Lindquist & Barrett (2008). The authors suggest that depending on how an unpleasant and highly aroused state is conceptualised, it could be experienced as fear in some circumstances and anger in another. Lindquist & Barrett examined the hypothesis that specific negative emotions are constructed from a combination of experienced high arousal, core affect and conceptualised knowledge, for example, what the individual knows about the category of sadness, fear, or anger. Here, Lindquist & Barrett differentiated between world-focused and self-focused emotion. Lambie & Marcel (2002) define world-focused emotion experiences as not directed at the self and whose content is not actually an emotion, but are experiences that give rise to emotions, for example awareness of an object to be escaped from relates to fear, or the experience of wanting to punch someone would be world-focused anger. In contrast, Lambie & Marcel define self-focused emotion as being focused on the body and including thoughts about bodily sensations and felt action urges.

Lindquist & Barrett (2008) examined the construction of a world-focused experience of fear, particularly the hypothesis that emotions are psychologically constructed events, specifically suggesting that world-focused fear can be "psychologically constructed when unpleasant, high arousal core affect is conceptualised as evidence that the world is threatening" (Lindquist & Barrett, 2008, p. 899). The authors manipulated core affect after priming participants with knowledge about fear, anger, or a neutral prime. Participants' world-focused experience of fear was examined by assessing their aversion to risk. Results showed that only participants who experienced unpleasant high arousal and had experienced conceptual knowledge about fear, experienced fear in the world as indicated by their aversion to risky activities. Those participants who experienced either conceptual knowledge about fear, or core affect, but not a combination of the two, did not indicate the experience of world-focused fear. Lindquist & Barrett propose these findings to provide evidence that specific emotions are constructed events comprised from core affect and conceptual knowledge about a specific emotion. Thus it is only when unpleasant core affect and high arousal are experienced in conjunction with conceptual knowledge about a specific emotion that the experience is labelled as e.g. fear. Behaviours or associated action tendencies related to that specific emotion are then experienced. In this case fearful participants became risk aversive (Lindquist & Barrett).

1.9 Summary and Conclusions

The debate over how to define and conceptualise emotions is far from clear-cut or unified. The use of discrete emotion terms to convey one's current emotional state are used every day in many cultures. However while some theories propose that the bases of emotion life involves a set of discrete irreducible basic emotions (Izard, 1977; Johnson-Laird & Oately, 1992; Plutchik, 1980), there is little firm evidence to support this claim. Studies examining the universality of facial expressions provide some evidence for cross-cultural recognition and thus possibly innate basic emotions (Ekman, et al., 1987; Izard, 1971). However, there is a lack of theoretical agreement on the number and identity of basic emotions, and further cross-cultural facial expression studies lack ecological validity due to the often pre-set or posed nature of photographs (e.g.

Ortony & Turner, 1992). Direct techniques such as PET and fMRI studies also fail to provide conclusive evidence that functioning in specific areas of the brain corresponds to discrete emotion experience (Barrett & Wager, 2006). An alternative approach suggests that valence is the basic building block of emotional life (Barrett, 2006b). While traditional dimensional models examining the structure of affect differed on what exactly the dimensions represent and how the variables should be named and conceptualised (Yik et al. 1999), they did represent a theoretical change from postulating discrete emotions as the basis of emotion structure, and allowed more fundamental elements of valence and arousal to be examined. More recent theorising maintains that valence or core pleasant and unpleasant affect represent the basis of emotional responding, and proposes that emotion experiences are actually psychologically constructed events which occur through a process of categorisation, and how conceptual knowledge about a specific emotion in bought to bear on the experience of valence and arousal (Barrett, 2006c). In this way different specific emotions could arise from the same combination of valence or arousal depending upon how the event is appraised and, once labelled, what specific action tendencies are related to that specific constructed emotion experience (Lindquist & Barrett, 2008).

To conclude, research and debate spanning more than 30 years has discussed how best to conceptualise the structure of affect. While discrete emotions are part of every day emotional responding and engrained in common parlance, it seems unlikely that basic emotions exist as ‘natural kinds’ (Barrett, 2006a). It is of course possible that with the advent of increasingly sophisticated brain imaging techniques, more robust evidence will emerge for neural specificity relating to discrete emotions (Barrett, 2006c). However, what does seem evident at present is that core affect, i.e. more fundamental elements of emotion experience can be measured neurologically (e.g. Barrett et al., 2007) and experimentally (Barrett et al., 2001). The concept of emotion experience as prototypical emotional episodes (Russell, 2003) encapsulates a less rigid approach to emotion experience, viewing fundamental emotion properties such as valence and arousal at the core of the individual’s subjective experience.

Experimental work in this thesis will explore how affect influences performance on open-ended judgemental tasks. Specifically the influence of specific negative emotions as compared with mood valency on task performance will be discussed.

2 How are moods and emotions implicated in processing?

2.1 Introduction

The next section examines historical and contemporary accounts of the effects of mood on processing. Specifically, this chapter will look at mood congruency theories (Bower, 1981; Isen, Clark, Shalker, & Karp, 1978; Mayer, Gaschke, Braverman, & Evans, 1992), mood as information accounts of relationships between mood and processing (Schwarz & Clore, 1983, 1988), the mood-as-input hypothesis (Martin, Ward, Achee, & Wyer, 1993; Martin & Davies, 1998), and the effects of specific moods on processing.

2.2 Mood congruency

Early theorising hypothesised that mood affected processing in a congruent manner. Mood congruency theories propose a match between the valence of one's mood and one's cognitions (Mayer et al., 1992). Early research into the effects of mood on processing found support for mood congruency in recall. For example, Bower, Monterio, & Gilligan (1978) induced a sad or happy mood in participants using hypnosis. Participants in the experimental conditions learnt two lists of words while either in a happy or sad mood and were asked to recall the first list of words learnt while currently feeling happy or sad. Results showed that participants recalled a greater number of words when the words were both learned and recalled in the same valenced mood. Bower et al. found a similar congruency effect with mood dependent retrieval, thus when in a positive mood participants retrieved more pleasant than unpleasant childhood memories. However, this effect was not found to the same extent for those in a negative mood recalling unpleasant experiences. Bower (1981) explained mood congruent recall effects in terms of a cognitive associative network theory and proposed that each emotion is represented by a specific unit in memory, which collects together other aspects of emotion that are linked by associative pointers. Further, each

emotion unit is linked with propositions that relate to life events when that emotion was aroused. Emotion units or nodes can be activated by various external stimuli. When an emotion node is activated, this activation will also spread throughout connected memory structures, which may then raise activation of a relevant memory above the consciousness threshold resulting in emotion congruent recall (Bower, 1981).

Early informational models consistently found that mood affected evaluations and judgements in a congruent manner. For example, mood congruent effects were found in person perception judgements, thus participants in a positive mood formed more favourable impressions and made more positive judgements than those in a negative mood (Forgas & Bower, 1987). Isen, Clark, Shalker, & Karp (1978) found that positive mood affected decision making processes about consumer goods in a congruent manner. They induced a positive mood by giving participants a free gift. Half the participants received a gift and half did not. All participants were then asked to evaluate the performance of consumer items such as their car or television set. Results showed that free-gift participants were in a more positive mood and so gave higher product ratings than those in the no gift condition. Isen et al. interpreted these results in mood congruency terms, suggesting that being in a positive mood meant that evaluations made about products from memory were reflecting this positive bias. Mayer et al. (1992) provided further evidence of mood congruency mechanisms, finding mood congruent judgement effects across a number of variables. For example, using probability estimation questions for a series of either positive or negatively valenced statements, mood congruency effects were found for naturally occurring mood. Mood congruency effects were also examined across a range of positive and negatively valenced specific emotions. Mayer et al. found that mood congruent judgements generalised to when participants were experiencing specific positive or negative emotions. Furthermore, Mayer et al. tested mood congruency effects across a range of tasks including probability judgements, person perception judgements, and categorization judgements, finding that mood congruent judgements occurred across all tasks. The authors thus concluded that rather then mood congruency being limited to certain conditions, mood congruent judgement

was in fact a general effect “caused by a basic-level cognitive process” (Mayer et al., p. 130).

However, as noted above, mood congruent effects were not uniformly observed, especially in the case of negative mood. For example, when asking participants to recall pleasant and unpleasant childhood incidents when either in a happy or sad mood, Bower (1981) found that the bias for happy participants to recall more pleasant than unpleasant incidents was far higher (92%) than the bias for sad participants to recall more unpleasant than pleasant events (55%). These results indicated a stronger mood congruency effect when in a positive than negative mood. Forgas & Bower (1987) examined effects of mood on person perception judgements. When participants were asked to make positive or negative impression-formation judgements about people, the difference in time taken to make positive or negative judgements was far greater for those in a positive mood than those in a negative mood. Positive mood also had a more pronounced effect on the difference between number of positive and negative person-perception judgements made, than the number of judgements made in a negative mood.

The observed lack of symmetry in mood congruent effects with negative and positive moods has been accounted for by suggesting that mood regulation processes may over-ride mood congruency effects. For example Mayer et al. (1982) suggested that when individuals have been induced into a negative mood, through for example the use of film, these individuals may employ mood management processes and thus mood congruent effects may be over-ridden in a desire to regulate their moods. Clark & Isen (1982) called this effect the ‘mood-repair’ hypothesis, i.e. people in a negative mood are more likely to try and use controlled strategies to relieve their negative mood state. According to Erber & Erber (2001) the mood-repair hypothesis provides a convenient account of asymmetrical mood congruency effects. Mood repair hypothesis implies that when in a positive mood, one would see no need to change or regulate the mood state, thus accounting for mood congruent effects. However, the experience of a negative mood state would prime a mood repair motive which is more likely to

result in processing shifts such as the use of systematic processing (Erber & Erber).

2.3 Mood as information

Evidence from mood congruency experiments (e.g. Isen et al, 1978; Mayer et al, 1992) suggested that affect influences judgements and evaluations by facilitating mood congruent recall of information relevant to the target. However, Schwarz & Clore (1998, p. 46) proposed that "the role of mood congruent retrieval in evaluative judgement has been overemphasized". Schwarz & Clore extended the mood congruent processing hypothesises and proposed that individuals evaluating a target will use their affective response to that target as a source of information. This approach examining mood effects on judgement became known as the mood as information model (Schwarz & Clore, 1983, 1988).

Schwarz & Clore (1988) suggested that when making evaluative judgements, one may assess one's feelings toward the target and use them as a basis for their judgement. Furthermore, when a task is complex, rather than processing and reviewing information in a detailed manner, Schwarz & Clore proposed that individuals may simplify the task by asking "How do I feel about it?". Schwarz & Clore thus suggested that when using a "How do I feel about it?" evaluative strategy, individuals misread pre-existing mood states as being a reaction to the target, this explaining why mood congruent evaluations such as positive evaluations when in a positive mood occur. Mood incongruent findings were accounted for by suggesting that when in an unpleasant mood state, people generally are motivated to find personally irrelevant explanations for their mood. Thus when in a negative mood, individuals are more likely to over-ride the "How do I feel about it?" heuristic and search for causes for their mood, resulting in a tendency to attribute their negative mood to a source unrelated to the target that they are evaluating. However, those in a positive mood would be less inclined to search for a cause for their mood, and so are more likely to make mood congruent evaluations (Schwarz & Clore, 1983, 1988).

Schwarz & Clore (1983) demonstrated mood as information effects experimentally by showing that when participants were in a negative or positive

mood and were encouraged to attribute their mood to a salient cause, for example the weather, the effects of sad mood on judgements were eliminated, thus resulting in mood incongruent evaluations. However, the impact of happy moods were less affected. This effect was termed the *discounting effect* (Schwarz & Clore), suggesting that affect is used as information unless "alternative plausible causes for an effect are made salient" (Schwarz & Clore, p. 518), in which case mood is not used a source of information.

Scott & Cervone (2002) found further support for the discounting hypothesis. They examined the impact of negative affect on performance standards. Scott & Cervone suggested that experienced negative affect would induce higher performance standards based on the assumption that negative affect would inform individuals that they are dissatisfied with current levels of performance and would thus lead to setting of higher performance standards. However, the authors predicted that negative mood would influence self-regulatory conditions only if the source of experienced negative mood was nonsalient. Results supported a discounting hypothesis, thus participants reported higher performance standards in the nonsalient negative condition, but not in the salient negative condition. Hence Scott & Cervone suggested that due to the source of induced negative affect being made highly salient, informational value from the negative mood was discounted.

The mood as information model was later extended to account for the way in which the informational value of one's feelings may result in the adoption of different processing strategies. Schwarz (1990) suggested that we feel bad when we encounter the possibility of negative outcomes and conversely feel good when positive outcomes seem likely. Thus, assuming that one is likely to want to obtain a positive outcome and avoid negative ones, negative emotions would inform the individual that the situation is problematic and thus a careful assessment of the situation should be made. Schwarz & Clore (1996) suggest that in the case of negative moods one would be unlikely to rely on heuristic processing strategies which typically involve considering limited amounts of information and employing shortcuts to arrive at a response involving little cognitive effort, but would be more likely to engage in systematic processing styles which are

typically perceived as effortful and occur in novel or problematic situations that necessitate careful thought and consideration. However, positive emotions would generally signal that a situation is benign and little needs changing, thus deployment of heuristic strategies would be more likely (Schwarz & Clore, 1996).

Thus while mood congruency theories such as the mood as information model can account for mood incongruent findings by the presence of overriding processes, Martin & Davies (1998, p. 36) question this "basic over-ride mentality". The issue examined is why mood congruent evaluations should involve basic processing, with mood incongruent evaluations being an over-riding process. Martin and Davies suggest that while the over-riding process accounts for developments reported in the literature e.g. mood incongruent effects, a more plausible approach would be a model that accounts for a variety of effects without the necessity for overriding processes. This is incorporated in the mood-as-input model described below.

2.4 The Mood-as-Input Model

The mood-as-input model (e.g. Martin et al., 1993; Martin, Abend, Sedikides, & Green, 1997; Martin & Davies, 1998; Martin & Stoner, 1996) assumes that the effect of mood, on for example evaluation or processing depends on the context in which the mood is experienced. This model develops the concept of mood being intrinsically linked to certain processing strategies such as mood congruent processing or specific heuristic or systematic processing styles. Instead, the mood-as-input hypothesis holds that it is not current mood *per se* that provides information as to whether one feels that goals for task completion have been met, but that "moods convey their evaluative and motivational implications by serving as information in a configural processing system" (Martin, 2000, p. 156). This approach implies that people process not only information related to how they feel about a target, but also the context in which feelings are experienced (Martin, 2000).

The context dependent nature of the mood-as-input model can thus account for mood incongruent evaluations in a configural processing system depending on the context in which a mood is experienced. Martin (2001)

illustrates the importance of examining the effect of mood in context by asking, while at a funeral of a friend, “what is the implication of experiencing positive feelings?” Martin suggests that it could mean a number of things. For example, you could be coping well, may not have been close to the deceased, or may simply be an unemotional person. The important point is that the implications of the mood can be fully understood only within the context in which the mood is experienced.

Martin et al. (1993) demonstrated that moods experienced in different contexts can have different motivational implications. They asked participants who were either in a positive or negative mood to generate a list of birds’ names. However, to ensure that they could control for the way in which participants would be interpreting their moods, they also manipulated the context or ‘stop rule’ for each mood. Once participants had undergone a negative or positive mood induction, participants were asked to generate a list of birds names using one of 3 stop rules, either (a) when they thought it was a good time to stop, (b) when they no longer enjoyed the task, or (c) when they felt like stopping. Martin et al. found that performance on the item generation task differed depending on the context (stop rule) in which either the negative or positive mood was experienced. Results showed that when in a negative mood and having received instructions to stop when they felt it was a good time to stop, participants took longer and generated a longer list of names than participants in a positive mood using the same stop rule. Conversely, participants in a negative mood with instructions to stop when they no longer felt that they were enjoying the task spent less time on the task, and generated less names than those in a positive mood using an enjoy stop rule. In the control condition where participants were asked to stop whenever they felt like it, those in a positive mood stopped sooner than those in a negative mood.

Martin et al. (1993) interpreted the results of their study by suggesting that the “extent to which they performed the task differed as a function of both their mood and stop rule” (Martin et al., p. 323). Thus the same moods can have different implications for task performance depending on the context, or stop rule in which the mood was experienced. Martin et al.’s findings thus can account for mood incongruent evaluations without a recourse to over-riding processes by

suggesting that it is not only moods which provide information about evaluative questions, but rather it is the context in which the mood is experienced which has motivational implications for task performance.

While mood congruent accounts have found that those in positive moods tend to give more favourable evaluations than people in negative moods (e.g. Mayer et al., 1992), Martin et al. (1997) provided further evidence to support the role of context dependent mood effects by examining mood and role fulfilment. Participants were induced into either a positive or negative mood by viewing happy or sad film clips. They then were asked to read either a happy or sad story, then asked to rate themselves on five empathy measures. Results showed that participants in a happy mood who had read a happy story rated themselves highly on empathy, as mood congruent theories would predict. However, participants in the sad mood condition who read a sad story also rated themselves highly on empathy.

Martin et al. (1997) suggested that rather than mood having an effect on evaluations in a congruent manner, if mood is experienced as part of a configural system "the implications of any given piece of information (including a mood) can change with the context" (Martin et al., p. 243). Here, mood was not important for empathy ratings as being in a negative mood still can lead to positive self-evaluation when the target being evaluated signalled role fulfilment. These findings contradict predictions made by mood congruency models such as the mood as information hypothesis (Schwarz & Clore, 1983, 1988), which suggests that individuals are motivated to maintain positive moods and avoid negative moods. However, based on findings such as those by Martin et al., the mood-as-input hypothesis predicts that rather than being motivated to maintain positive moods, individuals are motivated to attain positive outcomes, which can occur from the experience of a positive or a negative mood (Martin & Davies, 1998). From this perspective both mood congruent and mood incongruent evaluations arise from the same mechanism, thus "mood congruence is neither inevitable nor more basic than mood incongruence" (Martin, 2000, p.159).

2.5 Mood and processing style

Traditionally, the valence of a mood has been found to be synonymous with a specific processing style. For example Worth & Mackie (1987) and as noted above Schwarz & Clore (1996) suggested that moods have links to default processing strategies. Worth & Mackie found that when in a positive mood, individuals were more likely to engage in heuristic rather than systematic processing when exposed to persuasive messages for a short period of time. Schwarz (2001) also suggested that different moods can lead to different processing styles and proposed that a negative mood indicates a problematic situation that requires a higher degree of systematic processing, thus over-riding a reliance on pre-existing heuristic strategies. However, the mood-as-input model makes no specific assumptions about links between mood-valency and processing style. Martin (2000) suggests that the extent to which individuals process heuristically or systematically is determined by their confidence that heuristic or systematic processing will provide an acceptable outcome in a certain situation. Confidence is determined by the current mood and the context in which the mood is experienced.

Assuming that the context in which individuals process their moods can be conceptualised as stop rules as in the Martin et al. (1993) study. If participants are told to process until they have done enough, Martin (2000) suggests that they will be asking, implicitly or explicitly, “Have I done enough to reach my goal?”. Individuals in a positive mood tend to process less than those in a negative mood as positive moods tend to imply progression towards one’s goals, whereas negative moods signal a lack of accomplishment (Cervone, Kopp, Schaumann, & Scott, 1994). However, if the stop rule applied to the task is “Am I enjoying the task?”, those in a positive mood will process to a greater extent than those in a negative mood as their positive mood signals that they are enjoying the task at hand (Martin, 2000).

Further evidence examining the effects of an interaction between mood and explicit goal (stop rule) manipulation comes from work by Sanna, Turley, & Mark (1996). The authors showed that when using the stop rule to “do as much as they could”, participants in a negative mood persisted at the task for longer than

those in a positive mood. Again, this demonstrating that when one is trying to do as well as possible at a task, a negative mood would indicate that progress towards the goal is not being made, or is not 'good enough' to justify ending the task. However, when participants were working under a goal of "to continue until they no longer enjoyed the task", those in a positive mood exerted more effort and persisted for longer at the task than those in a negative mood. Furthermore, Sanna et al., found these mood and stop rule interaction effects whether or not the individual was being evaluated. Normally, when one is aware that they are being evaluated on a task, more effort is applied to the task at hand. However, in this case the authors found that the mood and stop rule interaction on performance occurred regardless of the social evaluation performance effects usually seen. This led the authors to conclude that the mood and stop rule interaction effects on performance were a robust effect that may "have relevance for the structuring of a variety of performance situations" (Sanna et al., p. 333).

Sanna, Parks, & Chang (2003) provide further evidence that the same moods can have different implications for task performance depending on the context in which the mood was experienced. In this experiment, context was manipulated by providing participants with the goal of either to compete or cooperate on a computerised resource dilemma task. Participants caught fish that they could keep for their own profit, but if the stock of fish (in a lake) fell below100, all profits (fish) would be confiscated. Participants believed they were playing against a competitor. Sanna et al. manipulated the way in which competitive or cooperative goals were interpreted in a negative or positive mood. In study 1 participants in the competitive goal condition were told to ask themselves "Have I taken as many fish as I can?" and if the answer was yes they were to stop, if the answer was no, they were to continue. In the cooperative condition they were told to ask themselves "Have I returned as many fish as I can?", again if the answer was yes, they should stop returning fish, and if no, then they should continue. Conversely, in study 4 participant's goal instructions were framed in terms of enjoyment. In the competition instruction they were instructed to ask themselves whether they were enjoying the goal of taking as many fish as possible. If their answer was yes, they should continue, if it was no then they were instructed to stop. In the cooperative competition participants were instructed to

ask themselves whether they were enjoying putting back as many fish as they could, if yes they should continue and if no, they should stop.

Interestingly, Sanna et al. (2003) found that in study 1, of those using a cooperation goal participants in a negative mood were more cooperative than those in a positive mood, thus they opted to continue to return more fish than those in a positive mood, conversely, when the goal was competitive, those in a negative mood were less cooperative, thus more competitive when in a sad than in a positive mood. Sanna et al. suggested that people in bad moods interpret those moods to mean that they had not yet competed enough or not yet cooperated enough, in other words, their bad mood signals a lack of goal fulfilment. However, in study 4, when goals were framed in terms of enjoyment, those in positive moods were more competitive and cooperative than those in negative moods. Sanna et al. suggested that in study 4, experiencing positive mood cued greater enjoyment, thus participants persevered at the task. These studies provide further evidence for a mood-as-input mechanism (e.g. Martin et al., 1993; Martin et al., 1997). For example, results suggest that there is no explicit link between mood and cooperation or competition, rather that the same mood can lead to either increased or decreased competition or cooperation, depending on the goals in which the mood is interpreted (Sanna et al.). These findings lend further support to the idea that moods can have different performance implications depending on the context in which they are experienced.

A review of the literature reveals that a number of studies have demonstrated how the effects of mood on processing are determined by the stop rules, or context in which the mood is experienced (e.g. Martin et al., 1993, Martin et al., 1997; Sanna et al. 1996, Sanna et al., 2003). Martin (2000) proposes that a strong version of mood-as-input theory would predict that mood has no specific motivational implications for processing, unless mood is interpreted concurrently with stop rules. The mood-as-input hypothesis has demonstrated how different configurations of negative and positive mood and stop rules can affect motivation to process and evaluative judgements. However, whether mood-as-input predictions occur with specific moods of the same valence remains to be investigated.

2.6 Specific Negative Moods and Processing

Lerner & Keltner (2000) propose that one major shortcoming of valenced based approaches such as the mood as information model (e.g. Clore, 1992; Schwarz, 1990; Schwarz & Clore, 1983, 1988) and the mood-as-input model (e.g. Martin & Davies, 1998; Martin, Ward, Achee & Wyer, 1993) is that they fail to take into account how different emotions of the same valence differentially effect processing, motivation, or judgments. If a strong version of the mood-as-input model (Martin 2000) predicts that moods have no implications for processing, one would also expect that different moods of the same valence, for example specific negative moods would have no implications for processing, unless they are interpreted in the context within which they are experienced. However, Lerner & Keltner suggest that emotions differ in their antecedent appraisals and thus one may expect specific emotions of the same valence to exert differential effects on processing. Raghunathan and Pham (1999) also suggest that specific moods of the same valence have differential influences on decision making processes. Examining the affects of sadness and anxiety on gambling decisions showed a distinction in the types of decision processes made depending on the concurrent mood. The authors suggested that these discrete negative moods may prime different goals. For example, anxiety may prime the individual to the goal of uncertainty reduction, thus causing anxious individuals to choose a low risk/low reward tactic in a gambling decision process, while sadness would motivate the goal of reward replacement, leading sad individuals to opt for a high risk/high reward gambling option. Similarly, DeSteno, Petty, Rucker, Wegener, & Braverman (2004) propose that specific emotions can have distinct effects on the persuasive impact of messages, suggesting that “the ability to experience distinct emotions should result in their differential influence on many cognitive and motivational processes.” (DeSteno et al, 2004, p. 44).

Cognitive appraisal theories (e.g. Frijda, 1986; Lazarus, 1991; Smith & Ellsworth, 1985) suggest that different appraisals of events can give rise to the occurrence of different discrete emotions depending how a particular event is appraised by an individual. As suggested by Lerner & Keltner (2000, p. 475) “emotions of the same valence differ in their antecedent appraisals”, hence

indicating that discrete emotions of the same valence may have different influences in judgement or processing. For example, Smith & Ellsworth (1985) proposed that individual emotions have a unique corresponding appraisal pattern. Patterns of appraisal were not related to valence, for example, emotions of a negative valence such as disgust and anger were found to be characterised by feelings or appraisals of certainty, yet sadness, also a negatively valenced emotion, was also found to be characterised by feelings of uncertainty. Further, positively valenced emotions such as happiness and pride were characterised by a feeling of certainty, yet emotions of interest and hope received appraisals of less certainty (Smith & Ellsworth). The way in which specific emotions are believed to exert distinct influences on judgements and choice are described by Lerner & Keltner as appraisal tendencies, thus the corresponding appraisal relating to a specific emotion drives goal directed processes which affect judgement and choice. This suggests that specific emotions of the same valence can exert differential effects on processing. Thus one of the key elements of appraisal theories is that the way in which an individual interprets an event influences their emotional reaction to it. In this way emotions are not considered to be hardwired, but depend upon “adaptive responses to the demands of the environment” (Smith & Ellsworth, 1985, p. 836).

Lerner & Keltner (2000) found that specific emotions of the same valence can have opposite effects on perceptions of risk. They hypothesised that despite anger and fear both being negatively valenced emotions, they would result in different risk assessments as they differed in their antecedent appraisal tendencies with anger being characterised by high appraisals of certainty and fear by low certainty appraisals. Participants were assessed on their dispositional ratings of fear and anger, then completed a risk perception questionnaire. Results showed that those who were fearful and thus less certain made more pessimistic assessments of future events, whereas those who were angry made more optimistic judgements. These findings correspond with an appraisal tendency approach where emotions high in certainty such as anger are characterised by appraisal themes of perceiving negative events as predictable and under control. Conversely, fear is perceived as an emotion associated with uncertainty characterised by perceiving negative events as unpredictable and under situational

control (Lerner & Keltner, 2000). Lerner & Keltner (2001) replicated these results with both naturally occurring and experimentally induced anger and fear. Examining the importance of informational value of discrete emotions, Lerner & Keltner (2001, p. 155) propose that concerning emotions and judgements "dimensions of emotion other than valence may have as much (or more) impact than valence does". These findings may have implications for the effects of specific negative moods on processing. For example, if specific moods of the same valence are characterised by differing appraisals (e.g. Lerner & Keltner, 2000, 2001; Smith & Ellsworth, 1985), this could have implications for the way in which specific negative moods provide information for evaluative judgements and goal achievement.

Further examination of the influence of specific emotions on processing has found that specific negative emotions of sadness and anger had differential influences on causal judgements. Keltner, Ellsworth, & Edwards (1993) showed that participants who had been induced into an angry mood perceived an ambiguous event as more likely to be caused by other people, as opposed to sad participants who perceived ambiguous events as more likely to have situational causes. Keltner et al. proposed that these differences were due to anger and sadness having different appraisal patterns, thus suggesting that judgements are prone to be characterised by one's emotional state. Raghunathan and Pham (1999) also found that emotions of the same valence had differential effects on the types of decision making processes made by sad and anxious individuals. The authors suggested that these discrete negative moods may prime different goals. For example, anxiety may prime the individual to the goal of uncertainty reduction, thus causing anxious individuals to choose a low risk/low reward tactic in a gambling decision process, while sadness would motivate the goal of reward replacement, leading sad individuals to opt for a high risk/high reward gambling option. Further, Tiedens & Linton (2001) propose that heuristic and systematic processing are not related to the valence of a particular mood, but rather the certainty appraisal related to a specific mood. Thus moods associated with uncertainty such as sadness and fear are more likely to result in more thorough processing than moods such as anger and disgust which are associated with certainty.

To summarise, evidence suggests that specific negative moods can exert differential effects on judgements and evaluations. Cognitive appraisal theorists (e.g. Smith & Ellsworth, 1985) suggest that emotion experience can be differentiated in terms of appraisal dimensions, with emotions of the same valence differing in their antecedent appraisals. In this way, an event can result in different emotion experience depending on how an individual appraises the event. An important aspect of appraisal theories in relation to specific negative moods is that specific negative moods of the same valence have been found to differ in the way that they are associated with a specific set of appraisals. Specific negative emotions have been found to have differential effects on evaluations such as risk (Lerner & Keltner, 2000) and social perception (Keltner, et al., 1993). Specific negative emotions have also been shown to prime different goals in gambling decisions (Raghunathan & Pham, 1999) and have differential effects on processing (Tiedens & Linton, 2001). This evidence would seem to suggest that there is a more fine-grained approach to the influence of emotion on cognitions than valence alone, but that specific emotions of the same valence can also have differential effects on judgements and evaluations.

2.7 Summary and conclusions

Examining the mechanisms that underlie the relationship between moods and processing, researchers have demonstrated a complex interplay between affective states and information processing. Mood congruency theorists (e.g. Bower, 1981; Isen et al., 1978; Mayer et al., 1992) found evidence for mood congruent effects in a number of areas such as recall (Bower et al., 1978), evaluative judgements (Forgas & Bower, 1987), and decision-making processes (Isen et al., 1978). However, mood congruent effects are not uniformly observed, especially in the case of negative moods (Bower, 1982; Forgas & Bower, 1982). Finding that mood congruency is not a uniform effect led to informational models suggesting a more complex interplay between mood and cognitions. The mood as information model (Schwarz & Clore, 1983, 1988) suggests that individuals use their feelings as a source of information when considering their reaction to a target. Schwarz & Clore (1988) suggested that this “How do I feel about it?” strategy can lead individuals to miss-read pre-existing mood states as being a

reaction to a target, thus resulting in mood congruent evaluations. However, mood incongruent evaluations were accounted for by suggesting that when individuals are in a sad mood state, they would be motivated to look for a personally irrelevant explanation for their mood, thus being more likely to over-ride the "How do I feel about it?" heuristic and attribute their negative mood to a source unrelated to the target being evaluated. This *discounting effect* (Schwarz & Clore, 1983) can thus account for mood incongruent evaluations.

Thus while informational accounts (Schwarz & Clore, 1982, 1988) are able to account for both mood congruent and mood incongruent processing, one criticism levied at such accounts is why mood congruent processing should be explained in terms of an over-riding process (Martin & Davies, 1998), that is, why should mood congruent evaluations be a more basic process that incongruent ones? The mood-as-input model (e.g. Martin et al., 1993; Martin & Davies, 1998) overcomes such criticisms by proposing that the motivational implications of moods are part of a configural processing system, also highlighting the context in which the mood is experienced as an important factor in evaluative judgments. The mood-as-input model would suggest that moods themselves do not have motivational implications for processing, but rather it is the context in which the mood is experienced which manipulates motivation for processing (e.g. Martin et al., 1993; 1997; Sanna et al., 1996, 2003). The mood-as-input model suggests no link between the valence of the mood and processing motivation. However, a criticism of valenced based models such as the mood-as-input hypothesis is their failure to account for how specific emotions of the same valence can effect processing (Lerner & Keltner, 2000). Appraisal theorists (e.g. Lerner & Keltner 2000, 2001; Smith & Ellsworth, 1985) suggest that discrete emotions of the same valence can exert differential effects on processing. Further evidence suggests that specific negative emotions of the same valence prime different goals (Raghunathan & Pham, 1999). Thus it remains unclear whether specific emotions of the same valence would result in differences in motivational processing when for example examined in a mood-as-input paradigm.

3 Mood-As-Input in the Context of Psychopathology

3.1 Introduction

Emotions are a key feature of psychopathology with the Diagnostic and Statistical Manual of Mental Disorders (4th edition; DSM-IV-TR, American Psychiatric Association, 2000), categorising both Generalised Anxiety Disorder (GAD) and Obsessive Compulsive Disorder (OCD) as anxiety disorders. This chapter will examine perseverance-based anxiety disorders such as OCD and GAD in relation to the mood-as-input hypothesis (Davey, Eldridge, Drost, & MacDonald, 2007; Davey, Startup, MacDonald, Jenkins, & Patterson, 2005; Davey, Startup, Zara, MacDonald, & Field, 2003; MacDonald & Davey, 2005a,b; Startup & Davey, 2001, 2003), and examine how specific emotions may affect perseveration in a mood-as-input framework.

3.2 Common Features of Perseverative Psychopathologies

A recurrent feature in anxiety disorders is repetitive and recurrent thought or behaviours (Davey, Field, & Startup, 2003). One of the central features of GAD is "excessive anxiety and worry…(which) the individual finds difficult to control" (DSM-IV-TR, APA, 2000, p. 472). A similar iterative thought pattern is inherent in OCD, which is characterised by "recurrent and persistent thoughts…(and) repetitive behaviours" (DSM-IV-TR, APA, p. 426). While DSM criteria clearly highlight worry as one of the central features of GAD, obsessive compulsive symptoms such as compulsive checking have also been reported in sufferers of GAD (Schut, Castonguay, & Borkovec, 2001; Tallis & de Silva, 1992). Another form of iterative thought pattern is manifest in mood disorders such as depression, where rumination is considered one of the maintaining components of depression (Moberly & Watkins, 2008; Nolen-Hoeksema, 1991;Watkins & Mason, 2002).

One of the key questions in examining the aetiology of these disorders is why individuals suffering from GAD and OCD experience persistent worry and

anxiety to the extent where their behaviour becomes uncontrollable and distressing. Common factors present in perseverative psychopathologies such as GAD and OCD are increased negative affect and ruminative thought patterns. For example Frost, Sher, & Green (1986) found that checkers as compared with non-checkers were significantly more depressed. Negative mood has also been found to be a feature of perseverative worrying. Davey, Eldridge, Drost, & MacDonald (2007) found that over the course of a catastrophising task participants showed increases in negative mood and decreases in positive mood. Implications of these findings will be discussed in more detail below. A second factor common to perseverative rumination is repetitive thought, which as noted by Davey et al. (2003) is a recurrent feature in anxiety disorders. According to Watkins (2008) repetitive thought is linked to increased negative affect, vulnerability to depression, and to anxiety. Thus it would seem that important factors underlying perseverative psychopathologies such as GAD and OCD include increased negative affect and a perseverative or repetitive thinking style. As highlighted by Schut et al. (2001) there are commonalities between worry, which is a central feature of GAD and compulsive behaviours, a central feature of OCD. Notably there was a high incidence of compulsive checking in GAD sufferers. One explanation for this finding is that GAD sufferers who experience compulsive behaviours also experience alexithymia and thus have difficulty in identifying and describing their feelings. Schut et al. suggest that it is this possible avoidance of affective experience that may be associated with an increase in compulsive checking behaviours. In the light of the aforementioned commonalities, Davey et al. (2005) suggest that perseverative psychopathologies may be more usefully understood by examining underlying mechanisms that are common across disorders, rather than examining disorders in isolation.

One theory that has attempted to examine underlying mechanisms in perseverative psychopathology is the mood-as-input model (Martin, Achee, Ward, & Wyer, 1993; Martin & Davies, 1998), which proposes that certain moods are not linked to specific default processing strategies, but it is the context in which the mood is experienced that has implications for performance. Martin (2000) proposes that it is not current mood *per se* that provides information about whether an individual's goals for task completion have been met, but that moods

convey information as part of a configural processing system. This approach suggests that people process not only information about how they feel about a target, but also the context in which the feelings were experienced. Specifically the mood-as-input model has been applied to perseverative worrying (Davey et al., 2007; Davey et al., 2005; Startup & Davey, 2001, 2003), perseverative checking (Davey et al., 2003; MacDonald & Davey, 2005a,b), and depressive rumination (Watkins & Mason, 2002).

3.3 Catastrophic Worry

Worry is a natural part of day-to-day life, however in the context of psychopathology the most pertinent questions examine how normal worry and pathological worry differ. Beck (1976) describes observing automatic thoughts in anxious patients as being specific and non-deliberative in style, but to occur as if by automatic reflex. This style of negative automatic thinking is further exemplified in Beck's explanation of catastrophising, a common occurrence in anxious patients whereby the patient "illustrates anticipation of extreme adverse outcomes" (Beck, p. 93). Similarly Kendall & Ingram (1987) proposed that anxious individuals possess an automatic questioning style consisting of "what if?" questions, which functions to maintain uncertainty and thus the anxious state self perpetuates itself.

3.3.1 Problem-solving and Pathological Worry

Central to an explanation of catastrophic worry is the question of why worriers continue to worry for significantly longer than non-worriers (Vasey & Borkovec, 1992). There are a number of features known to be characteristic of pathological worry. For example, worriers are known to experience avoidance coping, responsibility for negative outcomes, and poor problem-solving confidence (Davey, Hampton, Farell, & Davidson, 1992). Specifically, Davey et al. performed three questionnaire studies in which they attempted to identify ways in which trait anxiety can be considered separate to pathological worry. Results suggested that worry and anxiety differed in a number of characteristics, with the authors concluding that worry and anxiety could be considered as separate constructs. Worry was found to be characterised by problem-focused coping

strategies, information-seeking and monitoring coping strategies, and the tendency to define events as threats. However it is important to note that there was still a high correlation between levels of anxiety and worry (Davey et al., 1992). Interestingly Davey, Tallis, & Capuzzo (1996) found that while negative consequences of worrying relate to poor problem-solving confidence, worriers also perceived worrying as a positive and necessary process which helped to avoid potential future catastrophes.

Further support for worrying as a problem-solving activity came from work by Davey, Jubb, & Cameron (1996). Participants were asked to complete real-life problem scenarios and were given false feedback on their performance depending whether they had been allocated to an increased or decreased problem-solving condition. Participants also received either a positive or negative mood induction, resulting in four experimental conditions. Once they had undergone the initial manipulation procedure participants were asked to take part in a catastrophising interview. The catastrophising interview technique developed by Vasey & Borkovec (1992) asks participants to identify a current main worry. The experimenter then asks the participant, “what is it that worries you about X?”, where X is the current worry topic. When the participant gives an answer the experimenter then takes that answer and asks the same question, “what is it that worries you about X?”, but substituting the original problem with the answer just given. The dependent variable is the number of catastrophising steps generated by the individual. The interview is terminated either when the participant cannot think of another response, or when the same or similar answer is given three or more times. Using this interview format allows the depth of the worry and the amount of time spent ruminating on a worry to be assessed (Davey et al., 1996). Results showed that those who had decreased problem-solving confidence generated a significantly greater number of catastrophising steps than those who had increased problem-solving confidence. However, it is important to note that poor problem-solving is not the only factor involved in increased perseveration; concurrent mood must also be taken into account. For example, participants in the decreased problem-solving confidence condition reported higher levels of anxiety, but not sadness, than those in the increased problem-solving confidence condition.

Davey et al. (1996) suggested that low levels of problem-solving confidence may exacerbate worrying by thwarting effective problem-solving.

3.3.2 The Perseverative Iterative Style of the Catastrophising Process

The catastrophising interview developed by Vasey & Borkovec (1992) as described above has been used to examine many facets of catastrophic worry. Vasey & Borkovec found that worriers generated a significantly greater number of catastrophising steps than non-worriers and reported increased subjective discomfort as catastrophising progressed. Vasey & Borkovec took these results as evidence that worriers brought a specific cognitive style to the worry process, such as that described by Kendall & Ingram's (1987) "what if?" automatic questioning style. Furthermore, Vasey & Borkovec implied mood congruency effects in worrying by proposing that worriers heightened anxiety may increase availability of threat-related information in memory. To further examine the iterative style of worriers, Davey & Levy (1998) performed six experiments using the catastrophising interview technique. The experimenters used an analogue population of students. Participants were asked to complete the Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990) and then asked to identify a current main worry, which was then subjected to the catastrophising procedure as described above. Participants were then asked to think of a happy topic, then try to imagine it as a worrying feature on their life. Results showed that PSWQ scores significantly predicted the number of catastrophising steps generated when thinking about a positive topic. This suggests that the iterative style brought to a catastrophising scenario is not specifically linked to negative topics, nor is increased rumination related to rehearsal of information from existing worries (Davey & Levy).

Davey & Levy (1998) suggested that worriers may have spent longer than non-worriers identifying and assessing threatening aspects of a happy topic, thus accounting for increased rumination as compared with non-worriers, even when thinking about a positive topic. To examine this possibility Davey & Levy conducted a further study whereby participants were asked to catastrophise on a worry they were unlikely to have considered before. Here, participants were asked to imagine that they were the Statue of Liberty and that this was worrying for

them; they then completed the catastrophising task with this scenario as their worry topic. Participants were also separately asked to catastrophise on a separate main worry topic. Results showed that there were significant correlations between PSWQ scores and the number of catastrophising steps generated for the main worry, and for the number of steps generated for the hypothetical worry. One possible explanation for these findings was that worriers bring to a worry task an "exacerbated iterative style to "what if?" internal dialogues" (Davey & Levy, 1998, p. 579) regardless of the novelty of the worry topic. To examine whether the valence of the worry topic was an important feature in catastrophising, participants were also asked to take part in a reverse catastrophising procedure using the Statue of Liberty topic, i.e. they were asked to generate responses about what is good about being the Statue of Liberty. Results showed that a significant correlation between PSWQ scores and the number of steps generated for a main worry and for the number of positive topic steps (Davey & Levy).

Davey & Levy (1998) further examined the content of worry topics at the outset and termination of worry sequences. Results suggested that personal inadequacy was an important feature of the catastrophising process both in how worriers conceptualised the initial worry topic and in the final catastrophising worry steps, independent of the worry topic (Davey & Levy). To summarise, these series of experiments confirmed that worriers are more likely to catastrophise negative and positive aspects of a novel hypothetical worry than non-worriers, indicating an iterative style that is independent of the valency of the task. Furthermore, personal inadequacy in high worriers was a feature of catastrophising regardless of the worry topic (Davey & Levy).

3.4 Mood-as-Input and Catastrophic Worrying

Given that worriers show increased catastrophising regardless of the valency of the iterative task (Davey & Levy, 1998) it is unlikely that mood congruency effects (e.g. Bower, 1981, Vasey & Borkovec, 1992) underlie generation of catastrophic thought patterns. Furthermore, empirical evidence examined above suggests a number of key elements involved in catastrophic worry, namely that decreased problem-solving confidence is related to increased worrying (Davey et al., 1996). Thus worriers will catastrophise not only on a

current worry for significantly longer than non worriers (Vasey & Borkovec), but also on a positive aspect of their life and a hypothetical worry scenario, suggesting an exacerbated “what if?” questioning style regardless of the valency of the task (Davey & Levy, 1998). One theory that has provided an account of the mediating relationship between mood and cognitive style in catastrophic worrying is the mood-as-input hypothesis (Davey et al., 2007; Davey et al., 2005; Startup & Davey, 2001, 2003).

Startup & Davey (2001) examined how different combinations of mood and stop rule use may be implicated in catastrophic worrying. To examine the hypothesis that worriers possess an iterative style regardless of the valency of the task, Startup & Davey asked participants in either a positive, neutral, or negative mood to catastrophise on what would be worrying about being the Statue of Liberty, using the catastrophising task devised by Vasey & Borkovec (1992) as described above. In a separate condition participants were asked to take part in a reverse catastrophising interview where they were asked to catastrophise on what is good about being the Statue of Liberty, as described above in the study by Davey & Levy (1998). Results showed that regardless of whether participants catastrophised on a positive or negative topic, those in a negative mood condition generated a significantly greater number of catastrophising steps than those a neutral or positive mood condition. Startup & Davey interpreted these results within a mood-as-input framework, suggesting that if both positive and negative catastrophising tasks are conceived of as problem-solving attempts, this could generate an implicit “as many as can” stop rule (cf. Martin et al., 1993). Thus regardless of the valence of the iterative task itself, felt negative mood would provide the individual with information that the task had not yet been satisfactorily completed, hence participants increased perseveration in each negative mood condition (Startup & Davey).

As indicated by Startup & Davey (2001), it is assumed that worriers who are in a negative mood are using an “as many as can” stop rule. To further examine the effects of stop rule and mood on catastrophising, in experiment 2, Startup & Davey explicitly manipulated stop rule by asking participants to complete a negatively or positively valenced item generation task either using an

"as many as can", or "feel like continuing" stop rule. In order to examine the effects of stop rule use on high and low worriers, Startup & Davey performed a tertile split on participants Penn State Worry Questionnaire scores (PSWQ, Meyer et al., 1990). Interestingly, when using an "as many as can" stop rule, high worriers generated significantly more items and spent significantly more time on the task than low worriers. However, when using a "feel like continuing" stop rule, high worriers generated less items and spent less time on the task than low worriers. Startup & Davey propose that these results provide further support for a mood-as-input account of catastrophic worrying in that the context (i.e. stop rule) that high worriers performed the task in resulted in differences in perseveration. Furthermore, assessment of participant's mood revealed that worriers reported significantly higher levels of sadness and anxiety than low worriers. Again, this supports a mood-as-input account of perseverative worry whereby high worriers would bring a negative mood to a task, this negativity then interacting with implicit or explicit "as many as can" stop rule use to result in increased perseveration.

The interaction between worry and stop rule use was further examined in experiment 3 (Startup & Davey, 2001). Here, high worriers were asked to catastrophise on a current personal worry, those using an "as many as can" stop rule generated a significantly greater number of catastrophising steps than the low worry condition. When asked to use a "feel like continuing" stop rule, high worriers generated fewer (but not significantly) steps than non-worriers. Startup & Davey suggest these results are indicative that worriers do not have a perseverative style that is independent of stop rule, as demonstrated by high worriers differential performance depending on the stop rule being used. The finding that high worriers generate a significantly greater number of steps than low worriers when using an "as many as can" stop rule was suggested by Startup & Davey to support previous research (e.g. Davey et al, 1996) which indicates that worriers view worrying as a problem-solving task.

Startup & Davey's (2001) findings are consistent with a mood-as-input account of catastrophic worrying in that the manipulation of stop rule use in high worriers led to differential perseveration depending on the stop rule specified.

Startup & Davey suggest that negative mood brought to the catastrophising task by high worriers increases the likelihood of perseveration as the negative mood in an “as many as can” context indicates that what is considered essentially as a problem-solving task has not been completed. If mood-as-input theory is to be considered a parsimonious account of catastrophic worry, it is necessary that worriers are a) experiencing increased negative mood and b) adopting the use of “as many as can” stop rules.

Startup & Davey (2001, study 2) found that high worriers reported significantly higher levels of negative mood than low worriers before an item generation task. Startup & Davey (2003) extended an examination of mechanisms underlying perseverative worry by examining whether high worriers possess characteristics that would lead them to naturally adopt “as many as can” stop rule use, which, as predicted by mood-as-input theory would interact with negative mood to produce increased perseveration. Startup & Davey (2003) examined both naturally occurring and experimentally manipulated responsibility with the aim of exploring whether high worriers experience inflated levels of responsibility, this being a characteristic which could contribute to the adoption of “as many as can” stop rule use in task performance (Startup & Davey, 2003). Examining naturally occurring stop rules, after every 2 steps in the catastrophising interview participants were asked to rate from 0 – 100 on a visual analogue scale (VAS) the extent to which they felt a sense of responsibility that the issues have not yet been fully considered (where 0 = not at all responsible and 100 = extremely responsible). Participants were asked to catastrophise on either a hypothetical or a current worry. Results indicated that high worriers as compared to low worriers, disregarding whether they catastrophised on a main worry or hypothetical worry, experienced an elevated sense of responsibility that all issues relating to the worry topic had been fully considered.

In a second study Startup & Davey (2003) experimentally manipulated responsibility by asking participants to take part in a interview about worries they may have about issues of dyslexia, informing them that their answers may be used in a booklet for publication which may influence the budget received by students. In this way, participants were led to believe their answers would have

consequences for others, thus engendering a greater sense of responsibility. In the low responsibility condition participants were informed that their answers were of no real importance beyond the purpose of the experiment. Participants also either received a sad, happy, or neutral mood induction. Results indicated that those in a negative mood generated significantly more catastrophising steps than those in a positive mood, regardless of whether they were in a high or low responsibility condition. Furthermore, high responsibility participants showed greater perseveration at the task when in a negative than in a positive mood, yet those in the low responsibility condition showed greater persistence when in a positive mood.

Startup & Davey (2003) explain their findings in mood-as-input terms by suggesting that those in a low responsibility condition are naturally adopting a "feel like continuing" stop rule, thus explaining their increased persistence at the task when in a positive, but not a negative mood. These results begin to indicate some of the mechanisms that may underlie catastrophic worrying. In terms of a mood-as-input account of catastrophic worry Startup & Davey (2001) found that "as many as can" stop rule use manipulated perseveration in high worriers. Building on these findings, work by Startup & Davey (2003) suggests that one mechanism which may drive high worriers to adopt "as many as can" stop rule use is negative mood and high responsibility towards fully considering all the issues related to a worry topic.

Thus Startup & Davey (2001, 2003) have shown, as predicted by mood-as-input theory, that a combination of "as many as can" stop rule use and negative mood is related to increased catastrophic worry as measured by a catastrophising interview (Vasey & Borkovec, 1992). Of importance for further study is to understand mechanisms that underlie worry, i.e. why do worriers perceive it is useful to persist at worrying, and what is it that leads worriers as opposed to non-worriers to adopt "as many as can" stop rules? Startup & Davey (2003) found that responsibility toward considering all issues relating to a worry topic was one factor that manipulated natural adoption of either "as many as can" or "feel like" stop rule use in a catastrophising paradigm. Davey et al. (2005) provide further examination of stop rule use as a feature of pathological or catastrophic worry. Of

notable importance is how stop rule use is implicated in catastrophic worry. Davey et al. performed a questionnaire study asking participants to complete a Worry Stop Rule Checklist (Kato, MacDonald, & Davey, unpublished, cited Davey et al.). This consists of a 10-item scale with items related to an "as many as can" approach to worrying and a 9-item scale relating to a "feel like continuing" approach to worrying. Participants also completed the PSWQ (Meyer et al., 1990), the Consequences of Worry Scale (COWS, Davey, Tallis, & Capuzzo, 1996), the Obsessive Beliefs Questionnaire (OBQ, Bhar et al., 2003), and the Personal Feelings Questionnaire (PFQ, Harder & Lewis, 1987). Results indicated significant correlations with scores on the "as many as can" sub scale of the stop rule check list and measures of shame, guilt, measures of trait worry, and beliefs about the negative and positive consequences of worrying (Davey et al.). Interestingly, there was no significant correlation between "as many as can" stop rule use and responsibility, despite Startup & Davey (2003) finding that increased responsibility to considering all issues relating to a worry topic was a factor that led to increased perseveration in the presence of negative mood. However, Davey et al. note that the responsibility scale of the OBQ is specifically related to measurement of responsibility in OCD, and that inflated responsibility in OCD may be different to inflated responsibility concerns of pathological worriers, thus offering a possible explanation for this result.

Results from the above study suggest a relationship between "as many as can" stop rule use and a) trait measures of worry, b) beliefs about positive and negative consequences of worry (Davey et al., 2005). A second study by Davey et al. sought to further examine how stop rules are implicated in perseveration by examining the relationship between reported natural stop rule use and perseveration on a catastrophising task. Participants were asked to complete VAS measures of sadness, happiness, and anxiety, then a stop rule check list measuring participants ratings on measures relating to "as many as can" or "feel like continuing" stop rule use. Participants then took part in a catastrophising interview as detailed in studies by Startup & Davey (2001) where they were asked to catastrophise on a current main worry. Results showed significant correlations between "as many as can" stop rule use as measured by the stop rule check list and number of catastrophising steps generated in the catastrophising interview.

Importantly, scores on the “as many as can” stop rule scale were better predictors of perseveration on the catastrophising task than measures of trait worrying as measured by the PSWQ, trait anxiety as measured by the Stait-Trait Anxiety Inventory (STAI Y-2) (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983), and mood measures taken prior to the catastrophising interview. Thus Davey et al. suggest that “as many as can” stop rule use is strongly related to perseverative worry.

Davey et al. (2005) provide greater depth of knowledge concerning the relationship between stop rule use and catastrophic worry. However, mood-as-input theory would predict that increased perseveration during a worry bout would occur when the individual is employing “as many as can” stop rules and experiencing negative mood (cf. Startup & Davey, 2001). In attempting to further elucidate the mechanisms that underlie catastrophic worry, Davey et al. (2007) examined how mood and stop rule use change over the course of a worry bout. Examining naturally occurring mood, participants were classified as high or low worriers depending on PSWQ (Meyer et al. 1990) scores (cf. Startup & Davey). Participants were asked to take part in a catastrophising interview (as utilised by Davey & Levy, 1998; Startup & Davey) using either an “as many as can” stop rule, or a “feel like continuing” stop rule. After every 2 catastrophising steps participants were asked to fill in 100-point VAS scales measuring sadness, happiness and anxiety. Results supported previous findings (e.g. Vasey & Borkovec, 1992) suggesting that worriers experience greater increases in negative mood across the catastrophising task. Davey et al. found that in high worriers, negative mood increased and positive mood decreased through the progression of the catastrophising task, regardless of the stop rule that participants were currently employing. Davey et al. highlight the finding that only increases in sad mood were reported across the catastrophising task, but not anxious mood. The potential implications of this result will be discussed below in an examination of the effects of specific negative moods.

Davey et al. (2007) concluded that worriers appear to experience an increase in subjective negative mood across the course of a worry bout. This does not support a mood-as-input hypothesis, as for high worriers to terminate a worry

bout their mood state would need to shift from negative to positive whilst employing an “as many as can” stop rule. Davey et al. thus examined the possibility that in terminating a worry bout, worriers do not experience a change in experienced negative mood, but change their stop rule use from an “as many as can” to a “feel like continuing” stop rule. Thus as predicted by previous mood-as-input experiments (e.g. Martin et al., 1993), using a “feel like continuing” stop rule whilst in a negative mood would result in earlier termination of a perseverative task than when using the same stop rule whilst in a positive mood.

Davey et al. (2007) examined stop rule use by asking participants to complete a Worry Stop Rule Checklist (Kato et al., unpublished, cited Davey et al.), 100-point VAS of sadness, happiness, and anxiety at the out set of a catastrophising interview (cf. Vasey & Borkovec, 1992; Startup & Davey, 2001), the PSWQ (Meyer et al., 1990), and the Hospital Anxiety and Depression Inventory (HADS; Zigmond & Snaith, 1983). At the outset of the catastrophising task participants were asked to note down a current main worry, then complete a VAS shortened version of the Worry Stop Rule Checklist consisting of 4 statements, 2 representing items of “as many as can” stop rule use and 2 representing items of “feel like continuing” stop rule use. Each item was rated on a 100-point VAS scale. Participants then completed the catastrophising task, but were asked to stop after every two catastrophising steps and complete the shortened VAS Worry Stop Rule Check list.

Results showed that at the outset of the catastrophising task correlations between PSWQ scores and VAS mood measures indicated that high worriers reported significantly higher levels of sadness and anxiety than low worriers and significantly lower levels of happiness (Davey et al., 2007). Davey et al. also replicated previous findings (e.g. Davey & Startup, 2001) that high worriers were more likely to persevere at the worry task than low worriers. Furthermore “as many as can” stop rule ratings were significantly higher at the outset of catastrophising than at the end of the task, conversely “feel like continuing” scores were significantly lower at the outset of catastrophising than at the end of the task. However, there were no significant correlations between PSWQ scores and “as many as can” difference scores (examining the difference between “as many as

can" stop rule use at the outset and end of the catastrophising task), thus Davey et al. suggest that changes in stop rule use across the task were unrelated to trait worrying.

Davey et al. (2007) concluded that over the course of catastrophising worriers tended to experience increases in negative mood and decreases in positive mood (study 1), furthermore, during the course of a catastrophising task participants exhibited a shift from the use of "as many as can" stop rules to "feel like continuing" stop rules (study 2). The association between worry and increased negative mood is a robust finding (e.g. Davey & Levy, 1998; Vasey & Borkovec, 1992). Davey et al. explain the finding that worriers experience increases in negative mood across a worry bout by implicating the "what if?" questioning style of worriers first highlighted by Kendall & Ingram (1987). If this specific questioning style allows worriers to elaborate on potential negative outcomes, Davey et al. suggest this would be a factor linked to increased negative mood. As high worriers have been found to experience feelings of personal inadequacy, (e.g. Davey & Levy, 1998), this is also a possible cause of increased feelings of negativity (Davey et al.). Davey et al. propose that the shift in stop rule use could be associated with poor problem-solving confidence, with the individual feeling an increasing lack of ability to solve the problem. Thus they may begin to question what they are doing and adopt the tactic to stop when they feel like it rather than the persisting with the "as many as can" attitude with which they began the task with (Davey et al.).

In summary, Startup & Davey (2001) found high worriers generated a significantly greater number of catastrophising steps when using an "as many as can" stop rule than when using a "feel like continuing" stop rule. This finding supports a mood-as-input (e.g. Martin et al., 1993; Martin & Davies, 1998) account of perseveration whereby the effects of negative mood on task performance vary depending on the type of stop rule being employed. Importantly, experiments outlined above have elucidated what constructs may underlie the adoption of "as many as can" stop rule use in worriers and how mood and stop rule use contribute to perseveration of a worry bout. For example, Startup & Davey (2003) found that inflated responsibility to considering all the

issues involved, in conjunction with negative mood exacerbated, catastrophising in worriers. Davey et al. (2005) found that “as many as can” stop rule use is a significant predictor of perseveration in worriers. Furthermore worriers have been found to shift from use of an “as many as can” stop rule to “feel like continuing” stop rule over the course of a worry bout. As predicted by mood-as-input theory in combination with experienced negative mood this contributes to closure of the worry bout (Davey et al., 2007).

3.5 Mood-as-Input and Depressive Rumination

Watkins & Mason (2002) examined a mood-as-input account of depressive rumination as a maintaining factor in depression. Startup & Davey (2001) indicated that high worriers implicitly bring a default “as many as can” stop rule to a catastrophising task which along with concurrent negative mood result in increased perseveration. Thus Watkins & Mason hypothesised that high ruminators would also bring a default “as many as can” stop rule to a problem-solving task. They hypothesised that links between rumination and depression would suggest that high ruminators are more likely to be in a depressed mood than low ruminators, which if they are also bringing an implicit “as many as can” stop rule to a problem-solving task, would result in increased rumination as compared to low worriers.

Using a rumination interview similar to that devised by Vasey & Borkovec (1992) and used by Davey & Levy (1998) and Startup & Davey (2001), high and low ruminators were instructed to catastrophise on a current depressive topic using either an “as many as can” or “feel like continuing” stop rule. Results indicated that high ruminators using an “as many as can” stop rule generated significantly more rumination steps than high ruminators using a “feel like continuing” stop rule. Watkins & Mason (2002) interpreted their findings within a mood-as-input framework suggesting that high ruminators do not possess a perseverative style that is independent of stop rule use. Thus if in a negative mood and using an “as many as can” stop rule, the negative mood that high ruminators bring to a task is likely to signal to them that the goal related to their rumination has not yet been met, thus indicating need to persevere at the task (cf. Martin et al, 1993, Martin & Davies, 1998).

3.6 Mood-as-Input and Perseverative Checking

Initial experiments which showed mood–as-input theory to be a robust effect (e.g. Martin et al., 1993; Sanna et al, 1996; Startup & Davey, 2001) were key to establishing the utility of the theory as providing "a single mechanistic framework" (Davey, Field, & Startup, 2003, p. 89) as a parsimonious account of perseveration. Further evidence that mood-as-input theory can explain perseveration in psychopathology is exemplified in a mood-as-input account of perseverative checking whereby negative mood and "as many as can" stop rule use results in increased perseveration (Davey et al., 2003). Perseverative checking is a feature of psychopathology that lends itself to a mood-as-input explanation. For example, Steketee, Frost, & Cohen (1998) highlight that amongst other beliefs, compulsive checkers have an inflated responsibility for harm, overestimate the threat of negative consequences and have an intolerance for uncertainty; arguably these features could all be associated with adoption of "as many as can" stop rules in an open-ended task. Furthermore individuals suffering from OCD have been found to experience mood disturbance in the form of anxiety related to unwanted intrusive thoughts and depression related to increase in negative automatic thoughts (Salkovskis, 1985). Specifically, compulsive checkers report higher levels of anxiety and depression than non-checkers (Frost et al., 1986).

Davey et al. (2003) examined how mood-as-input theory could be applied to perseverative checking thoughts. In study 1 the authors examined whether perseveration at an item-generation checking task was determined by a combination of concurrent mood and stop rule use as predicted by mood-as-input theory. Participants were assigned to either a negative, positive, or neutral mood condition and an "as many as can" or "feel like continuing" stop rule condition. Participants were then asked to complete a check-generation task whereby they were asked to imagine that they were going on a 3 week holiday and to list the things around the home that should be checked for safety or security reasons before going away. Davey et al. indicate that this task was designed to represent a number of features that are common to compulsive checking activities. For example the task is open ended and individuals are asked to generate items which

if left unchecked could have negative consequences, for which the individual may feel responsible. Results indicated that those in a negative mood using an “as many as can” stop rule generated significantly more items than those in a positive mood using the same stop rule, the same pattern of results was found for time spent on the checking-generation task. There was also a significant difference in the number of checks when using an “as many as can” stop rule compared to a “feel like continuing” stop rule when in a negative mood than a positive mood. Thus when in a negative mood, those using an “as many as can” stop rule generated more check items than those using a “feel like continuing” stop rule, however the inverse was true in the positive mood condition, those using a “feel like continuing” stop rule generated more checks than those using an “as many as can” stop rule.

Findings by Davey et al. (2003, study 1) suggest that mood-as-input theory provides a parsimonious account of compulsive checking, thus when mood is interpreted within different contexts (i.e. stop rules), the same mood can have differential implications for performance (cf. Martin & Davies, 1998) on a check-generation task. A similar mood and stop rule interaction is found by Davey et al. in study 2. In order to examine another element related to perseverative checking, in this case repeated attempts to recall whether a checking activity has been properly carried out, participants were given a list of 60 items to memorise. Again each item related to something which one may check around the home before going away on a 3 week holiday. Participants were then induced into a negative or positive mood and asked to use either an “as many as can” or “feel like continuing” stop rule. Examining the amount of time spent recalling items to be checked around the home before going away revealed that when in a negative mood, those using an “as many as can” stop rule spent significantly longer recalling check items than those in a negative mood using a “feel like continuing” stop rule. The inverse was found for those in a positive mood, participants using a “feel like continuing” stop rule spent longer recalling items than those using an “as many as can” stop rule. In the negative mood condition participants also recalled a significantly greater number of items using an “as many as can” than those using a “feel like continuing” stop rule. However, there was no significant difference in performance between the two stop rule groups when in a positive

mood. Davey et al. propose that these findings clearly support a mood-as-input account of perseverative checking, demonstrating that mood and stop rule interact to determine performance related to checking activities such as the number of items generated in a checking task and time willing to be spent recalling check-relevant items.

MacDonald & Davey (2005a,b) further examine mood-as-input explanations of checking behaviour relevant to pathological perseveration. MacDonald & Davey (2005a, p. 71) propose that one of the central features of obsessive compulsive (OC) checking is "…repeated ritualised checking of individual items based on judgements about whether the task has been successfully completed or not". To this end, MacDonald & Davey (2005a) devised an open-ended judgemental checking task to address evidence which suggests that OC checkers will continue to check until they are fully confident of having properly completed their checks (e.g. Coles, Frost, Heimberg, & Rheaume, 2002). Arguably one could hypothesise that an elevated need for confidence at having checked properly could relate to stricter adoption of "as many as can" stop rule use. Interestingly, concerning mood, OC checkers also need to have significantly reduced their anxiety relating to having checked properly. For example, de Silva (2003) proposed that obsessions or persistent ideas caused increased anxiety that is relieved only when the compulsive behaviour has been performed in the required fashion.

MacDonald & Davey (2005a) examined a mood-as-input account of perseverative checking. Building on findings by Davey et al. (2003), MacDonald & Davey examined how different configurations of mood and stop rule would influence perseveration, but as explained above, in this case using an open-ended analogue checking task. Participants were induced into a negative or positive mood, then given the checking task instructions. Participants were instructed that they would be given a piece of text to read that may be used for future secondary level mathematics examination, but that the text had not yet been proof read. MacDonald & Davey added approximately 100 random spelling and grammatical errors to 41 lines of text taken from research methods book by Coolican (1994, cited MacDonald & Davey). Participants were asked to make a note of any

punctuation or grammatical errors found in the text and go back and recheck each line for errors, noting in tally form the number of times they rechecked each line. Participants were then asked to carry out the task using either an “as many as can”, or “feel like continuing” stop rule. Once participants had been asked to start the task, the experimenter who was timing the amount of time it took for task completion returned after one minute, participants were then asked to complete a measure rating how confident they were that at this stage in the task, they had found and corrected all errors in the text. On finishing the task as well as completing VAS scales of sadness, happiness and anxiety, participants were asked to complete a second confidence rating. Based on previous findings (e.g. Davey et al., 2003) the authors predicted that perseveration would occur either when in a negative mood using an “as many as can” stop rule, or in a positive mood using a “feel like continuing” stop rule.

MacDonald & Davey (2005a) examined four measures related to the open-ended checking task, the overall number of lines checked, the highest number of checks in a single line, the total number of lines rechecked, and total time spent checking. Results indicated that on all four measures participants in a negative mood condition using an “as many as can” stop rule showed significantly increased performance than those using a “feel like continuing” stop rule. In the positive mood condition the only significant difference in performance was on the total number of lines rechecked where those using a “feel like continuing” stop rule rechecked a significantly greater number of lines than those using an “as many as can” stop rule. Furthermore, those in a negative mood using an “as many as can” stop rule rated significantly greater confidence in their performance on completion of the checking task than at the outset of the task. Examining the relationship between mood, confidence, and perseveration revealed that sadness ratings were significantly inversely related to confidence ratings at the outset of checking. Further, happiness ratings at the outset of checking were significantly correlated with confidence ratings at the end of checking. MacDonald & Davey propose that in terms of pathological checking, the negative mood and “as many as can” stop rule configuration is of most interest as it is most representative of clinical OC checkers who are known to experience increased negative mood (Frost et al., 1986) and experienced heightened responsibility for harm as a result

of not having checked properly (Steketee et al. 1998). On this basis, findings by MacDonald & Davey (2005a) using a mood-as-input framework provide some interesting insight into mechanisms underlying compulsive checking, as increased perseveration on all four checking measures occurred when participants were in a negative mood and using an “as many as can” stop rule (NM/AM). Furthermore, VAS mood measures indicated that those in the NM/AM condition experienced decreases in anxiety and sadness across the checking task. The authors suggest that this finding is representative of clinical checking in that as reported by de Silva (2003), OC checkers report decrease in anxiety on completion of ritualised checking.

To further examine how confidence and mood may affect perseverative checking MacDonald & Davey (2005a, study 2) used the same checking task as described above (study 1) examining the same mood and stop rule configurations, with the addition of also manipulating mood at the end of the checking task to examine effects on participant’s confidence ratings at having checked properly. Previous research (Cervone, Kopp, Schaumann, & Scott, 1994; Scott & Cervone, 2002) suggests that negative affect induces more stringent standards for performance, when negative affect results in unsatisfactory evaluations of one’s performance. Results confirmed findings from study 1, namely that perseveration on the checking task was most prominent when in a negative mood using an “as many as can” stop rule, these mood and stop rule conditions being most closely related to clinically compulsive checking (MacDonald & Davey). Interestingly, when participants were induced into a positive, negative, or neutral mood after the checking task, participants who underwent a negative mood induction exhibited significantly reduced confidence ratings, regardless of the mood induction procedure they experienced at the outset of the study. MacDonald & Davey suggest that these results confirm that negative mood not only affects perseveration (in conjunction with “as many as can” stop rule deployment), but may also affect concurrent judgements about whether checking is successful.

Work by MacDonald & Davey (2005a) suggests that mood-as-input theory provides a robust explanation of mechanisms related to OC checking. Their results also cast some light on the way in which confidence at having checked

successfully may affect perseverative checking and how negative mood influences subjective feelings of confidence. However, one criticism of the mood-as-input model as an account of perseverative checking (MacDonald & Davey) is that the checking measures used are not representative of OC checking (van den Hout, Kindt, Luigjes, & Marck, 2007). Van den Hout et al. replicated findings by MacDonald & Davey showing that those in a negative mood and using an "as many as can" stop rule persevered for significantly longer on all four checking variables than those in a negative mood using a "feel like continuing" stop rule. Their critique focuses on the checking task, which van den Hout et al. suggest is too complex to represent the type of checking performed by an OC checker where perseverative tasks are ones that for healthy people would require little or no cognitive effort or resources. Furthermore van den Hout et al. suggest that with the kind of repetitive checking that was required in the original study, one would expect an increase in the degree of accuracy with the more checking that is performed. Again, van den Hout et al. suggest this is not representative of OC checking whereby increased checking does not improve accuracy.

Replicating MacDonald & Davey's (2005a) original study, van den Hout et al. (2007) also included a version of the checking task that was either simple, or intermediate in complexity as compared to the original checking task. In replicating the original task van den Hout et al. did find that as predicted, the more people checked, the more accurate they became, suggesting that "persistence in the text-correction paradigm may be *functional* and might result in more errors being detected" (van den Hout et al., 2007, p. 1228). Furthermore, it was argued that OC checking involves tasks, which for healthy people would require few cognitive resources. As such, they predicted that if the task became less demanding, it would be more relevant to OC checking. Results indicated that when the task became simpler, a smaller difference in perseveration was observed between those using an "as many as can" or "feel like continuing" stop rule when in a negative mood. Van den Hout et al. question the validity of the checking task used by MacDonald & Davey as a model for clinical checking. They pointed out that tasks carried out by OC checkers are normally non-functional, yet the original task used by MacDonald & Davey is complex and functional, and that when using

a simpler, arguably more OCD relevant task the difference in perseveration between stop rule groups (in a negative mood) diminishes (van den Hout et al.).

MacDonald & Davey (2005b) also examined how inflated responsibility (another dispositional characteristic in individuals suffering from OCD) and negative affect are implicated in perseverative checking. Splitting participants into either high or low responsibility conditions based on their scores on the Responsibility Attitude Scale (RAS; Salkovskis et al., 2000), participants then underwent either a positive or negative mood induction procedure. Participants then completed the analogue checking task as used in the MacDonald & Davey (2005a) study. Results indicated that participants high in responsibility and in a negative mood showed significantly greater perseveration of checking behaviours than those in a negative mood in the low responsibility group. High responsibility participants in a negative mood also showed significantly greater checking behaviours than high responsibility participants in a positive mood.

MacDonald & Davey (2005b) thus suggest that high responsibility alone may not be sufficient to generate perseverative checking, but that perseveration may occur only in combination with negative mood. This finding again supporting a mood-as-input account whereby mood combines with other factors as part of a configural processing system to result in perseveration (Martin & Davies, 1998). However, taking into account issues raised by van den Hout et al. (2007), one also could call into question the validity of the checking task employed by MacDonald & Davey (2005b). According to findings by van den Hout, it is possible that if a simpler and arguably more OC checking relevant task was employed, the magnitude of difference in perseveration between high and low responsibility groups when in a negative mood could diminish.

To sum up, Studies by Davey et al. (2003) and MacDonald & Davey (2005a,b) suggest that the mood-as-input hypothesis reliably predicts circumstances under which perseverative checking occurs. Using a checking related item generation task, Davey et al. (2003) found that participants in a negative mood using an “as many as can” stop rule perseverated for significantly longer at generating items than participants using a “feel like continuing” stop rule, or in a positive mood using an “as many as can” stop rule. This was also the

case when participants were asked to recall a learnt list of check relevant items, and for the time spent recalling these items (Davey et al., study 2). MacDonald & Davey (2005a,b) replicated mood-as-input accounts of perseverative checking by using an open-ended judgemental checking task. Perseveration was found to be greatest under conditions that are most relevant to OC checkers, namely experienced negative mood and an "as many as can" approach to checking. However, van den Hout et al. (2007) have criticised the checking task used by MacDonald & Davey, suggesting that the task was not a valid representation of OC checking due to its complexity. When a mood-as-input account of perseverative checking is examined using a simpler 'effortless' task, which van den Hout et al. (2007) propose is representative of OCD patients, the difference in the detection of errors by those in a negative mood using an "as many as can" stop rule as compared to those using a "feel like continuing" stop rule decreases.

MacDonald & Davey (2005a,b) further examined factors that may contribute to perseveration and cast some light on why OC checkers may adopt an "as many as can" approach to checking. They found that confidence in having checked successfully was related to the use of "as many as can" stop rules at the outset and the end of an open-ended checking task. Furthermore, MacDonald & Davey (2005b) examined how inflated responsibility combined with negative mood resulted in significantly increased checking. Importantly however, negative mood alone was not sufficient for perseveration as predicted by mood-as-input theory. Negative mood in relation to the context in which it is experienced, in this case inflated responsibility, is key to the occurrence of perseveration.

3.7 Summary of Mood-as-Input and Perseverative Psychopathologies

In summary, the mood-as-input hypothesis has been used to examine processes underlying perseveration across a number of perseverative psychopathologies. An examination of the literature reveals that a combination of induced negative mood and "as many as can" stop rule use has resulted in increased perseveration on checking tasks and perseverative worry tasks (e.g. Davey et al., 2003; MacDonald & Davey, 2005a; Startup & Davey, 2001).

Furthermore, naturally occurring negative mood associated with being a high worrier (Startup & Davey, 2001), or high ruminator (Watkins & Mason, 2002), also resulted in increased perseveration when experienced concurrently with an "as many as can" stop rule, but not when in a negative mood using a "feel like continuing" stop rule. While worriers have been found to experience increasing negative mood over the course of a catastrophising bout, high worriers also demonstrate a shift in using "as many as can" stop rules, to a "feel like continuing" stop rule, thus accounting for the termination of a worry bout while concurrently experiencing negative mood (Davey et al, 2007).

These studies have several implications. Primarily they confirm that negative mood alone is not sufficient to result in perseveration at an open-ended judgemental task, nor do OC checkers, or perseverative ruminators, or worriers, bring a general perseverative iterative style to a task. Rather the above experiments suggest that the effects of mood on processing are determined by whether the individual perceives that he/she has reached their goal in relation to the task at hand. Thus it is likely that mood serves as input to evaluating goal completion depending upon the context in which it is experienced (Martin et al., 1993; Martin, Abend, Sedikides, & Green, 1997; Martin & Davies, 1998).

3.8 Mood-as-input theory and specific negative moods in psychopathology

Mood-as-input theory (Martin et al., 1993; Martin & Davies, 1998) makes no predictions about how specific negative moods may interact with stop rule to affect performance. Thus far this chapter has examined mood-as-input explanations of perseverative psychopathology, specifically looking at catastrophic worry (Davey et al., 2007; Davey et al., 2005; Startup & Davey, 2001, 2003) and perseverative checking (Davey et al., 2003; MacDonald & Davey, 2005a,b). Mood-as-input theory as applied to perseverative psychopathologies predicts how negative and positive mood interacts with stop rules to affect perseveration. As noted by MacDonald & Davey (2005a), in examining perseverative psychopathologies the most pertinent mood and stop rule configuration is negative mood and "as many as can" stop rule. However, taking a

more fine-grained approach, one could question whether different types of negative mood would have different implications for performance depending on the context in which they were experienced.

While a mood-as-input approach to perseverative psychopathology has to date examined negative and positive affect in conjunction with stop rule use, research in psychopathology indicates that specific negative moods play an important role in the aetiology and maintenance of some disorders. For example, Vasey & Borkovec (1992) indicated that heightened anxiety in worriers may increase the availability of threat-related material in memory. Kendall & Ingram (1987) also associated increased anxiety with an iterative "what if?" questioning style. However, Davey et al. (2007) reported that at the outset of a catastrophising task, high worriers reported significantly higher levels of both sadness and anxiety than low worriers, thus suggesting that rather than sadness or anxiety individually, it may be a more general feeling of negativity that combines with "as many as can" stop rule use to result in perseveration.

When attempting to examine the role of specific negative moods in a mood-as-input account of perseverative psychopathology, it is important to consider how specific negative moods relate to each other (see chapter 2 for a detailed discussion of the structure of affect). For example, Carver & Harmon-Jones (2009) challenge isomorphism between dimensions of negative and dimensions of positive affect. They focus on one negative emotion of importance that is yet to be examined in relation to a mood-as-input account of pathological perseveration, this being anger. A point of interest raised by Carver & Harmon-Jones is that anger need not be assumed to be only a negative emotion, they argue that while the majority perceive anger negatively, some find it less aversive. If this is the case, implications for a potential role of anger in mood-as-input theory are certainly less clear-cut than when examining broader categories of valence. The argument presented by Carver & Harmon-Jones (2009) challenges a dimensional approach to affect, by suggesting that specific affects are not necessarily formed by a purely positive or purely negative dimension. In relation to the mood-as-input hypothesis, this could challenge the idea that specific negative moods would interact with stop rules in the same way as would a more general negative or

positive affect. However, this view is challenged by Watson (2009, p. 206) who argues that while there is some correlation between anger and positive affects "…anger is strongly correlated with other types of negative affect but is much more weakly related to the positive affects."

Another way of examining implications of specific negative moods in a mood-as-input account of perseveration is to examine comorbidity of specific negative moods such as anxiety and sadness with emotional disorders. The debate centres on how relationships between emotions are conceptualised. For example, papers by Brown, Chorpita, & Barlow (1998), Watson (2005), and Watson, O'Hara, & Stuart (2008) all emphasize that earlier classification of emotional disorders such as those in DSM-II (American Psychiatric Association (APA, 1968) reflected the predominant view that there exist a set of discrete emotions such as anger, anxiety, sadness etc. and that these were irreducible (e.g. Izard, 1977; Johnson-Laird & Oately, 1992; Plutchick, 1980). Consequently, Brown et al. and Watson et al. suggested that the discrete emotion approach shaped classification of mental disorders explaining why they were classed into categories distinguishing between depressed/sad mood, or anxious mood. However, as noted by Watson et al. evidence began to establish the existence of two general underlying dimensions of affect, positive and negative affect. Both Brown et al. and Watson et al. associate this shift in thinking to a shift in the way that emotional disorders are classified today in DSM-IV (APA, 1994), namely representing "consistent findings of high comorbidity among anxiety and mood disorders" (Brown et al., 1998, p. 179). That a higher-order factor of negative and positive affect produces strong correlations between specific negative emotions indicates that there is substantial comorbidity between mood and anxiety disorders (Watson et al.). This view is exemplified in the DSM-IV classification of mental disorders.

Watson et al. (2008) present data showing correlations between depressed mood and anxious mood in 8 different samples, college students, community adults, postpartum women, older adults, adolescent patients, and adult psychiatric patients. The data suggests a strong link between sad/depressed mood and anxious/worried mood, where the overall correlation was r = .78 between

depressed and anxious mood and r = .68 between both depressed and angry mood and anxious and angry mood. However, Watson et al. propose that despite there being a strong association between specific negative moods, this should not be taken as evidence that all emotional experience can be reduced to two higher order dimensions of negative and positive affect. Rather Watson et al. suggest that affect is better understood in a hierarchical structure. As described by Tellegen, Watson, & Clark (1999) a hierarchical structure would represent a bipolar Happiness vs. Unhappiness dimension, independent Positive affect and Negative affect dimensions, and at the base level, discrete emotions. This has implications for the role of specific negative moods in a mood-as-input account of perseveration. If, as proposed by Watson et al. discrete negative moods are highly correlated, this may suggest that in a mood-as-input context, specific negative moods would provide similar information as a more general feeling of negativity, especially given high comorbidity amongst anxiety and mood disorders (Brown et al., 1998). This is emphasised by Barrett (2006b) who proposes that negative and positive affectivity are the basic elements of affect.

Literature examining specific negative moods does not provide a clear-cut indication of how specific negative moods may interact with stop rule use to affect perseveration in psychopathologies. Carver & Harmon-Jones (2009) have tried to demonstrate an interesting point that not all specific negative moods are uniquely related to broader dimensions of negative affect, suggesting that anger is not completely an aversive emotional experience. If indeed discrete negative emotions do have very different properties, they may have different implications for behaviour in a mood-as-input paradigm. However, Watson (2009) proposes that anger is far more strongly correlated with other discrete negative emotions such as anxiety and sadness. Among others, Watson et al. (2008) also support the view that specific negative emotions are strongly correlated, this indicating the presence of a higher order negative affect dimension. Watson et al. (2008) propose that specific emotions fit best into a 3-level hierarchical model that can accommodate both specific and non-specific elements of affective experience. Examining how specific negative moods may operate in a mood-as-input framework, one could argue that given the reported high correlation between specific negative moods (Watson et al., 2008), and that DSM-IV (APA, 1994) now recognises the high

level of comorbidity between anxiety and mood disorders, there may not be differentiation on performance in conjunction with stop rule use. However, as reported by Vasey & Borkovec (1992) and Kendall & Ingram (1987), heightened anxiety is clearly a feature related to perseverative and iterative thought patterns, thus it may be a mediating factor in perseverative psychopathologies.

3.9 Summary and conclusions

This chapter has examined a mood-as-input account of perseverative psychopathologies. According to DSM-IV-TR (2000) sufferers of both OCD and GAD experience perseverative cognitions either in the form of excessive anxiety and worry (GAD), or recurrent thought patterns (OCD). Examining catastrophic worrying led Davey & Levy (1998) to conclude that worriers possess an iterative style that is independent of the valency of the task, with personal inadequacy also being a dispositional feature of high worriers. Mood-as-input theory (Martin et al., 1993; Martin & Davies, 1998) has been applied to perseverative psychopathologies in an attempt to elucidate how perseveration may occur in multiple disorders rather than examining disorders in isolation. A mood-as-input paradigm has been used to examine both perseverative worry (Startup & Davey, 2001, 2003) and compulsive checking MacDonald & Davey (2005a,b), in both cases suggesting that the configuration of negative mood and “as many as can” stop rule use are the best predictors of perseveration. Startup & Davey (2003) and MacDonald & Davey (2005b) explored the role of heightened responsibility in perseverative worrying and perseverative checking respectively, showing that heightened responsibility in conjunction with negative mood resulted the greatest increase in perseveration.

In order to gain a fuller understanding of mechanisms underlying perseveration, Davey et al. (2005) examined processes involved in stopping worrying, specifically examining how beliefs about worrying related to stop rule use. Results suggested that “as many as can” stop rule use was a robust predictor of trait measures of worry frequency (measured by the PSWQ) and behavioural measures of perseverative worry (measured by the catastrophising task). Furthermore, worriers’ beliefs about utility of worrying also predicted “as many as can” stop rule use (Davey et al.).

While it is important to understand what factors contribute to perseveration, it is also important to understand how perseveration is eventually terminated. Davey et al. (2007) examined changes in mood and stop rule use over the course of a worry bout. Results indicated that catastrophising was not brought to a close by mood change. In fact replicating previous findings (e.g. Vasey & Borkovec, 1992), Davey et al. (2007) found that negative mood actually increased over the course of the catastrophising task. However, worriers did exhibit a shift from an "as many as can" stop rule to a "feel like continuing" stop rule. Davey et al. (2007) attributed this to poor problem-solving confidence, eventually leading the individual to question their current strategy and shift to a "feel like" stopping strategy, which in conjunction with negative mood is known to indicate decreased catastrophising (cf. Startup & Davey, 2001).

Research on mood-as-input theory as applied to perseverative psychopathologies predicts that perseveration will occur with pathological worriers or checkers bringing a negative mood to the situation and deploying strict "as many as can" stop rules (e.g. Davey et al., 2003, Davey et al., 2005; MacDonald & Davey, 2005a,b; Startup & Davey, 2001, 2003). However, laboratory studies to date have focused on examining valence and stop rule. The mood-as-input model does not make any predictions about how negative moods of the same valence convey information within the context of differing stop rules. While there is high comorbidity between specific negative moods (e.g. Watson et al., 2008), a hierarchical approach to the structure of affect suggests that affect is best conceptualised with discrete emotions at base level and broader valenced dimensions representing positive and negative affect (e.g. Tellegen et al., 1999). Yet regardless of valence being fundamental in affective experience, previous work relating to psychopathology suggests a role for specific negative moods such as anxiety, rather than say anger, as a feature of perseverative thought patterns (cf. Kendall & Ingram, 1987; Vasey & Borkovec, 1992). This thesis aims to examine how information from specific negative moods may affect pathological perseveration within a mood-as-input framework.

4 Methodological issues – The mood induction procedures

4.1 Introduction

The work described in this thesis will employ two different mood induction procedures (MIPs). The first two experiments will use a combination of music and guided imagery as devised by Mayer, Allen, and Beauregard (1995) and used in previous mood-as-input studies to induce feelings of negativity and positivity (e.g. MacDonald & Davey, 2005a,b; Startup & Davey, 2001, 2003). In subsequent experiments, in order to mask the purpose of the MIP, film clips validated by Rottenberg, Ray, & Gross (2007) will be used to induce mood. This chapter will give an overview of commonly used mood induction techniques, examine the effectiveness and validity of MIPs, and finally discuss issues surrounding the induction of discrete moods of the same valence.

4.2 Overview of Mood Induction Procedures

Key to the experimental examination of mood on behaviour is an effective mood induction procedure (MIP). Some of the most commonly used mood induction techniques will be briefly discussed. For example, hypnosis (e.g. Bower, 1981; Bower, Monterio, & Gilligan, 1978) has been used on participants to recall certain emotional events from memory while hypnotised then to experience that emotion in isolation. However, such techniques depend upon the individual being susceptible to hypnosis, with susceptibility in some samples reported to be as low as 15% (Martin, 1990). Velten (1968) used self-referent mood statements to induce elation or depression. Here participants are asked to try to feel the mood suggested by a number of statements printed on cards that either related to elation or depression. Westerman, Spies, Stahl, & Hesse (1996) report the Velten technique as being one of the most widely employed MIPs. However, other techniques such as false feedback related to supposed performance on a task (e.g. Isen, Clark, Shalker, and Karp, 1978), music (Sutherland, Newman, &

Rachman, 1982), music and guided imagery (Mayer et al., 1995), and film (Rottenberg et al., 2007; Gross & Levenson, 1995) have been commonly used as MIPs. More recently, online mood inductions have been shown to be successful at inducing negative and positive moods (Verheyen & Goritz, 2009).

4.3 Effectiveness of Mood Induction Procedures

Review articles (e.g. Gerrards-Hesse, Spies and Hesse, 1994; Martin, 1990) and a meta-analysis (Westerman et al., 1996) have compared the efficacy of a range of MIPs. Westerman et al. compared 11 MIPs and Martin reviewed 16. Martin found varying success among different mood inductions, reporting that Velten self-referent statements and manipulation of facial expression successfully induced the desired mood state approximately 50% of the time. Music, autobiographical recall, and film were found to be successful approximately 75% of the time (Martin). Using a meta-analysis technique Westerman et al. concluded that presentation of a film or story with the instruction to try and enter into the desired mood state was most effective in inducing positive and negative moods. Further, combined MIPs such as music combined with reading self-referential statements were found to be similarly effective in inducing negative mood states, although they were deemed to be more difficult to assess, being less numerous and more diverse (Westerman et al.). Westerman et al. also noted that the effectiveness of mood inductions was higher for negative than positive moods, probably because most participants began the experiment in a positive mood, and it is harder to enhance an already positively biased mood state than to depress it.

One of the difficulties in assessing the effectiveness of MIPs is a lack of consensus on how mood change is measured (Martin, 1990). The method of assessing mood change can of course affect the usefulness of the induction, for example Westerman et al. (1996) found that changes in mood are lower for behavioural measures than for self-report measures such as visual analogue scales (VAS). Larsen & Sinnett (1991) found differences in the effectiveness of the Velten technique in manipulating mood to depend upon the manipulation check used. Again, self-report measures were found to yield a larger mood change than psychomotor tasks, or physiological check measures. Furthermore, the effectiveness of a MIP may depend whether it relates to the dependent variable

being studied. Westerman et al. warn of choosing a MIP (specifically when using a film or story MIP) that may interact with the topic being studied, owing to the risk of semantic priming effects.

4.4 Validity of Mood Induction Procedures

As noted above, MIPs often rely on self-report measures to assess mood change. However, essential to the method being employed is the validity of the procedure. Thus the procedure should induce accurately the observed change, and the apparent mood change should not result from factors other than the MIP. Factors that may affect the validity of MIPs are discussed by Martin (1990) and by Westerman et al. (1996). Westerman et al. noted that effects are especially large when participants are instructed explicitly to enter a specified mood state, thus implying that demand characteristics may be responsible for some MIP effects. Polivy & Doyle (1980) examined demand characteristics when using a Velten MIP to conclude that demand characteristics falsely inflate measurements of the desired mood effect, yet also contribute to the effect, thus suggesting that being told the purpose of the experiment can also help the participant to attain the desired mood. In a meta-analysis, Larsen & Sinnett (1991) found smaller effect sizes for mood manipulation measures when participants were deceived as to the purpose of the MIP.

Clark (1983) found that the manipulation check itself can also produce demand characteristics suggesting that self-report mood manipulation measures are more susceptible to demand characteristics. Larsen & Sinnett (1991) also reported that effect sizes for the MIP were larger when self-report measures were used. However, Larsen & Sinnett (p. 331) also propose an alternative account, i.e. that “self-report measures show stronger effects because they tap emotional responses more directly than non-self-report measures”, thus suggesting that they are simply more valid indicators of mood than other measures.

Martin (1990) suggests individual differences as one factor which may influence the effectiveness of MIPs, proposing that an individual is more likely to be susceptible to a particular MIP if the contents of the procedure focuses on or relates to their current concerns. With specific reference to the Velten MIP, Polivy

& Doyle (1980) propose that up to 50% of participants are unaffected by the MIP. Blackburn, Cameron, & Deary (1990) examined individual differences in responses to the Velten MIP. They found that six of eight hypothesised individual differences affected responses to the Velten depression induction. These were basal depression, frequency of negative thoughts, experiences of recent negative events, belief in the statements they were asked to read, neuroticism, and degree of suggestibility. Gender and levels of introversion did not influence the effectiveness of the MIP. The authors concluded that the six factors found to affect responses to the Velten MIP increase the likelihood of the individual becoming depressed. It is thus not surprising that individuals high in these vulnerability factors to depression may be more likely to respond to a depressive MIP. Furthermore Blackburn et al. suggest that even though women are more likely to experience naturally occurring depression, the absence of differences between genders in this study may suggest that women are no more susceptible than men to induced negative mood.

In summary, asking the participant to enter into a specific mood state can have both positive and negative consequences in a MIP. Demand characteristics have been found to falsely inflate the effects of MIPs (Martin, 1990; Westerman et al., 1996). However, Polivy & Doyle (1980) suggest that telling a participant to enter into a certain mood may not only contribute to mood change due to demand characteristics, but may also aid the individual in entering the desired mood state. According to Clark (1983) the manipulation check can also affect the validity of a MIP as self-report measures can result in demand characteristics. Alternatively, Larsen & Sinnett (1991) suggest that self-report measures may result in increased mood change than do other mood measures, as they are actually a more valid indicator of mood. Individual differences may also affect the validity of a MIP, for example if the contents of the MIP specifically relates to the individual's current concerns. Furthermore, individual differences such as current levels of depression, or degree of suggestibility, are also factors that will influence the outcome of a MIP (Blackburn et al., 1990). This research is investigating how specific moods of the same valence may interact with stop rule use on perseverative checking tasks. As indicated by Larsen & Sinnnett self-report measures are a valid indicator

of mood, thus self-report visual analogue scale mood measures will be employed in this thesis.

4.5 Specificity of Induced Mood

As the aim of this research is to examine effects of specific negative emotions, it is important to consider evidence concerning the induction of discrete emotions. Chapter 1 of this thesis examined theoretical accounts of how discrete emotions can be understood within the structure of affect; a similar debate arises in considering whether it is possible to induce discrete emotions in a laboratory setting. Potential difficulties in eliciting discrete moods have been recognised for many years. For example, Izard (1972, p. 77) notes "One emotion can almost instantaneously elicit another emotion that amplifies, attenuates, inhibits, or interacts with the original emotion experience". Polivy (1981) conducted four experiments examining the induction of three separate emotions, anger, anxiety, and sadness. Polivy used different methods of induction including experimenter deception in an anger induction and the Velten MIP in a depression and an anxiety induction. It was concluded that inducing anger through experimenter deception also increases anxiety, although admittedly Polivy suggests this could be due to the experimental design. In a second study using the Velten MIP to induce depression and elation, Polivy found that inducing depression in this way also increases anxiety and hostility. Using a naturalistic self-report measure of moods over a two week period, Polivy also found high correlations (.88) between depression and anxiety. Two possible explanations for these results were suggested, either that emotions occur in tandem, or eliciting one emotion also elicits other effective states.

Marzillier & Davey (2005) also examined interaction between induced negative moods. Comparing three different MIPs, namely guided imagery and music (Mayer et al., 1995), film clips (Gross & Levenson, 1995), and autobiographical recall and music (Blagden & Craske, 1996) the authors examined the relationship between induced anxiety and disgust. Results indicted that regardless of the type of MIP used, inducing anxiety also increased reported disgust, but inducing disgust did not affect reported anxiety. Marzillier & Davey explain these results in terms of a hierarchical model of emotions (cf. Watson &

Tellegen, 1985), suggesting that negative affect may be at the top of the hierarchy, anxiety at the next level, and other discrete negative emotions at the next level, thus accounting for the unidirectional relationship between anxiety and disgust.

Whether the co-occurrence of negative emotions is due to emotions occurring in tandem (Polivy, 1981), or that due to a hierarchical nature of affect, eliciting one emotion such as anxiety is likely to elicit other negative emotions (Marzillier & Davey, 2005), such findings are problematic if one wishes to induce discrete emotions of the same valence. However, as will be discussed below a number of techniques have been devised with the aim of inducing discrete emotions of the same valence.

4.6 Inducing discrete emotions

Despite indications that MIPs often induce simultaneous emotions (e.g. Izard, 1972; Polivy, 1981), the majority of MIPs, especially the Velten technique have focused on valence, e.g. inducing positivity and negativity. Mayer et al. (1995) devised a MIP to examine four discrete moods: happiness, anger, fear, and sadness. Their induction combines the use of both guided imagery and music. Westerman (1996) suggests that a combination of techniques provides an effective way of inducing negative mood. Mayer et al. asked participants to enter into a specified mood. They were played a piece of music for one minute then were signalled to start reading the vignettes, which appeared at 30 second intervals on a screen. The angry music used was by Mossourgsky (1867); Night on a Bare Mountain. An example of angry vignette is “A friend of yours was sexually assaulted by a convicted rapist just released on parole”. The sad music used was by Chopin (1839); Opus 28/#6 from Preludes. An example of a sad vignette is “No one remembers your birthday”. The anxious music used was Ives (1906); Halloween. An example of an anxious vignette is “You’re swimming in a dark lake and something big brushes against your leg”. The happy music used was Delibes (1870); Mazurka from Coppelia. An example of a happy vignette used is “You just got a new job, and it’s even better than you expected”.

Mayer et al. (1995) used a 16-item mood adjective scale to measure the four individual moods, mood was measured 5 times, once at baseline and once

after each of the mood inductions. Bearing in mind Polivy's (1981) conclusions that inducing one specific emotion is likely to also induce others, Mayer at al. examined the effectiveness of their MIP on the basis that the target mood in each induction was raised significantly from baseline despite natural covariance of negative moods. They concluded that targeted moods rose to a significantly higher degree than non-targeted moods. Targeted moods were also significantly higher across mood inductions, i.e. each target mood was rated as being significantly higher than other moods that were rated at the same time (Mayer et al.). The use of a combined vignette and music induction has also been successfully replicated by others and extended to included disgust and neutral inductions (cf. Marzillier & Davey, 2005).

Other techniques that have been extended successfully to induce specific emotions include the use of film (e.g. Gross & Levenson, 1995; Phillippot, 1993; Rottenberg et al., 2007). Films are deemed to be a useful tool in emotion elicitation as they are high in ecological validity (Gross & Levenson; Rottenberg et al.). As proposed by Gross & Levenson, emotions are often evoked by dynamic, visual, and auditory stimuli external to the individual. Furthermore, films are easily masked as a MIP, thus enabling one to control for demand characteristics (Rottenberg et al.) and arguably decreasing mood saliency issues of association between the induced mood and the film. Gross & Levenson perceived that while film had potential as a MIP, an accepted database of film stimuli was lacking. Advocating a discrete emotion perspective, Gross & Levenson examined films to elicit eight emotional states: amusement, anger, contentment, disgust, fear, neutral, sadness, and surprise. Examining a pool of 250 films, Gross & Levenson measured the reaction of 494 participants to the films on 16 emotion terms using a 9-point Likert scale. The basis of the film selection was whether on average the target emotion received a higher rating than the six non-target emotions. Films were then also assessed for intensity and discreteness of the elicited emotions. Arguably this procedure goes some way to address problems highlighted by Polivy (1981) if one of the selection criterion is discreteness of the elicited emotion for a particular stimuli. Two films for each target emotion were chosen. The efficacy of the film to induce the target emotion was then assessed again by examining discreteness and discriminability ratings, the latter being

measured by how well the emotional state targeted by the film could be predicted from self-report ratings. Gross & Levenson (p.95) claimed “fairly high levels of discrimination for each of the emotions”, with each target film being given a 70% correct classification, apart from the neutral film which received a 66% discriminability rating. Results show strong support for discreteness ratings, with target emotions being rated as significantly higher than all 15 other non-target emotions for both films, this being a crucial factor when choosing a MIP for negative emotions of the same valence as will be necessary for the present research.

4.7 Difficulties in inducing discrete emotions

Despite reporting success in identifying a number of films to induce discrete emotions, Gross & Levenson (1995) indicate that some emotions are more difficult to induce than others. Specifically anger, contentment, and fear were reported to be more difficult to elicit using film than other emotions. Gross & Levenson suggest that while their chosen films induced anger, they also elevated other negative emotions. Rather than suggesting that their film stimuli were inadequate, the authors suggest the elicitation of anger with a brief film is difficult, as it “appears that there is a natural tendency for anger to co-occur with other negative emotions” (Gross & Levenson, p. 104). With fear, levels of interest and tension were also raised. Gross & Levenson suggest that this may be a natural response to the way that fear occurs. The authors conclude that for some emotions, discreteness would be difficult to identify not only in the laboratory, but also in daily life. These findings echo those of Polivy (1981). Thus when considering mood induction data one may expect co-occurrence of specific negative moods.

4.8 Ethical Implications

As noted by Martin (1990) when employing any mood induction procedure, especially negative ones, ethical implications must be taken into account. Each experiment conducted in this thesis complied with British Psychological Society recommendations of ethical conduct and had received ethical approval by the School of Life Sciences Research Governance committee

at the University of Sussex (Appendix J: Ethics approval form). Accordingly all participants were informed in writing and orally of their right to withdraw from the experiment at any time and informed that all data would be kept confidential. Where participants were asked to catastrophise on a current worry topic (experiments 4 & 5), the experimenter checked that they were happy to talk about the topic they had chosen and reminded them that they could stop at any point if they became uncomfortable with the discussion. At the end of the experiment all participants were debriefed as to the nature of the experiment and offered contact information for the university counselling services in the unlikely event that anything they had discussed in the experiment had touched on an issue for which they wanted to seek expert advice (Appendix A: Debrief sheet). Participants who underwent a negative mood induction procedure were offered a happy mood induction option at the end of the experiment to alleviate any negative emotions that may have occurred as a result of the mood induction procedure.

4.9 Mood induction materials employed in this thesis

Experiment 1 of this thesis uses a combined music and vignette MIP as devised by Mayer at al. (1995). The music and vignettes as described above will be used to elicit a sad, happy, angry, and an anxious emotion. Rottenberg et al. (2007) extended the work of Gross & Levenson (1995) and have made a detailed examination of the use of film in eliciting emotions. Like Gross & Levenson, Rottenberg et al. recommend a number of film clips specifically aimed to induce discrete emotions. These will be used in the current research when examining sadness, anxiety, anger, and happiness as they have been validated expressly to induce discrete negative moods, and other evidence suggests that film is an effective method for inducing negative mood states (Marzillier & Davey, 2005; Westerman et al, 1996). Based on recommendations by Rottenberg et al. experiments 2 – 6 use a film MIP; for sadness the Lion King (Hahn, Allers, & Minkoff, 1994); for anger, Cry Freedom (Spencer, Briley, & Attenborough, 1987); and for anxiety Silence of the Lambs in experiment 2 (Deeme, 1991) and The Shining (Kubrick, 1980) in experiments 3 & 4. Again, Rottenberg et al. reported that discrete feelings of anger and fear/anxiety were difficult to induce, suggesting specifically that anger may require high levels of personal engagement

or immediacy, which are difficult to achieve with a film. Studies by Gross & Levenson and by Rottenberg et al. both examined amusement and contentment, but the current emotion desired in the present study was happiness, thus several film clips were rated in a laboratory setting, on the basis of these results, the happy clip was also from the Lion King (see appendix B for ratings).

4.10 Summary and conclusions

This chapter has examined various MIPs. Initial attempts to induce emotion in a laboratory setting focused on examining positivity/elation and negativity/depression (e.g. Velten, 1968; Isen et al, 1978). Among the most successful techniques were found to be film, music, autobiographical recall, and combined techniques such as music with self-referential statements (Westerman et al., 1996). Asking participants to enter into the specified mood is a tenuous point as it potentially results in demand characteristics that can falsely inflate measurements of the desired mood, yet it is also deemed useful in helping participants enter into the desired mood state (Polivy & Doyle, 1980). Polivy (1981) proposes that it is difficult to examine emotions in isolation due to discrete emotions of the same valence naturally co-occurring, thus inducing one negative emotion will also induce others. However despite co-occurrence of emotions MIPs have been designed to induce specific emotions. Mayer et al. (1995) have examined the efficacy of mood and guided imagery in inducing specific emotions, Gross & Levenson (1995) and Rottenberg et al. (2007) have examined film as a method for inducing discrete MIPs. While it is clear that the issue of co-occurrence among emotions of the same valence exists, specificity and discreteness of the target emotion was given careful consideration for both the music and film MIPs. In particular Mayer et al. employed the criterion that the target emotion must be raised to a significantly higher degree than non-target moods. Gross & Levenson and Rottenberg et al. chose films that had high discreteness ratings for target emotions as compared with other films rated for the same emotion. However, both papers reported that some emotions more than others, namely anger and fear/anxiety were particularly difficult to induce in a discrete manner.

To conclude, two MIPs will be employed in this body of work, a combined music and guided imagery technique (e.g. Mayer et al., 1995) and a film MIP (Gross & Levenson, 1995; Rottenberg et al., 2007). These techniques have been developed with the aim of specifically inducing discrete negative moods. While difficulties inducing certain emotions such as anger and anxiety in a discrete manner have been discussed, the two procedures still report increased anger and anxiety for each suggested procedure. Furthermore, given the nature of the studies to be conducted and the need to conduct experimental work on an individual basis with a large number of participants these types of MIPs lend themselves to inducing discrete emotions under the given conditions.

5 Specific Moods and Perseverative Checking: A Mood-as-input Account

5.1 Introduction

Mood-as-input theory (Martin & Davies, 1998; Martin, Ward, Achee, & Wyer, 1993) provides an account of how mood affects behaviour whereby the effect of mood is dependent on the context in which it is experienced. For example, Martin et al. found that on an open-ended task mood *per se* did not determine performance. However, the context that a mood was experienced in, for example asking participants in either a negative or positive mood to stop the task either when they no longer felt like continuing ("feel like continuing" stop rule), or when they thought they had done as much as they could ("as many as can" stop rule) did result in different rates of perseverance. Thus when in a negative mood using an "as many as can" stop rule, participants persevered for longer than when in the same mood using a "feel like continuing" stop rule (Martin et al.) As discussed in chapter 4, in an attempt to address processes underlying pathological perseveration, mood-as-input theory has been successfully applied to a number of perseverative psychopathologies including depressive rumination (Watkins & Mason, 2002), catastrophic worry (Davey, Eldridge, Drost, & MacDonald, 2007; Davey, Startup, MacDonald, Jenkins, & Patterson, 2005; Startup & Davey, 2001, 2003), and perseverative checking (Davey, Startup, MacDonald, & Field, 2003; Davey, Startup, Zara, MacDonald, & Field, 2003; MacDonald & Davey, 2005a,b). For example, Startup & Davey (2001) examined a mood-as-input account of catastrophic worry and Watkins & Mason examined depressive rumination. In both studies either naturally occurring negative mood (Watkins & Mason) and induced negative mood (Startup & Davey) in combination with an "as many as can" stop rule was found to increase perseveration as compared with being in a negative mood using a "feel like continuing" stop rule. However, one area yet to be examined within a mood-as-input framework is how specific negative moods may interact with implicit or explicit stop rule use. Experiments 1 & 2 examine how specific negative moods interact with stop rule to affect performance on a

perseverative checking task. Recent mood-as-input experiments have been shown to provide a robust account of perseverative checking (MacDonald & Davey, 2005a). The present experiments also examine a checking task with the aim of further exploring mood-as-input accounts of perseveration.

5.2 A Mood-As-Input Account Of Perseverative Checking

Davey et al. (2003) tested predictions from the mood-as-input model by examining how different configurations of mood and stop rule would affect task performance on a checking-related item-generation task. As predicted by previous mood-as-input accounts of perseverative behaviours (e.g. Startup & Davey, 2001; Watkins & Mason, 2002) perseveration at an open-ended checking task occurred when in a negative mood using an “as many as can” stop rule. An “as many as can” stop rule and negative mood configuration is likely to be representative of perseverative checking given that those suffering from OCD are known to experience mood disturbance (Salkovskis, 1985) and possess characteristics that relate to potential adoption of “as many as can” stop rule use, such as an inflated responsibility for harm, and an intolerance for uncertainty (Steketee, Frost, & Cohen, 1998).

Davey et al. (2003) suggested that while this examination of the mood-as-input hypothesis provides information about the conditions under which perseverative checking is likely to occur, the item-generation tasks used in the two studies do not address the central features of obsessive compulsive (OC) checking, namely repeated ritualised checking of individual items. To address this issue MacDonald & Davey (2005a) devised an open-ended judgmental checking task which would allow participants in either a sad or happy mood using an “as many as can” or “feel like continuing” stop rule to continue to check until they are fully confident of having properly completed their checks; confidence at having checked properly being a key feature of OC checking (e.g. Coles, Frost, Heimberg, & Rheaume, 2002, cited MacDonald & Davey, 2005a). The task examined four aspects of checking, the overall number of lines checked, the highest number of rechecks in a single line, the total number of lines rechecked, and the total time spent checking (see chapter 3 for a detailed explanation of the checking task). Furthermore, to address the question of whether anxiety would be

decreased on termination of the checking bout (e.g. de Silva, 2003), MacDonald & Davey measured sadness, happiness, and anxiety levels pre, during, and post checking task. Finally, measures of confidence at having checked properly were taken before, during, and after the checking task.

Results indicated that participants in a negative mood using an “as many as can” (NM/AM) stop rule showed greater perseveration on all four checking measures than any other mood and stop rule configurations (MacDonald & Davey, 2005a). Accordingly MacDonald & Davey note that the NM/AM configuration is of most theoretical interest as it mostly closely resembles clinical checking. Furthermore, those in a negative mood using an “as many as can” stop rule rated significantly greater confidence in their performance on completion of the checking task than at the outset of the task. Examining the relationship between mood and confidence at having checked properly revealed that those in the NM/AM condition exhibited a significantly greater decrease in negative mood throughout the checking task as compared to the other experimental conditions. The authors suggest that while this could be indicative of a decrease in discomfort as reported by OC checkers (de Silva, 2003), this could also be due to natural dissipation of induced negative mood at the outset of the checking task.

In a second experiment MacDonald & Davey (2005a) replicated results from study 1 showing that increased perseveration occurred when in a NM/AM condition. Furthermore, results also indicated that confidence at having checked properly could also be influenced by manipulating mood whereby confidence ratings significantly decreased following a negative mood induction. This indicates that negative mood may have an effect on perseveration of checking, but also moment-to-moment judgements at having checked successfully (MacDonald & Davey).

Using the same open-ended checking task MacDonald & Davey (2005b) examined the relationship between inflated responsibility and negative mood. Increased checking perseveration occurred under the condition of inflated responsibility in conjunction with negative mood. Importantly, high responsibility alone was not sufficient to facilitate increased checking. In accordance with a mood-as-input account of perseverative checking (Davey et al., 2003; MacDonald

& Davey, 2005a) the context in which the mood was experienced (here high or low responsibility) was a crucial mediator in checking perseveration (MacDonald & Davey, 2005b).

Thus previous research (e.g. MacDonald & Davey, 2005a,b; Startup & Davey, 2001, 2003; Watkins & Mason, 2002) suggests that the mood-as-input theory provides a robust account of conditions under which perseverative behaviour occurs across a number of psychopathologies. Specifically, MacDonald & Davey (2005a,b) have demonstrated that negative mood effects on behaviour can be mediated by manipulating stop rule (MacDonald & Davey 2005a) and responsibility at having checked properly (MacDonald & Davey, 2005b), essentially both being 'rules' relating to the termination of an open-ended task. The studies in this chapter attempt to extend a mood-as-input account of perseverative checking by moving beyond a simple valenced approach and to examine how specific negative moods such as sadness, anxiety, and anger interact with stop rule use on the checking task devised by MacDonald & Davey (2005a).

5.3 How May Specific Negative Moods Affect A Perseverative Checking Task?

Theoretically, one of the appealing aspects of the mood-as-input model is that it attempts to explain underlying mechanisms of perseveration, thus being applicable to a number of disorders. This is demonstrated by the finding that a combination of negative mood and "as many as can" stop rule use has resulted in increased perseveration in ruminative thought (Watkins & Mason, 2002), catastrophic worry (Startup & Davey, 2001, 2003) and perseverative checking (MacDonald & Davey, 2005a,b). However, taking a more fine-grained approach, it is feasible that different specific negative moods may interact differently with stop rule use as compared to a general feeling of negativity.

The two experiments in this chapter focus on the effects of specific negative moods on perseverative checking. Previous work suggests that moods of the same valence, such as anxiety and sadness, can have distinct effects on processing. Depending on the way in which an event is appraised can mean that emotions of the same valence can exert different influences on judgements. For

example, Smith & Ellsworth (1985) found emotions of the same valence to differ in their underlying appraisals. As such anger was found to be associated with feelings of certainty, yet sadness was associated with feelings of uncertainty. One could suggest that these different appraisals could result in different outcomes when considering whether a goal, such as whether one has performed as well as they can on a task has been met. Furthermore, Lerner & Keltner (2000) found that anger and anxiety had different effects on risk perception and Raghunathan & Pham (1999) suggested that anxiety and sadness actually prime different goals in a gambling decision scenario. It is thus feasible that specific negative moods may interact differentially with stop rule use on a perseverative task. However, a high level of comorbidity among specific negative moods has been noted (e.g. Watson, O'Hara, & Stuart, 2008). Theorists such as Frijda (2001) examining the core properties of affect suggest that the core elements of emotions are pleasure and pain. The view that valence is the fundamental property of emotional responding is similarly expressed by Barrett (2006b) who suggests that valence is the core element of emotion experience.

To examine further the relationship between mood and stop rule use in perseverative checking, the aim of the present studies is to move beyond a valenced approach and to examine how specific negative moods such as sadness, anxiety, and anger interact with stop rule use on a perseverative checking task. Experiment 1 will use a combined mood induction procedure where the participant is asked to enter mood X (either a sad, happy, angry, or anxious mood) while listening to music and reading a number of statements designed to induce the desired mood state. This type of procedure has been demonstrated to be an effective way to induce negative mood states (Gerrards-Hesse, Spies, & Hesse, 1994; Marzillier & Davey, 2005). To address the issue of demand characteristics and possible mood saliency effects, study 2 will employ film as a mood induction procedure. There is an extensive literature on the efficacy of film to induce specific negative moods (e.g. Rottenberg, Ray, & Gross, 2007; Gross & Levenson, 1995). Furthermore, when using film, the purpose of the mood induction can be masked, thus overcoming potential mood saliency issues.

A strong version of the mood-as-input hypothesis would predict that mood has no specific motivational implications unless interpreted within the context in which it is being experienced (Martin, 2000). While research (e.g. Lerner & Keltner, 2000; Raghunathan & Pham, 1999) indicates that specific negative moods can have different effects on judgemental tasks, to date, no predictions have been made using mood-as-input theory about how specific negative moods would interact with stop rules on a perseverative task. It is possible that information from discrete negative moods would interact differently with stop rule use, to result in differences in perseveration. However, due to high comorbidity amongst specific negative emotions (e.g. Watson et al., 2008) and more recent work that suggests valence is a core property of emotional responding (e.g. Barrett, 2006b; Frijda, 2001), it remains unclear what kind of informative value specific negative emotions provide in a mood-as-input framework. As suggested by theorists such as Barrett and Frijda, if valence is one of the core properties of emotional responding, this may over-ride informational value from discrete moods if they are all of the same valence. These predictions will be examined in experiment 1.

5.4 Experiment 1

5.4.1 Introduction

The first experiment is designed to investigate how specific moods of the same valence (sadness, anxiety, and anger) interact with an “as many as can” or “feel like continuing” stop rule use on a perseverative checking task. Previous research (MacDonald & Davey, 2005a) on the mood-as-input hypothesis and perseverative checking indicates that perseveration as measured by a) the overall number of checks, b) the highest number of rechecks in a single line, c) the total number of lines rechecked, and d) the total time spent checking would occur when in a negative mood using an “as many as can” (AM) stop rule, or with measures a, b, & c when in a positive mood using a “feel like continuing” (FL) stop rule.

5.4.2 Method

Participants

Participants consisted of 80 undergraduate and postgraduate students from the University of Sussex. Nineteen were male and sixty-one were female, the age range was from 18 – 35 years with a mean age of 21.12 (sd = 3.48). All participants were volunteers and 76 % participated in order to gain course credits.

Procedure

Participants were required to give their informed consent, after which they were randomly assigned to either a sad (N = 20), happy (N = 20), anxious (N = 20) or angry (N = 20) mood group, this relating to the type of mood induction they would undergo. All participants were asked to listen to an extract of music whilst reading a series of sentences from the computer, they were then asked to read and check a piece of text for errors.

Stage 1

Baseline mood measure: All participants rated their current levels of sadness, happiness, anxiety and anger on separate visual-analogue (VAS) 10-point scales ranging from 0 (not at all sad, anxious etc.) to 10 (extremely sad, anxious etc.). Visual analogue scales of this type have demonstrated both validity and reliability in college students (Stern, Aruda, Hooper, Wolfner, & Morey, 1997) and the general population (Nyenhuis, Stern, Yamamoto, Luchetta, & Arruda, 1997).

Stage 2

Mood Induction: Participants were randomly assigned to either a sad, happy, angry, or anxious mood condition. The combined induction method used herein was based on the work of Mayer, Allen, & Beauregard (1995) and extended by Marzillier & Davey (2005). This used music and guided imagery vignettes to induce specific moods of sadness, anxiety, anger, and happiness.

Participants were informed by written and oral instruction that they were to try and enter into mood X (depending on what mood condition they had been

assigned to). The music was started one minute before the imagery vignettes were shown and was looped to continue during the experiment. Music was played through headphones and the vignettes were shown at 30-second intervals on Microsoft Power Point. To facilitate mood induction for the three negative mood conditions, the blinds were drawn, main lights were turned off and an angle poise lamp produced subdued lighting. During the happy mood induction the overhead lights and lamp were both on and the blinds were open (cf. Davey, Startup, MacDonald, Zara, & Field, 2003).

- Sad mood induction: Participants were asked to listen to Chopin (1839), Opus 28, #6, from *Preludes.* An example vignette is "You are told by a young relative that she has cancer and has only six months to live".

- Happy mood induction: Participants listed to Delibes (1870), Mazurka from *Coppelia.* An example vignette is "You just got a new job, and it's even better than you expected".

- Anxious mood induction: Participants listened to Ives (1906) *Halloween*. An example vignette is "You are in your bedroom late at night when you hear someone else enter your apartment. No one else you know has a key".

- Angry mood induction: Participants listened to Mussorgsky (1867) *Night on Bare Mountain.* An example vignette is "Somebody files a false legal claim against you".

At the end of the mood induction, participants were asked to complete a second set of mood VAS scales measuring as above, sadness, happiness, anxiety and anger.

Stage 3

Checking task instruction: The checking task and task instruction was based on a task devised by MacDonald & Davey (2005a). Participants were instructed that they would be reading a piece of text that had not been proof read, but which may be used as part of future secondary level maths examinations. Approximately 100 random spelling and punctuation errors had been added to a passage of 41 lines of text taken from Coolican (1994). Participants were

instructed to check for typing, punctuation and grammatical errors and note them on the sheet provided. Participants were also instructed that they should go back and re-check each line for errors and note in tally form the number of times they re-checked each line. These instructions were given both orally and in writing (see appendix E and F for task instructions and task). Participants were then asked to complete a third set of mood VAS as above.

Before starting the checking task, participants were given their 'stop rule' instruction. Participants were randomly assigned to either a FL group, or an AM group. The FL group received verbal and written instructions to check the text until they felt that they no longer wanted to continue (see appendix B). The AM group received verbal and written instructions to check the text until they completed the goal of finding and correcting as many errors as possible (see appendix C).

Stage 4

Checking task: Once participants had been asked to start the checking task, the experimenter started the stopwatch and left the room.

Stage 5

Post task: When participants felt that they had completed the task, they informed the experimenter who then noted the total time spent checking. Participants were asked to complete a fourth set of mood VAS (as above). Participants were then debriefed and thanked. To ensure that ethical guidelines were met all who participated received a debrief information sheet with contact details of the university counselling services and the experimenter's contact details, should they wish to have further information, or withdraw their data from the study (appendix A). Those who had undergone a negative mood induction were offered the option of staying and listening to some happy mood inducing music.

5.4.3 Results

Effect sizes are reported using Pearson's correlation coefficient *r* as an effect size measure, or partial eta squared. Using Cohen's (1988) criteria a small

effect size is reflected by an *r* of 0.1, medium by 0.3, and large by 0.5. Using partial eta squared a small effect size is reflected by a measure of 0.01, medium by 0.06, and large by 0.14.

Mood manipulation measures

To check that there were significant differences in each target mood pre and post induction, four repeated measures t-tests were performed. In the sad condition, t (19) = 4.20, p = < .001, r = 0.66, in the happy condition, t (19) = 5.22, p = < .001, r = 0.77, in the anger condition t (19) = 7.30, p = < .001, r = 0.86 and in the anxious condition t (19) = 5.61, p = < .001, r = 0.79. These results suggest that in each mood condition, ratings of the target mood increased significantly post mood induction (see Table 5.1).

Table 5.1 Mean mood ratings pre and post mood inductions with standard deviations in parenthesis

Mood Group	*Sad rating Time 1*	*Sad rating Time 2*	*Happy rating Time 1*	*Happy rating Time 2*	*Angry rating Time 1*	*Angry rating Time 2*	*Anxiety rating Time 1*	*Anxiety rating Time 2*
SAD	2.58(2.23)	4.42(2.30)	6.13(1.71)	4.49(1.82)	1.59(1.63)	2.48(2.39)	3.29(2.24)	3.43(2.48)
HAPPY	1.92(1.42)	1.47(1.75)	6.44(1.46)	7.37(1.58)	1.19(1.71)	0.82 (1.39)	1.96(2.10)	1.09(1.48)
ANGRY	2.23(2.32)	3.44(1.9)	5.58(2.29)	4.46(1.92)	0.90(.97)	4.01(2.0)	2.68(1.80)	3.00(2.15)
ANXIOUS	1.92(1.37)	3.37(1.95)	6.65(1.45)	4.91(1.52)	1.34(2.0)	1.96(2.07)	2.54(2.14)	4.80(2.25)

To examine if the mood inductions were discrete, or if inducing one mood also increased other moods, four one-way mood group × mood ANOVAs were performed (examining mood ratings at time 2, immediately after the mood induction). There was a significant difference across groups in levels of self-reported sadness, F (3, 76) = 7.76, p = < .001, η_p^2 = 0.23. Bonferroni post hoc tests suggest that levels of sadness were significantly greater in the sad mood condition than the happy mood condition (p = < .001), but there were no other significant differences in sadness ratings between groups. There was a significant difference across groups in reported happiness, F (3, 76) = 13.09, p = < .001, η_p^2 = 0.34. Post hoc tests indicated significantly greater happiness ratings in the happy mood group than in each negative mood group (with all p < .001). Reported anger in each mood group (equal variances not assumed) revealed that there was a

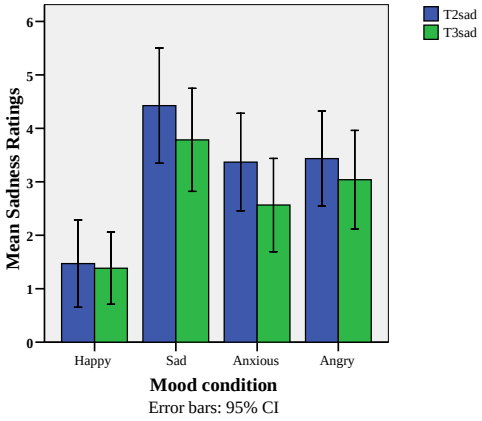
significant difference, F (3, 76) = 8.84, p = < .001, η_p^2 = 0.26. Games-Howell tests indicated that self reported anger was significantly greater in the anger condition than the happy condition (p = < .001) and in the anxious condition (p = .01), but not in the sad condition. Anxiety (equal variances not assumed) was significantly different across groups, F (3, 76) = 10.36, p = < .001, η_p^2 = 0.29. Post hoc tests suggest that changes in anxiety were significantly higher in the anxiety condition than in the happiness condition (p = < .001). There was a marginally significant difference in anxiety between the anxious and angry mood groups (p = .07), but there was no significant difference between the anxious and sad conditions.

In summary, examining differences between pre and post mood induction measures indicates that each target mood was significantly higher post mood induction. Examining mood ratings across groups indicated no significant differences between levels of sadness in the sad, anxious and angry mood groups, suggesting that inducing anxiety and anger may also increase reported sadness. Happiness was found to be significantly greater in the happy mood group than all other mood conditions, suggesting a fairly discrete mood induction. That anger was significantly greater in the anger condition than the happy and anxious conditions, but not the sad condition, suggests that inducing anger may also increase sadness. Anxiety was significantly higher in the anxious condition than in the happy condition, with a near significant difference between the anxious and anger conditions. However, there was no significant difference between rated anxiety in the anxious and sad conditions. This suggests that inducing sadness may also increase anxiety levels. These results suggest that mood inductions are not entirely discrete. Mood induction procedures were successful at increasing each target mood. However, comparing ratings of mood by each mood group there are significant differences between ratings of happiness and negative mood ratings, yet inductions of specific negative moods are not entirely discrete. This is not surprising given high levels of comorbidity amongst negative emotions (Watson et al., 2008).

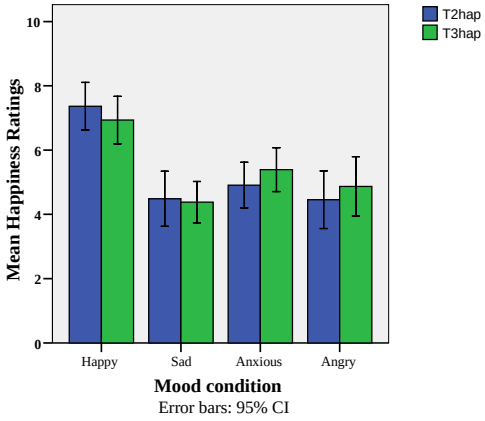
Mood Dissipation

To check whether there was a significant change in mood between the end of the mood induction (mood time 2) and the start of the checking task (mood time 3) in each target mood, four repeated-measures t-tests were performed. Figure 5.1 shows rating of mood at time 2 and 3 by each mood group. In the sad mood condition, t (19) = 2.36, p = 0.03, r = 0.48, in the anxious mood condition, t (19) = 1.34, p = 0.2, r = 0.29, in the happy mood condition, t (19) = 2.38, p = 0.03, r = 0.48, and in the anger mood condition, t (19) = 2.62, p = 0.02, r = 0.52. These results indicate that in the sad, happy, and angry mood conditions there was a significant difference in the induced mood between time 2 and time 3, but not in the anxiety condition. An examination of figure 5.1 shows that in each case the target mood had decreased over time. This has implications for findings if one were to suggest that felt mood lacked sufficient intensity to affect behavioural tasks. However, it could be argued that naturally occurring mood becomes weaker as the event that induced it becomes more distant. Previous mood-as-input studies have examined perseverative behaviours with both naturally occurring mood (e.g. Watkins & Mason, 2002) and induced mood (e.g. Startup & Davey, 2001) where they have found a similar pattern of behaviours in both cases. It is likely that mood will dissipate to an extent over time, yet despite this, previous mood-as-input studies (as noted above) report a robust interaction between mood and stop rule on performance.

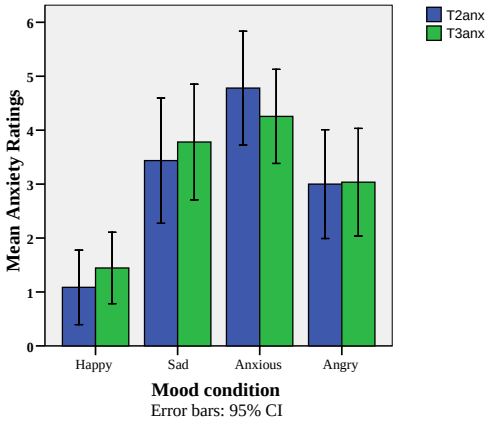
(i)



(ii)



(iii)



(iv)

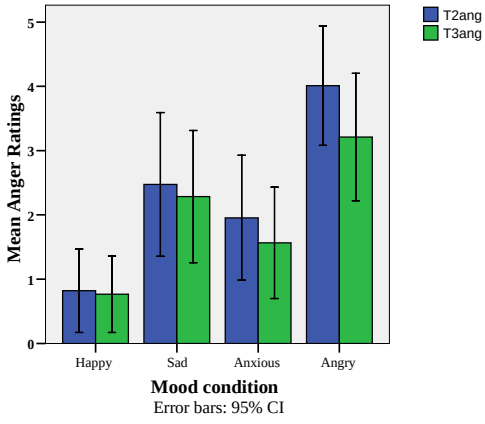


Figure 5.1 (i) Sadness, (ii) happiness, (iii) anxiety and (iv) anger ratings for each mood condition at time 2 & 3.

Task Perseveration Measures

Four two-way ANOVAs were conducted to investigate the effects of mood and stop rule on task performance. Perseveration at the task was measured by (i) the overall number of checks in the task, (ii) the highest number of rechecks in a single line, (iii) the total number of lines checked, and (iv) the total time spent checking. Figure 5.2 shows performance on these measures by all eight mood conditions (happy, sad, angry, and anxious groups, using an AM stop rule or a FL stop rule).

Overall number of checks

A two-way mood × stop rule ANOVA on the total number of checks (equal variances not assumed) revealed a main effect of mood group, F (3, 72) = 2.89, p = .04, η_p^2 = 0.11 and a main effect of stop rule, F (1, 72) = 26.66, p = < .001, η_p^2 = 0.27. There was no significant mood × stop rule interaction F (3, 72) = .25, p = .86, η_p^2 = 0.01. To clarify, those using an AM stop rule generated a significantly greater number of checks than those using a FL stop rule, regardless of whether they were in a positive or negative mood. This would indicate that stop rule, rather than the hypothesised interaction between mood valency and stop rule was influencing performance. The main effect of mood on performance just reaches significance (p = .04). This indicates that regardless of the stop rule being used, there was a significant difference in performance between the mood conditions. This is likely to be a reflection of the angry group producing a slightly greater number of checks than the sad mood group (see figure 5.2). However when using Games Howell pairwise comparisons (this more conservative test was used to account for unequal variances) to compare each mood group against the other, there are no reported significant differences in performance between groups.

Highest recheck in a single line

The data showed two cases that were three or more standard deviations away from the mean. Cases greater than two standard deviations away from the mean can be considered to be outliers, one treatment of which is to exclude them from the data (Field, 2004), thus these two cases were excluded from the analysis.

A two-way ANOVA (equal variances not assumed) indicated no effect of mood, F (3, 70) = 1.67, p = .18, η_p^2 = 0.09 and a significant effect of stop rule, F (1, 70) = 17.59, p = < .001, η_p^2 = 0.14. There was no significant interaction, F (3, 70) = .09, p = .96, η_p^2 = < 0.01.

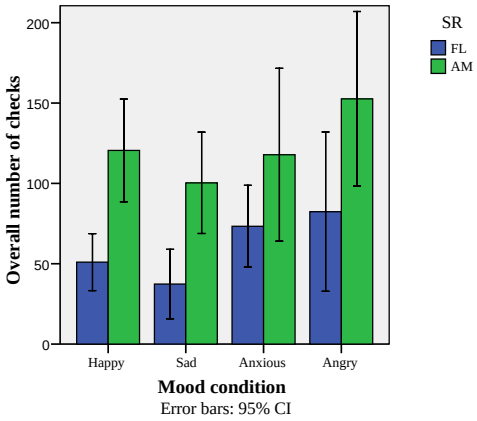
Total number of lines rechecked

The data revealed two cases that lay three standard deviations away from the mean, again these were excluded from the analysis. A two-way ANOVA (equal variances not assumed) showed no significant effect of mood, F (3, 70) = 1.19, p = .32, η_p^2 = 0.05 and a significant main effect of stop rule, F (1, 70) = 22.95, p = < .001, η_p^2 = 0.26. There was no significant interaction, F (1, 70) = .25, p = .86, η_p^2 = 0.02.

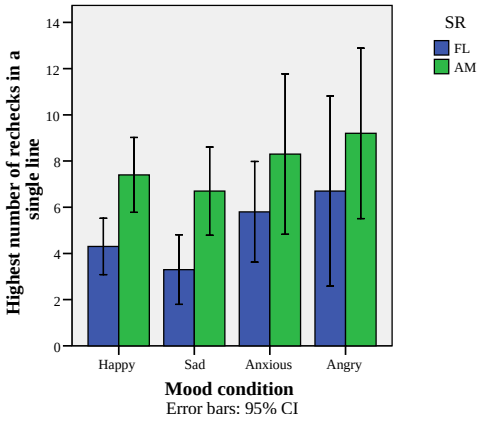
Time spent checking

A two-way ANOVA showed no significant main effect of mood, F (3, 72) = 1.5, p = .22, η_p^2 = 0.06, however there was a significant main effect of stop rule, F (1, 72) = 28.96, p = < .001, η_p^2 = 0.28. There was no significant interaction F (1, 72) = .63, p = .60, η_p^2 = 0.03.

(i)



(ii)



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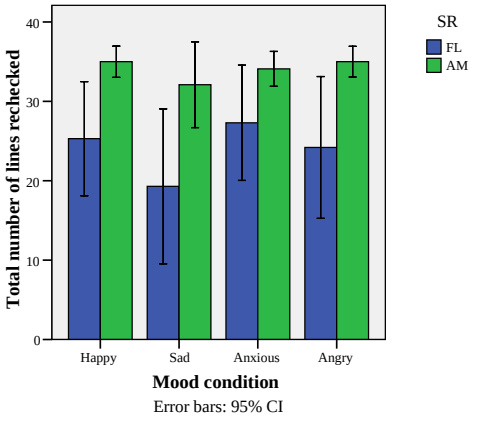

(iv)

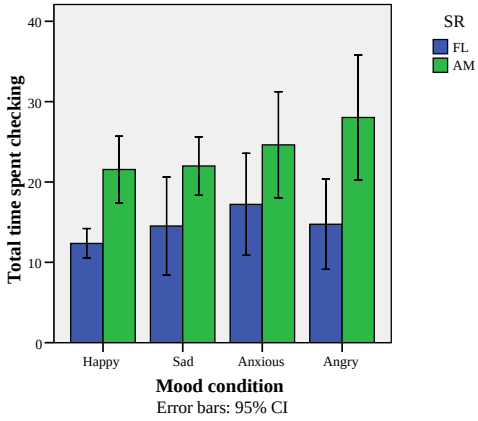

Figure 5.2 (i) Overall number of checks (ii) Highest rechecks of a single line (iii) Total number of lines rechecked. (iv) Total time spent checking.

To summarise, results indicated that whilst mood inductions significantly increased each target mood, these inductions were not always discrete. Examination of the change in induced mood between the end of the mood induction (time 2) and the start of the checking task (time 3) shows a significant decrease in each target mood in the sad, happy and angry mood conditions. Two-way ANOVAs were conducted on each of the four task perseveration measures. Results indicated that there was a main effect of mood and a main effect of stop rule on the total number of checks, but no significant interaction. There was no effect of mood and no significant interactions between mood and stop rule on the highest number of rechecks in a single line, the total number of lines checked, or the time spent checking. However, there was a significant main effect of stop rule on these three measures. A main effect of stop rule on each dependent variable indicates that those using an AM stop rule displayed greater perseveration than those using a FL stop rule.

Stepwise regressions

To further explore the data, a stepwise regression was performed to examine whether mood, stop rule or a mood × stop rule interaction were significant predictors of any of the four dependent variables. Wright (1997) advises caution when using stepwise regression, as this method allows the inclusion or exclusion of variables to rest solely on statistical computation, and *p* values can be difficult to interpret as the model is based on specifications made by a statistical package. However, a stepwise method can be useful when carrying out exploratory research, if results are treated with caution (Tabachnick & Fidell, 2001; Wright).

Four stepwise regressions were conducted with mood (each participants mood rating on all four moods just before the start of the checking task), stop rule, and mood × stop rule interaction (thus 9 predictors) as the predictor variables. The

criterion variables were time spent checking, overall number of checks, highest number of rechecks in a single line, and total number of lines rechecked. Table 5.2 details information for the predictor variables retained in the model for each criterion variable.

For the criterion variable total number of checks, stop rule was the only significant predictor, F (1,78) = 25.54, p = < .001, r = 0.54. For the variable highest number of rechecks in a single line two cases were found to be 3 or more standard deviations away from the mean and thus were excluded from the analysis. Again stop rule was the only significant predictor in the model, F (1,76) = 17.87, p = < .001, r = 0.44. For total number of lines rechecked, two cases were found to be outliers and thus excluded. Here, stop rule was the only significant predictor, F (1,76) = 25.93, p = <. 001, r = 0.50. Finally for time spent checking, stop rule was the only significant predictor retained in the model F (1,78) = 28.82, p = < .001, r = 0.52.

Table 5.2 Unstandardised and standardised regression coefficients for predictor variables retained for each criterion variable

Criterion variable	***Sig. predictor***	***B***	***SE B***	***β***
Time	Stop Rule	9.34	1.74	0.52*
Overall number of checks	Stop Rule	61.80	12.23	0.50*
Highest rechecks in a single line	Stop Rule	2.87	0.85	0.36*
Total number of lines checked	Stop Rule	10.03	1.97	0.50*

Note. Time: R^2 = 0.2

Overall number of checks: R^2 = 0.25

Highest number of rechecks on a single line: SR: R^2 = 0.13

Total number of lines rechecked: R^2 = 0.25:

*p = <. 001

Results from the stepwise regressions confirm findings from the ANOVAs, namely that for each perseveration measure stop rule use has the only

significant effect on performance. An examination of Figure 5.2 indicates that regardless of mood condition, on each perseveration measure those using an “an many as can” stop rule persevere at the task longer than those using a “feel like continuing” stop rule.

5.4.4 Discussion

The results of experiment 1 do not confirm a mood-as-input account of perseverative checking when specific moods of the same valence are combined with stop rule use. Previous research (e.g. MacDonald & Davey 2005a,b) would predict that negative mood in combination with an “as many as can” stop rule would result in perseveration on the open-ended checking task used in the present study. Results from the current study suggest that each target mood was significantly increased post-mood induction, but that negative mood inductions may not have been entirely discrete, especially in the case of sad mood. Furthermore, there was a significant decrease in target mood between the end of the mood induction and start of the checking task.

Examining the four task perseveration measures using a complex mood condition × stop rule ANOVA, in each case revealed a significant main effect of stop rule for each measure. There was a significant main effect of mood on the total number of checks, however post hoc tests suggested no significant differences in performance between mood groups on this measure. None of the interaction effects on any of the perseveration measures were significant. These results were confirmed by performing a stepwise regression on each of the four perseveration measures. For each of the four measures stop rule was found to be a significant predictor. This does not confirm the possibility that specific negative moods may provide discrete information (e.g. Lerner & Keltner, 2000; Raghunathan & Pham, 1999) in conjunction with different combinations of stop rule, or that affective information is provided by the valency of the specific mood (e.g. Barrett, 2006b; Frijda, 2001).

Results indicate that the mood induction procedure may not have been an effective way of inducing discrete negative moods. Sadness was not significantly greater in the sad mood condition than the angry and anxious mood conditions

and thus may have contributed to an overall feeling of negativity in all three negative mood conditions, rather than discrete kinds of negative mood. However, previous research (e.g. Davey et al., 2003; MacDonald & Davey, 2005a,b) found that when in a positive mood, those in the FL condition performed a greater number of checks overall and had a higher number of rechecks in a single line than those in a positive mood using an AM stop rule. Yet, as can be seen from Figure 5.2, in each perseveration measure those in a happy mood demonstrated increased perseveration when using an "as many as can" stop rule rather than a "feel like continuing" stop rule. Thus despite the difficulty in inducing discrete negative moods, this does not explain why there was not the expected interaction between positive mood and stop rule use.

One possible explanation for the observed results is that induced mood was found to have dissipated between the end of the mood induction and start of the checking task. This could explain why there was no effect of mood on performance, however mood was not found to have decreased significantly between time 2 and 3 in the anxious mood condition and there was still no effect of anxious mood on behaviour. A more plausible explanation is that mood had been induced, but that participants were aware where their mood had come from as the mood induction specifically states that they should try and get into mood 'X'. Schwarz & Clore (1983) and Scott & Cervone (2002) have both demonstrated that if the source of a current mood is highly salient, for example clearly attributable to the weather (cf. Schwarz & Clore), then the impact of mood on judgements is eliminated. Thus if in the present experiments participants perceived their current mood to be related to the mood induction procedure, as suggested by Scott & Cervone, informational value from the mood would be eliminated. This would explain why there was an effect of stop rule, but no mood and stop rule interaction on all checking measures.

A logical progression from these findings is to examine the possibility of using a different method to induce mood. A different mood induction must be capable of inducing a fairly strong discrete mood, due to the finding that anxiety and anger also increase sadness. Furthermore, it must induce mood without the

participant being aware that they are undergoing a mood induction and thus not being able to consciously attribute their mood to an experimental procedure.

5.5 Experiment 2

5.5.1 Introduction

Experiment 1 examined a mood-as-input account of perseverative checking. Previous research in this area (Davey et al. 2003, MacDonald & Davey, 2005a,b) indicated that a combination of negative mood and "as many as can" stop rule is the most relevant mood and stop rule combination on an iterative checking task (Davey et al.) and an open-ended judgemental checking task (MacDonald & Davey). In an attempt to increase understanding of how mood and stop rule interact to result in perseveration in perseverative psychopathologies such as obsessive checking, experiment 1 examined how specific moods of the same valence, here sadness, anxiety and anger, would interact with stop rule use to result in perseveration on a open-ended judgemental checking task as devised by MacDonald & Davey, 2005a). However, results indicated that specific negative moods were not interacting with stop rule use, in each case there was a main effect of only stop rule on perseveration. While it is possible that information from specific negative moods is not used as information in conjunction with stop rules, based on previous research one would still have expected differential perseveration depending on the type of stop rule employed when in a happy mood (cf. Davey et al.; MacDonald & Davey, 2005a,b), yet there was no indication of this.

A possible explanation for these results is that the source of the induced mood was highly salient and thus informational value from any of the induced moods was discounted (Schwarz & Clore, 1983; Scott & Cervone, 2002). To this end, experiment 2 will be a replication of experiment 1, but will employ an alternative mood induction procedure. The present experiment aims to induce mood through film, whereby participants will not be informed that the film clip they watch is part of a mood induction. Evidence suggests that film is an effective tool in inducing mood. Westerman, Spies, Stahl & Hessen (1996) found film to be among the most effective methods of inducing positive and negative mood.

Further Marzillier & Davey (2005) found that video compared well to other mood induction techniques such as guided imagery and music and autobiographical recall and music.

Previous research (e.g. Gross & Levenson, 1995; Marzillier & Davey, 2005; Rottenberg. Ray, & Gross, 2007) has examined and validated specific film clips that can be used to induce discrete emotions. They suggest that the ease with which a film can be embedded into an experimental procedure can allow one to elicit emotion with relatively low levels of demand characteristics. Furthermore both Gross & Levenson and Rottenberg et al. have validated a number of film clips with the specific aim of eliciting specific target emotions, this being ideal for the present study. Experiment 2 will use validated film clips to induce specific negative moods without participants being informed that they are undergoing a mood induction procedure. As in experiment 1 the hypothesis to be examined is whether specific negative moods will provide distinct information when experienced in conjunction with either an “as many as can” (AM), or “feel like continuing” (FL) stop rule on an open-ended judgemental checking task, or whether valence will be an over-riding source of informational value (e.g. Barrett, 2006b; Frijda, 2001).

5.5.2 Method

Participants

Participants consisted of 80 undergraduate and postgraduate students and staff members from the University of Sussex. Twenty-three participants were male and fifty-seven were female, the age range was from 18 – 42 years, with a mean age of 22.27 (sd = 5.45). All participants were volunteers and 50% of participants took part in the experiment in order to gain course credits.

Procedure

Participants were informed both orally and in writing that they would be asked to complete a number of unrelated tasks, including watching a short film clip and proof reading a piece of text for errors. Participants were then required to give their informed consent, after which they were randomly assigned to either a

sad (*N* = 20), happy (*N* = 20), anxious (*N* = 20) or angry (*N* = 20) mood group, this relating to the type of mood induction they would undergo.

Stage 1

As experiment 1

Stage 2

Mood induction: Participants were randomly assigned to either a sad, happy, angry or anxious mood condition. Instructions are based on those used by Gross & Levenson, (1995), Marzillier & Davey, (2005) and Rottenberg, Ray, & Gross (2007). Participants were not told that they would be experiencing a mood induction procedure, instead they were asked to "please watch the film carefully". This type of instruction is recommended by Rottenberg et al. to avoid demand characteristics. To facilitate mood induction for the three negative mood conditions, the blinds were drawn, main lights were turned off and an angle poise lamp produced a subdued lighting effect. During the happy mood induction the overhead lights and lamp were both on and the blinds were open (cf. Davey et al., 2003). Participants viewed the films from a PC monitor.

- Sad mood induction: Participants were asked to watch a clip from the film *The Lion King* (Hahn, Allers, & Minkoff, 1994). The clip lasted 6.50 minutes.

- Happy mood induction: Participants watched a clip also from the Lion King (Hahn et al., 1994). The clip lasted 7.02 minutes.

- Anxious mood induction: Participants watched a clip from *Silence of the Lambs* (Saxon, Ult, Bozman, & Demme, 1991). The clip lasted 4.19 minutes.

- Angry mood induction: Participants watched a clip from the film *Cry Freedom* (Spencer, Briley, & Attenborough, 1987). The clip lasted 3.21 minutes.

Stage 3

Distractor task: After watching the films, participants were asked to complete a second set of VAS scales, again measuring sadness, happiness, anxiety, and anger. Participants were then asked to spend one minute sketching a cognitive map of the campus. This has successfully been used as a distractor task in other experiments involving mood inductions (e.g. Davey et al., 2003) to help ensure the participant does not make a direct link between the mood induction procedure and mood measures, thus hopefully decreasing demand characteristics.

Stage 4

Checking task instruction: As in experiment 1.

Stage 5

Checking task: See experiment 1.

Stage 6

Post task: See experiment 1.

5.5.3 Results:

Mood manipulation measures

A repeated measures t-test was performed for each mood condition to examine whether there was a significant difference in the target mood condition post mood induction. In the sad mood condition, t (19) = 3.79, p = .001, r = 0.66, in the happy mood condition, t (19) = 4.43, p = < .001, r = 0.71, in the anger condition, t (19) = 6.16, p = < .001, r = 0.82, and in the anxious condition, t (19) = 4.00, p = .001, r = 0.68. These results suggest that ratings of the target mood increased significantly post mood induction (see Table 5.3).

Table 5.3 Mean mood ratings pre and post mood inductions

Mood Group	*Sad rating Time 1*	*Sad rating Time 2*	*Happy rating Time 1*	*Happy rating Time 2*	*Angry rating Time 1*	*Angry rating Time 2*	*Anxiety rating Time 1*	*Anxiety rating Time 2*
SAD	2.12(1.89)	3.93(2.77)	6.80(1.79)	5.57(2.15)	1.03(1.68)	1.90(2.19)	3.16(2.69)	3.33(2.73)
HAPPY	1.86(1.53)	1.18(1.38)	6.27(1.73)	7.41(1.30)	1.02(1.91)	1.08(1.88)	3.49(2.65)	2.34(1.92)
ANGRY	1.85(1.75)	5.23(2.19)	5.83(1.67)	4.10(2.10)	1.26(1.81)	5.12(2.69)	3.49(2.99)	4.37(2.74)
ANXIOUS	2.46(2.38)	2.66(2.39)	5.69(2.42)	5.03(2.40)	1.76(2.24)	2.10(2.49)	3.20(2.61)	4.10(2.55)

Four one-way mood group × mood (time 2 mood ratings immediately after induction) ANOVAs were performed to examine if mood inductions were discrete. There was a significant difference across groups in levels of self-reported sadness (equal variances not assumed), F (3, 76) = 12.02, p = < .001, η_p^2 = 0.32. Games-Howell tests suggest that levels of sadness were significantly greater in the sad mood condition than the happy mood condition (p = .002), however while there were no other significant differences in sadness ratings between groups as can be seen from Table 5.3 sadness levels were higher in the anger induction post mood induction than they were in the sad mood condition. There was a significant difference in reported happiness, F (3, 76) = 9.72, p = < .001, η_p^2 = 0.28**.** Post hoc tests indicated significantly greater reported happiness in the happy mood group than in each negative mood group (all p < .05). Examining reported anger in each mood group revealed that there was a significant difference, F (3, 76) = 11.46, p = < .001, η_p^2 = 031. Post hoc tests indicated that self reported anger was significantly greater in the anger condition than the happy condition (p = < .001), sad condition (p = < .001) and anxious condition (p = .001). There was a near significant difference in anxiety across groups, F (3, 76) = 2.64, p = .06, η_p^2 = 0.09**.** Post hoc tests suggest that there were no significant differences in anxiety levels when the anxious mood group was compared to the other mood groups (all p = > .05).

To summarise, repeated measures t-tests indicated that there was a significant increase in each target mood post mood induction. Examining mood ratings by each group indicated that there was not a significant difference in levels of sadness between the sad, anxious and angry groups. An examination of the means (see Table 5.3) clearly shows that anger induction also increases levels of

reported sadness, this may not be surprising since Gross & Levenson (1995) indicate that anger is likely to co-occur with other negative moods. Levels of happiness were significantly higher in the happy mood condition than all other conditions. Anger was also found to be significantly greater in the anger condition than in all other conditions. However, the anxiety induction appeared to be less successful. Post hoc tests revealed that there were no significant differences in anxiety ratings when the when the anxiety condition is compared to the sad, happy and angry conditions. As there was not even a significant difference in anxiety levels between the anxious and happy mood conditions, it seems unlikely that inducing the other negative moods increased reported anxiety in those conditions. It is possible that the anxious mood induction was not very effective.

Mood Dissipation

To examine whether induced mood dissipated between the end of the mood induction (mood time 2) and the start of the checking task (mood time 3) in each target mood, four repeated measures t-tests were performed. Figure 5.3 shows rating of mood at time 2 and 3 by each mood group. In the sad mood condition, t (19) = 2.85, p = .01, r = 0.55, in the happy mood condition, t (19) = 2.76, p = .01, r = 0.53, in the anger mood condition, t (19) = 5.36, p = < .001, r = 0.78, and in the anxious mood condition, t (19) = .30, p = 0.77, r = 0.07. Thus indicating that in the sad, happy, and angry mood conditions there was a significant difference in the induced mood between time 2 and time 3. An examination of Figure 5.3 shows that in each case the target mood had decreased over time apart from in the anxiety condition.

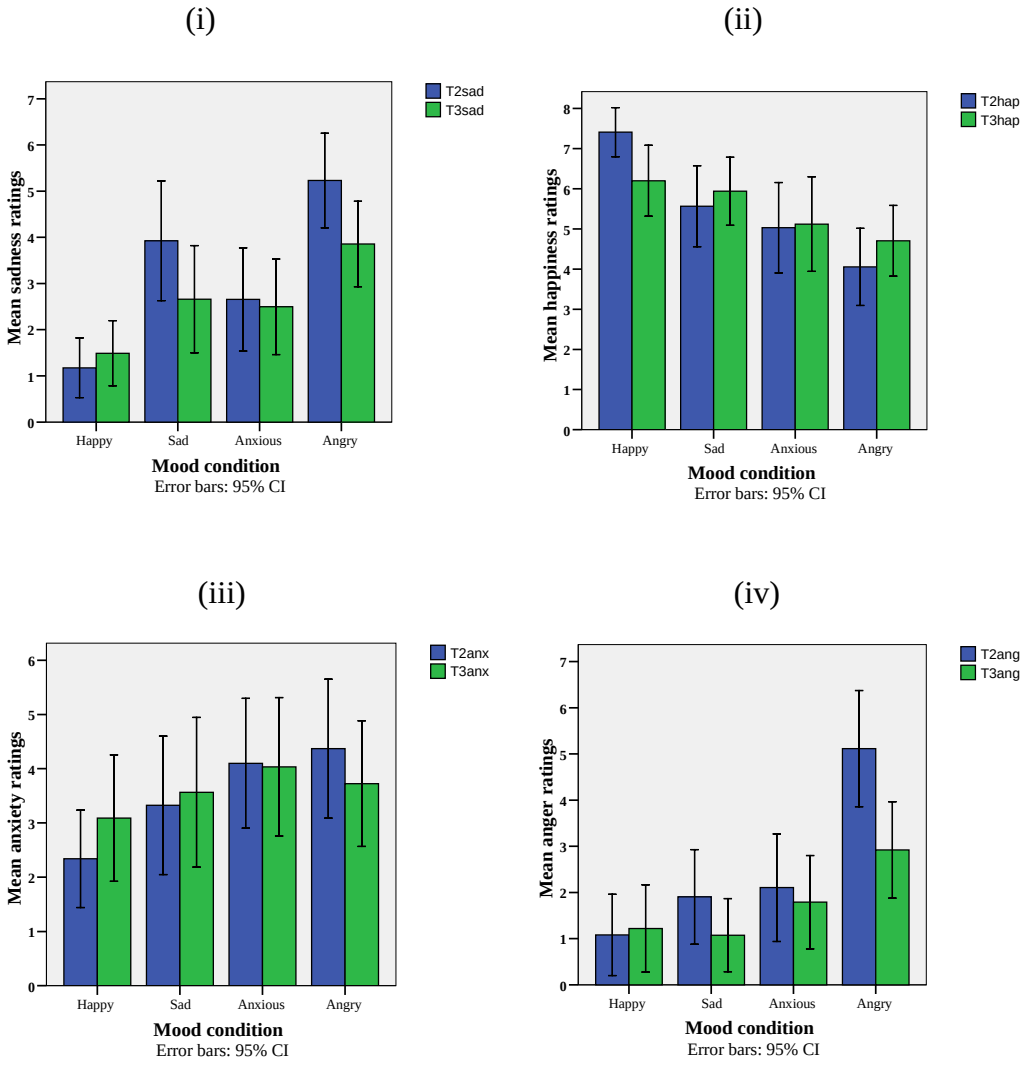

Figure 5.3 (i) Sadness, (ii) happiness, (iii) anxiety and (iv) anger ratings for each mood condition at time 2 & 3.

Task perseveration measures

Four two-way ANOVAs were conducted to investigate the effects of mood and stop rule on task performance. Perseveration at the task was measured by (i) the total number of checks in the task, (ii) the highest number of rechecks in a single line, (iii) the total number of lines rechecked, and (iv) the total time spent

checking. Figure 5.4 shows performance on these measures by all eight conditions (happy, sad, angry and anxious groups using an AM stop rule, or a FL stop rule).

Overall number of checks

An examination of the data showed that there was one outlier that was greater than three standard deviations away from the mean, this data was excluded from the analysis. A two-way mood × stop rule ANOVA on the total number of checks revealed a main effect of stop rule, F (1, 71) = 29.30, p = < .001, η_p^2 = 0.26. There was no main effect of mood group, F (3, 71) = 1.70, p = .18, η_p^2 = 0.02, or a significant interaction, F (3, 71) = 1.63, p = .19, η_p^2 = 0.01.

Highest recheck in a single line

Examination of the data revealed one case that was three standard deviations away from the mean, this was excluded from the analysis. A two-way ANOVA (equal variances not assumed) showed no main significant effect of mood, F (3, 71) = .57, p = .63, η_p^2 = 0.01, but a significant main effect of stop rule, F (1, 71) = 12.23, p = .001, η_p^2 = 0.15. There was no significant interaction, F (3, 71) = .02, p = .99, η_p^2 = 0.01.

Total number of lines rechecked

A two-way ANOVA (equal variances not assumed) indicated a significant main effect of stop rule, F (1, 72) = 24.22, p = < .001, η_p^2 = 0.25. There was no significant main effect of mood group, F (3,72) = .85, p = .47, η_p^2 = 0.03 and no interaction, F (3, 72) = .18, p = .91, η_p^2 = < .01.

Time spent checking

A two way ANOVA showed no significant main effect of mood, F (3, 72) = .80, p = .50, η_p^2 = 0.03, however there was a significant main effect of stop rule, F (1, 72) = 28.50, p = < .001, η_p^2 = 0.28. There was no significant interaction F (1, 72) = .38, p = .77, η_p^2 = 0.01.

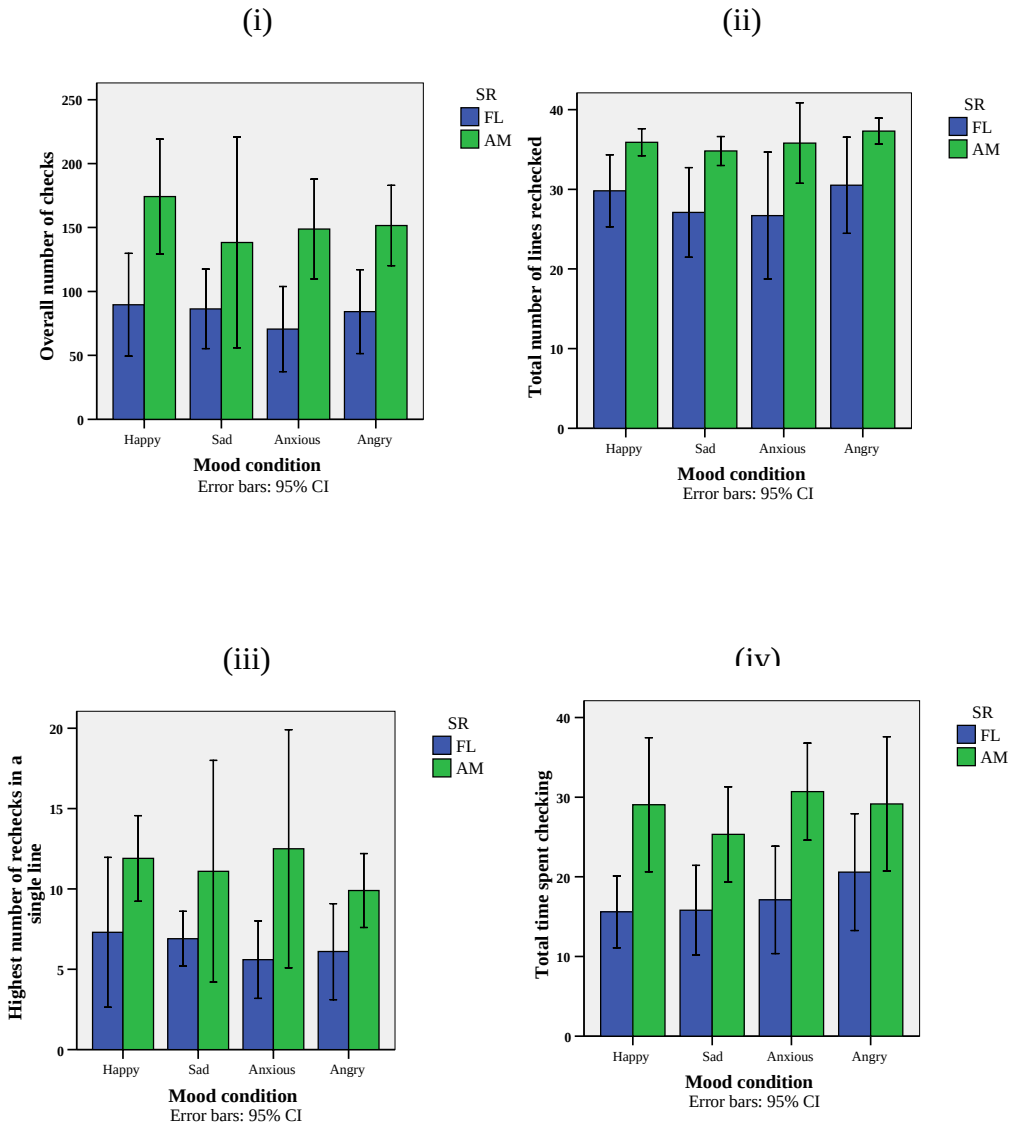

Figure 5.4 (i) Overall number of checks (ii) Highest recheck of a single line. (iii) Total number of lines rechecked. (iv) Total time spent checking

Stepwise regressions

As an exploratory measure, four stepwise regressions were performed (for details of why a stepwise regression was chosen see experiment 1). The criterion variables were time spent checking, overall number of checks, total number of lines rechecked, and highest number of rechecks in a single line. The predictor variables were mood, stop rule and mood × stop rule interaction (thus 9 predictors). See table 4 for the unstandardised and standardised regression coefficients of the predictor variables retained in the model for each criterion variable.

Table 5.4 Unstandardised and standardised regression coefficients for predictor variables retained for each criterion variable

Criterion variable	***Sig. predictor***	***B***	***SE B***	β
Time	Stop Rule	11.28	2.08	.52*
Overall number of checks	Stop Rule	63.30	11.77	.52*
Highest rechecks in a single line	Stop Rule	7.43	1.48	.49*
Total number of lines checked	Stop Rule	4.19	1.16	.38*

Note. Time: $R^2 = 0.27$

Overall number of checks: $R^2 = 0.27$

Highest number of rechecks on a single line: $R^2 = 0.24$

Total number of lines rechecked: $R^2 = 0.15$

*p = < .001

For the criterion variable time spent checking, stop rule was the only significant predictor retained in the model, F (1, 78) = 29.43, p = < .001, r = 0.52. For total number of checks, one case was found to be an outlier (> than 3 sd away from the mean) and was excluded. Stop rule was found to be the only significant predictor: F (1, 77) = 28.91, p = < .001, r = 0.52. For total number of lines checked, stop rule was the only significant predictor: F (1, 78) = 25.16, p < .001, r = 0.49. For the variable highest number of rechecks in a single line, one case was

an outlier and thus excluded. Again stop rule was the only significant predictor in the model: F (1, 77) = 13.11, p = .001, r = 0.38.

5.5.4 Discussion

Results from experiment 2 were very similar to those of experiment 1. On each of the four perseveration measures stop rule was a significant predictor. A mood-as-input account of perseverative checking would predict a mood × stop rule interaction (cf. Davey et al., 2003; MacDonald & Davey, 2005a,b) whereby a negative mood and "as many as can" stop rule interaction would result in increased perseveration as compared to a negative mood and "feel like continuing" interaction. As noted in experiment 1, it is still unclear how specific negative moods may interact with stop rule use on perseveration measures. If mood was being used as information, one would still expect a mood and stop rule interaction in the happy condition, again this was not observed in experiment 2.

One reason for hypothesising that results would differ between experiments 1 and 2 is the change in mood induction procedure. The films used had been validated with the specific purpose of being used to elicit specific target emotions (Rottenberg et al., 2007). While independent t-tests confirmed a significant change of each target mood pre and post mood induction, again it was clear that mood inductions were not entirely discrete. For example, there was a marginal difference in anxiety ratings post mood induction by each mood group, but an examination of the means actually indicates that anxiety was slightly higher post mood induction in the anger condition than in the anxious condition. Furthermore, there was no significant difference between anxiety levels when comparing the anxious and happy mood conditions. This indicates that the anxiety induction may not have been very successful. Interestingly Rottenberg et al. indicate that both anger and fear/anxiety are among the more difficult emotions to elicit, often eliciting a blend of emotions. However, although significant differences in pre and post mood ratings for each target mood would suggest that there had been some success in inducing the desired emotion, it is possible that natural co-occurrence of discrete emotions may be hard to overcome.

Thus while the use of film is likely to decrease demand characteristics and reduce issues surrounding mood saliency whereby highly salient induced moods are likely to be discounted as a source of information (cf. Scott & Cervone, 2002; Schwarz & Clore, 1983), there was no mood × stop rule interaction. It is possible that specific negative moods are just not being used as information in conjunction with stop rules. However, previous research (e.g. Davey et al., 2003; MacDonald & Davey 2005a,b) indicates that when in a positive mood using either an explicit "feel like continuing" approach (Davey et al, 2003) or experiencing low responsibility towards having checked properly (MacDonald & Davey, 2005b), again being indicative of a "feel like" approach to checking, there would be increased perseveration as compared to those in a positive mood using an "as many as can" stop rule; this was not the case in the present experiment. Possible explanations for these results will be examined below.

5.6 General Discussion

A mood-as-input account of perseverative checking (e.g. Davey et al., 2003, MacDonald & Davey, 2005a,b) would predict that checking most allied with pathological checking would occur when in a negative mood employing an "as many as can" stop rule. Experiment 1 and 2 both examined a mood-as-input account of perseverative checking, with experiment 2 using a film mood induction procedure. Film has been validated as a useful tool in eliciting specific emotions (e.g. Gross & Levenson, 1995; Rottenberg, Ray & Gross, 2007). In both experiments the target mood in each mood condition was significantly increased, two-way ANOVAs indicated that stop rule was a consistent predictor of performance, but that there was no interaction between mood and stop rule on any of the four checking measures. Stepwise regressions confirmed that specific negative moods combined with either an AM stop rule or a FL stop rule were not significant predictors of perseveration. However, on all four perseveration measures, stop rule was a significant predictor.

There are various possibilities why there was no mood and stop rule interaction on the checking task in either experiment 1 or 2. It is possible that a mood-as-input paradigm does not extend to specific negative moods indicating that perhaps specific negative moods are not used as a source of information in

relation to concurrent stop rule use. If, as suggested by Barrett (2006b) and Frijda (2001), more fundamental properties of affect such as valence or pleasure and pain are at the heart of emotional responding, perhaps it is these properties of emotion (rather than informational value provided by specific negative moods) that contributes to mood-as-input explanations of perseverative psychopathologies.

However, despite the absence of mood interaction effects with stop rule on perseveration measures in the present studies, evidence does suggest that specific negative moods carry discrete informational value (e.g. Lerner & Keltner, 2000; Raghunathan & Pham, 1999). For example, Raghunathan & Pham concluded that sadness and anxiety actually primed different goals in a gambling task, arguably an open-ended judgmental task, just as checking is. One obvious question that arises is whether manipulating stop rules for a task are somehow diluting or over-riding information from the induced specific negative moods? A second possibility is that the intensity of the induced mood is not strong enough (cf. Rottenberg, 2007), thus while mood inductions are increasing the target mood, it is not being induced to such an extent that each negative mood provides specific information when experienced in conjunction with stop rule. In experiment 2 anxiety levels in the anxious group were not significantly greater than those in the happy condition, which indicates that the induction procedure was not very effective. Future work will employ an alternative anxiety-provoking film. Alternatively results could be due to other methodological issues. For example, while the mood induction was not introduced as a mood induction procedure, the nature of the films may have made it obvious to participants that the films were intended to alter mood state. A final possibility is that by repeatedly asking participants to fill out VAS mood scales, it became obvious to the participant that the film had been intended to alter affect.

In future work it would be useful to employ a different film clip that had been validated to induce anxiety. This would provide some information as to whether the anxiety induction film used in experiment 2 was ineffective at inducing a discrete anxious mood, or whether (as suggested by Rottenberg et al., 2007) anxiety is more difficult than other emotions to induce in a discrete manner.

To examine in more detail what kind of informational value discrete emotions may provide when making judgements, examining induced discrete emotions without a stop rule manipulation would provide more information as to whether discrete emotions have differential effects on implicit stop rule tendencies or evaluative judgements, this will be examined in the following experiment.

6 Mood And Goal Related Performance Standards

6.1 Introduction

Experiments 1 & 2 of this thesis hypothesised that stop rule would interact with either specific negative moods, or mood valency as found in previous mood-as-input studies of psychopathology (e.g. MacDonald & Davey, 2005a; Startup & Davey, 2001; Watkins & Mason, 2002) to affect task perseveration. However, there were no interaction effects between specific moods or mood valency and stop rule use in either experiment. In order to examine possible influence of mood on performance in isolation from any effect of stop rule on performance, this study is designed to examine how mood affects the way in which individuals approach and evaluate their performance and goals in relation to task completion. The mood-as-input hypothesis predicts that task perseveration would occur when participants are in any negatively valenced mood and deploying an "as many as can" (AM) stop-rule, or when they are in a positive mood and deploying a "feel like continuing" (FL) stop-rule (Martin & Davies, 1998; Martin, Ward, Achee & Wyer, 1993). However, the question being examined in the present experiment is whether moods of a negative valence implicitly affect stop rule use, i.e., how mood affects one's evaluations of whether to persevere with a task. Mood-as-input theory suggests that there is no relation between the valence of one's mood and goal directed behaviour or processing style (Martin, 2000). Rather, the effect of any given mood depends upon the context it is experienced in. This view will be examined in the present experiment.

6.2 Negative affect and personal performance standards

As indicated by Martin (2000), the mood-as-input theory suggests no relation between mood and processing style, however other literature indicates that there is a relationship between mood and processing. For example, Cervone, Kopp, Schaumann, & Scott (1994) examined how induced negative mood affected

performance standards and self-efficacy judgements. Self-efficacy may be particularly important in goal related tasks in that people high in self-efficacy have been found to choose to perform more challenging tasks and tend to persist at tasks for longer than those with low self-efficacy (Schwarzer & Scholz, 2000). This is particularly pertinent to a mood-as-input account of evaluative processing (Martin et al., 1993). Thus, mood can be seen to serve as input into evaluative strategies as to how an individual feels about a target, whether the target may be to stop when they no longer feel like continuing ("feel like" stop rule) or to persevere until they feel they have done as much as they can ("as many as can" stop rule). If self-efficacy is high, one may feel a greater sense of competency over their ability to successfully complete an open-ended task, this may result in termination of the task earlier than if one is low in feelings of self-efficacy.

Cervone et al. (1994) performed 3 experiments examining the effects of mood on standards for performance, judgements of performance capabilities, and self-efficacy judgements. In experiment 1 they examined social and academic activities, in experiment 2 novel tasks were examined including a suicide note detection task or a suicide statistics task, in experiment 3 they examined the relationship between performance standards and self-efficacy judgements. In both experiments 1 and 2 negative mood was found to induce higher personal standards for performance, but had no effect on perceived self-efficacy. Cervone et al. suggest that if negative mood increases personal performance standards this can create negative discrepancies between performance standards adopted and the level of performance judged to be achievable. As such this indicates that negative mood may induce self-defeating cognitive patterns (Cervone et al.). If this is the case, one could argue that creating high minimal performance standards could lead to the natural adoption of "as many as can" stop rule use, motivated by an attempt to meet the increased adopted personal standard.

Scott & Cervone (2002) further examined the link between negative affect and performance standards. Results supported previous work (e.g. Cervone et al., 1994) whereby negative affect induced higher standards for performance as measured by items assessing minimal performance standards for academic and social situations. They also examined self-efficacy appraisals by asking

participants to rate the level of performances they judged themselves capable of achieving, again in academic and social situations. Scott and Cervone suggest that prior performance, self-efficacy for the goal activity, performance levels related to significant others, and negative affect, all relate to goal stringency.

However Scott and Cervone (2002) further suggest that negative affect only provides a context for regulation in relation to task perseverance when the source of the mood is not salient. This has implications for mood-as-input theory, suggesting that people only use their moods as information when there is no obvious explanation for their mood state. Thus if the source of the mood is salient, i.e. participants are aware that they have undergone a mood induction procedure, negative affect may not have implications for performance standards. Results confirmed these predictions in that negative affect generated higher minimal performance standards, apart from when the mood induction procedure was made highly salient (Scott & Cervone). However, as predicted by previous research (Cervone et al., 1994) negative affect had no impact on perceived self-efficacy.

Research described above (e.g. Cervone et al., 1994; Scott & Cervone, 2002) found no links between negative affect and self-efficacy, but literature does suggest a link between low self-efficacy and depression. For example, Bandura, Pastorelli, Barbaranelli, & Caprara (1999) found that perceived social and academic inefficacy contributed to both concurrent and subsequent depression in children. Furthermore, perceived inefficacy has also been associated with anxiety arousal when one feels a lack of perceived self-efficacy in coping with the demands of the environment (Bandura, 1988). It is thus possible that there is a relationship between mood and perceived self-efficacy, although possibly a more complex interaction with environmental cues, self-efficacy, and mood, rather than a causal relationship between increased negative affect and decreased perceived self-efficacy.

Gendolla & Krüsken (2002) examine the idea that emotions have a motivational function, which can be perceived in the activity of the autonomic nervous system. The authors suggest that moods influence appraisal in a mood congruent manner. Thus people in a positive mood are more convinced that they can cope with the demands of a task, but those in a negative mood feel less able to

cope. Gendolla & Krüsken examine how mood provides information to impact on the mobilization of effort when demands of a task are considered easy or hard. In a similar vein to the mood-as-input model (e.g. Martin et al., 1993; Martin & Davies, 1998), Gendolla & Krüsken suggest that it is not moods *per se* that influence effort mobilisation, rather that moods influence autonomic activity with their informational impact depending on the context in which they are experienced. Thus performance standards for a task depended on the mood the participant was in and whether the task was perceived as easy or difficult. The authors measured systolic blood pressure (SBP) responses as a reflection of effort in relation to the task. They found that when in a negative mood and the task was easy SPB responses were stronger, thus reflecting more effort on the task, yet when the task was more difficult SPB responses were stronger when in a positive mood. This can be taken as evidence that mood has an informational effect on behaviour depending upon the perceived demands of the task. It is possible that mood and implicit task demands brought to a task by an individual may also influence task performance depending on the valency of the mood. As such, this type of research can be related to psychopathology in that it supports a link between emotional responding and physiological responding.

Research discussed above suggests a link between negative affect and minimal performance standards (Cervone et al., 1994; Scott & Cervone, 2002), which may have implications for goal stringency in relation to task performance (Scott & Cervone). Feelings of inefficacy at tasks have also been related to anxiety (e.g. Bandura, 1988) and depression (e.g. Bandura et al., 1999). Furthermore Gendolla & Krüsken (2002) found that self-regulation at a task as determined by systolic blood pressure was dependent on the participants' concurrent mood and the perceived ease of the task. However, putting aside the issue of how specific moods and goal stringency (e.g. stop rule use) may interact to affect performance, the question remains as to whether specific negative moods would have similar or differential effects on personal performance standards.

6.3 Effects of specific moods on appraisal judgements and processing styles

Siemer (2001) examined effects of specific moods on appraisal and emotion judgements. After inducing a sad, angry, and anxious mood, results indicated that sad and angry mood inductions had indeed induced the target mood. However, the anxiety induction was less discretely induced and Siemer concludes that while a negative mood was clearly induced in the anxiety condition, the induction was less effective at specifically inducing an anxious mood. This type of finding is common in mood induction procedures, e.g. Gross & Levenson (1995) and Rottenberg, Ray & Gross (2007) found that anxiety/fear and anger were particularly difficult to induce discretely. Siemer asked participants to appraise various scenarios. In the anger condition participants were asked to appraise the degree of responsibility of another person for an event described in the scenario, in the sad condition participants were asked to appraise the degree of perceived personal controllability of the negative event in the scenario. Finally, in the anxiety condition, participants were asked to appraise the perceived risk or probability of a negative outcome of a situation.

Results indicated specific mood influence on appraisal judgements in which anger increased attribution of responsibility towards another person and sadness increased appraisal of low subjective controllability of the situation. With the anxiety appraisal of risk, there was no clear predicted mood influence. Siemer (2001) concludes that this last result is likely to be linked with the finding that the anxiety mood induction had not produced a discrete anxious mood. These findings suggest that discrete moods of the same valence can have distinct influences on appraisal judgements, which according to Siemer indicates that moods provide a temporary disposition to have certain kinds of cognitions. If this is the case, one could propose that induced moods of the same valence may have distinct appraisal patterns that could generate different types of evaluative judgements and implicit stop rule use. For example, if sadness increases low subjective controllability of a situation, one could suggest that this would be linked to the adoption of an “as many as can” stop rule for a task as one may feel the need to increase their control

over the situation by being sure that they have completed the task to the best of their ability.

Further, Tiedens & Linton (2001) suggest that moods of the same valence can lead to different processing styles. They propose that emotions characterised by certainty (such as contentment and anger) result in heuristic processing and those characterised by uncertainty (such as worry and surprise) result in systematic processing (Tiedens & Linton). In relation to mood as input theory, this difference of processing style within moods of the same valence could also be related to task perseveration. Moods that promote a more systematic processing style could, as a result, be related to increased perseveration on task performance as one would be more likely to apply a detail-orientated, considered approach to the task. Ambady & Gray (2002) also examined the effect of sadness on processing style (study 4). Ambady & Gray (p. 947) suggested that sadness was associated with a "deliberative information-processing style" which in turn impaired accuracy of social judgements. The authors found that by manipulating cognitive load in sad participants on a social judgement task, their performance equalled that of participants in a neutral condition. It was suggested that the additional cognitive load meant that participants did not have the resources to allocate to the deliberative thinking style that normally occurs in a sad mood, thus eliminating differences between those in a sad and neutral mood on social judgements. Again this suggests that a sad mood may engender a specific processing style relating to evaluative judgements.

6.4 Mood-as-input theory and specific negative moods

Mood-as-input theory has already been successfully applied to various perseverative psychopathologies such as catastrophic worry (Startup & Davey, 2001, 2003), depressive rumination (Watkins & Mason, 2002) and perseverative checking (Davey, Startup, Zara, MacDonald, & Field, 2003; MacDonald & Davey, 2005a,b). Specifically related to perseverative checking, Davey et al. found significantly greater perseveration on a check related item generation task when in a negative mood and using an "as many as can" stop rule. These results were replicated on a number of measures relevant to obsessive compulsive checking by MacDonald & Davey (2005a). However, while research suggests that

a combination of negative mood and strict “as many as can” stop rule use are related to perseveration, little is known about exactly how negative mood and stop rule interact, or how mood provides information in relation to a task.

Literature (e.g. Raghunathan & Pham, 1999; Siemer, 2001) does suggest that not all negative moods convey the same type of information. If certain types of negative mood influence implicit stop rule use, this could have implications for the relation of negative moods and cognitive processing style. Thus if (as proposed by Scott & Cervone, 2002) negative mood affects minimal performance standards, one could suggest that in the case of anxiety disorders, high anxious mood and high minimal performance standards could lead to implicit adoption of an “as many as can” type stop rule and thus increased perseveration. However, Scott & Cervone also suggest that if minimal performance standards become so high as to be unachievable, this may lead to abandonment of pursuits, e.g. as with clinical depression. Thus one could expect differential effects of anxious and sad moods in relation to task perseveration.

6.5 Experiment 3

The present experiment will examine two predictions. Mood-as-input theory predicts that mood valency, i.e. negative mood and high minimal performance standards (e.g. “as many as can” stop rule use) result in increased perseveration than positive mood valency and high performance standards. Thus if suggested by Cervone et al. (1994) and Scott and Cervone (2002) there is a link between negative affect and minimal performance standards, one may expect negative mood valency to result in higher minimal performance standards and increased “as many as can” stop rule stringency. However, previous research also suggests that specific negative moods can have distinct influences on processing styles and performance standards (e.g. Raghunathan & Pham, 1999; Siemer, 2001; Tiedens & Linton, 2001), thus it is also possible that there will be differential effects of anxiety and sadness on stop rule preference and evaluative judgments.

6.5.1 Method

Participants

Participants consisted of 60 undergraduate psychology students from the University of Sussex. Seven participants were male and fifty-three were female, the age range was from 18 – 41 years, with a mean age of 21.16 (sd = 4.85). All participants took part as partial fulfilment of their study requirements.

Procedure

Participants were informed both in writing and orally that they would be required to watch a short film clip and complete some questionnaires. Participants were required to give their informed consent and were then randomly assigned to one of three mood conditions, sad (N = 20), happy (N = 20), or anxious (N = 20).

Stage 1

Mood induction: Participants were randomly assigned to either a sad, happy, or anxious mood condition. Participants were given both verbal and written instructions. Instructions are based on those used by Gross & Levenson, (1995), Marzillier & Davey (2005), & Rottenberg, Ray, & Gross (2007). Participants were not told that they would be experiencing a mood induction procedure, instead they were asked to watch the film clip and informed that they would be asked some questions about the film later in the experiment. Experiment 2 of this thesis concluded that the anxiety induction film clip had not been effective at inducing anxiety. To overcome this, in the present experiment a different film clip was employed which had also been validated by Rottenberg et al. (2007) as an effective method of inducing an anxious mood state. To facilitate mood induction for the two negative mood conditions, the blinds were drawn, main lights were turned off and an angle poise lamp produced a subdued lighting effect. During the happy mood induction the overhead lights and lamp were both on and the blinds were open (cf. Davey et al., 2003).

- Sad mood induction: Participants were asked to watch a clip from the film *The Lion King* (Hahn, Allers, & Minkoff, 1994). The clip lasts 6.50 minutes.

- Happy mood induction: Participants watched a clip also from the Lion King (Hahn et al., 1994). The clip lasts 7.02 minutes.

- Anxious mood induction: Participants watched a clip from *The Shining* (Kubrick, 1980). The clip lasts 1.22 minutes.

Stage 2

Distractor task: As Experiment 2.

Stage 3

Post mood induction VAS scales: All participants rated their current levels of sadness, happiness, anxiety and arousal on separate visual-analogue (VAS) Likert 10-point scales ranging from 0 (not at all sad, anxious etc.) to 10 (extremely sad, anxious etc.).

Stage 4

Questionnaires:

Checking stop rule questionnaires: The Checking Stop Rule Questionnaire (see appendix J) is a 20-item Likert scale checking stop rule questionnaire developed by Kato, MacDonald, & Davey (unpublished work). The questionnaire consists of two sub-scales with 10 items assessing an “as many as can” checking stop rule preference and 10 items assessing a “feel like continuing” stop rule preference. Using a sample of 156 participants Kato et al. report a Cronbach’s alpha .92 for the “as many as can” stop rule sub-scale, and .87 for the ‘feel like continuing’ stop rule sub-scale. In the present study using a sample of 60 participants, Cronbach’s alpha was again 0.92 for the “as many as can” stop rule sub-scale and 0.88 for the ‘feel like continuing’ stop rule sub-scale. This shows good internal consistency. The 20-item questionnaire asks participants to indicate their response to different checking scenarios on a 5-point Likert scale from 1 (Not the kind of thing I think of at all) to 5 (I think of this kind of thing a lot). An example question is ‘I’m pretty sure I’ve checked properly, so don’t worry about it anymore’.

Checking stop rule preference was also measured using a 10-item visual analogue scale (VAS) questionnaire. The questions were derived from the 20-item scale cited above with a 5 question "feel like continuing" subscale and a 5 question "as many as can" subscale. Participants were asked to rate the extent that they agreed with the statement as if they were checking something at this moment in time on a scale ranging from 0 (do not agree at all) to 100 (completely agree). An example question is 'I must check things one more time – just to be on the safe side'.

Evaluative Judgements Questionnaire: The evaluative judgements questionnaire was based on measures used by Scott & Cervone (2002). This consisted of a 4-item questionnaire that asked participants to rate their satisfaction of their performance in both academic and social environments. An example question is 'Consider your marks last term, and the overall mark you may get this term. How satisfied with your performance would you be if your mark for this term turned out to be exactly the same (i.e., no higher or lower) than it was last term?' Participants were then asked to rate their degree of satisfaction on a 100-point VAS ranging from 0 (not at all satisfied) to 100 (extremely satisfied).

Self-Efficacy Questionnaire: This 10-item self-efficacy scale was produced in English in an international manual by Schwarzer (1993). This used a Likert scale raging from 1 (Not at all true) to 4 (exactly true). An example question is 'I can remain calm when facing difficulties because I can rely on my coping abilities'. Schwarzer & Scholz (2000) reported that across 23 nations that the scale is used in Cronbach's alpha ranged between 0.75 and 0.90.

Stage 5

Final VAS mood measures (as above) and debrief.

6.5.2 Results

Mood manipulation measures

To examine whether induced mood was rated as being significantly higher in each target mood group, three one-way (mood group × vas mood rating)

ANOVAs were performed to examine induced levels of sadness, anxiety and happiness. See Table 6.1 for mean mood ratings.

Table 6.1 Mean mood ratings and standard deviations post mood induction

Mood Group	***Sad Ratings***	***Happy Ratings***	***Anxiety Ratings***
SAD	5.40 (2.43)	4.35 (1.51)	3.70 (2.67)
HAP	1.12 (1.03)	7.37 (0.98)	1.84 (1.82)
ANX	2.72 (2.30)	6.21 (2.07)	4.04 (2.93)

Ratings of sadness (equal variances not assumed) were significantly different across all three mood groups, F (2, 57) = 22.82, p = <. 001, η_p^2 = 0.45. Games-Howell tests suggest that sadness was significantly higher in the sad mood group than in the happy condition (p = <. 001) and than in the anxious condition (p = .003). Happiness ratings were also found to be significantly different across groups, F (2,57) = 18.48, p = <. 001, η_p^2 = 0.39. Post hoc tests revealed that happiness ratings were significantly greater in the happy condition than the sad condition (p = <. 001). There was a marginal significant difference in happiness ratings between the happy and anxious mood groups (p = .07). There was a significant difference in anxiety across all three mood groups, F (2,57) = 4.45, p = .01, η_p^2 = 0.14. Post hoc tests suggest a significant difference in anxiety ratings in the anxious and happy conditions (p = .02), but not in the anxious and sad conditions (p = >.05).

These results suggest that mood inductions were successful. As can be seen from table 6.1, the highest target mood rating for each mood was by the relevant mood group. Post hoc tests revealed that anxiety ratings were not significantly different in the sad and anxious groups, although previous experiments (see experiments 1 & 2) suggest that anxious and sad mood inductions are often not discrete due to the way in which these moods are experienced.

Was there an effect of mood on the dependent variables?

This experiment is interested in examining how specific negative moods and a happy mood may affect participants preference for either “as many as can”, or a “feel like continuing” checking stop rule preference. As such, each subscale of the two stop rule checking questionnaires was examined separately. Examining the 20-item Likert stop rule preference questionnaire two one-way (mood group x “as many as” (AM or FL stop rule score) ANOVAs were performed to examine whether there was a significant difference of mood group on sum AM stop rule preference, or sum FL stop rule preference. Figure 6.1 (graphs i & ii) shows the sum AM and FL checking stop rule ratings for the 20-item Likert questionnaire. Comparing performance by each mood group on the AM subscale, F (2,57) = 4.28, p = .02, η_p^2 = 0.13. Post hoc tests show a significant difference between sad and happy mood groups on mean AM ratings (p = .03) with those in the happy group indicating a stricter AM checking stop rule preference and a near significant difference between the sad and anxious mood conditions (p = .08). Comparing performance on the FL subscale, F (2,57) = 0.30, p = 0.74, η_p^2 = 0.01 indicates no difference between mood groups.

Examining the 10-item VAS stop rule preference questionnaire, again two one-way (mood group × “as many as” (AM or FL) stop rule score) ANOVAs were performed. For the AM subscale, these data were found to be non-normally distributed. As a corrective measure a log transformation of the data was taken, but this was unsuccessful and the data remained negatively skewed. Results suggest that there was no effect of mood on checking AM stop rule preference, F (2,57) = 1.84, p = 0.17, η_p^2 = 0.06. An examination of the FL subscale also shows no difference in performance between mood groups, F (2,57) = 1.80, p = 0.17, η_p^2 = 0.06. Figure 6.1 (graphs iii & iv) shows the mean AM subscale and mean FL subscale ratings.

There was no difference between mood groups on self-efficacy ratings, F (2,57) = 0.74, p = .48, η_p^2 = 0.03 or evaluative judgement ratings, F (2,57) = .67, p = .52, η_p^2 = 0.02. Figure 6.2 (graph i) shows the mean self-efficacy ratings by

each mood condition. Figure 6.2 (graph ii) shows the mean evaluative judgement ratings by each mood condition.

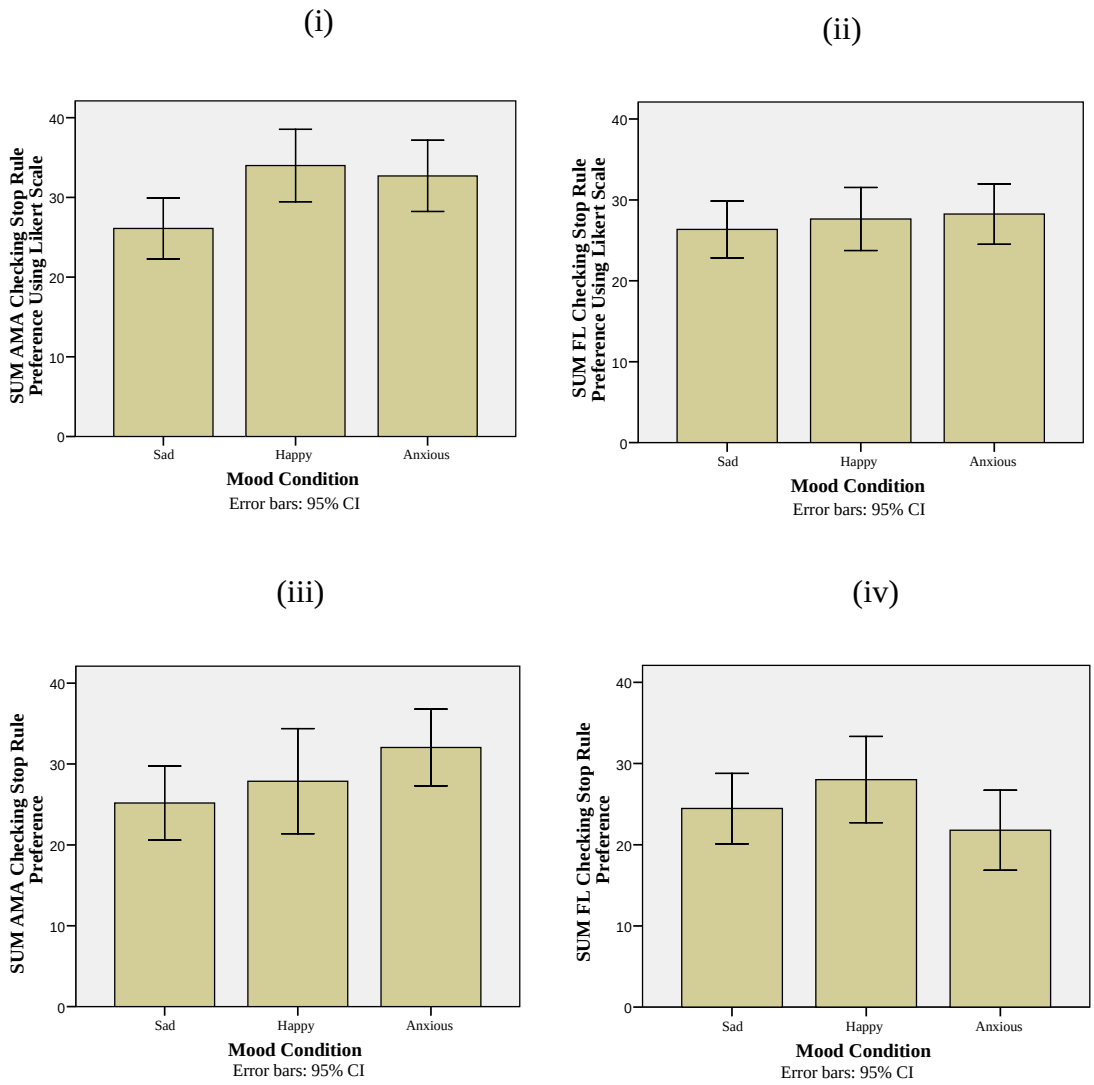

Figure 6.1 (i) Sum AMA checking stop rule preference using Likert scale. (ii) Sum FM checking stop rule preference using Likert scale. (iii) Sum VAS AMA checking stop rule preference. (iv) Sum VAS FL checking stop rule preference.

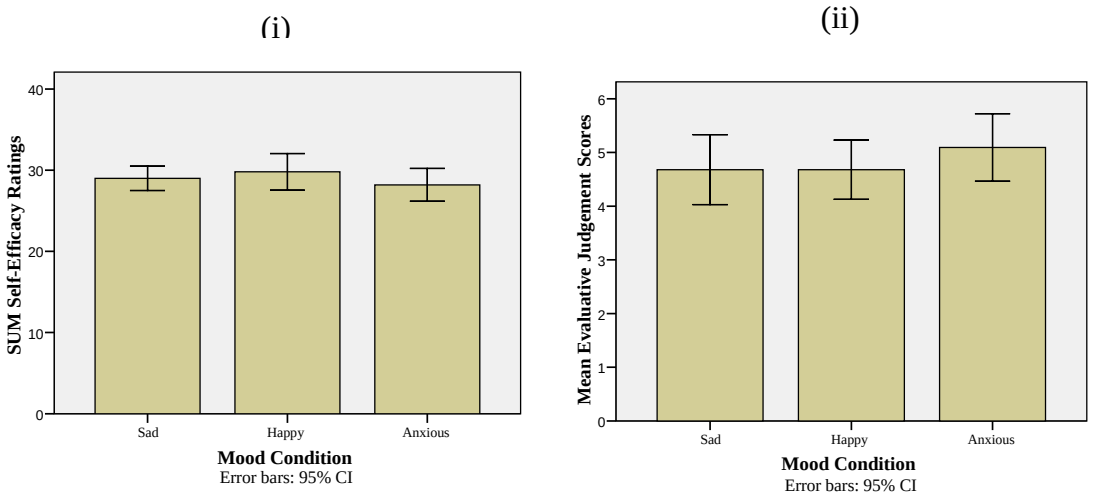

Figure 6.2 (i) Sum Self-Efficacy Ratings (ii) Mean Evaluative Judgement Scores

Correlations

To further explore the relationship between mood, AM and FL stop rule preference, self-efficacy and evaluative judgements, correlations between mood ratings post mood induction and each of the measured variables will be examined.

Table 6.2 Correlations between AM and FL Likert and VAS subscales; self-efficacy scores, and evaluative judgement scores.

Mood	***AM Likert scale***	***FL Likert scale***	***AM VAS***	***FL VAS scale***	***Self efficacy***	***Evaluative judgement***
Sad	.27*	.02	.32**	.14	-.22	.01
Hap	-.14	.10	-.09	.20	.35**	.18
Anx	.27*	.09	.26*	.17	-.32**	.03

Note, $N = 60$

* $p < .05$, ** $p < .01$

Table 6.2 shows correlations between sad, happy, and anxious post induction mood ratings and scores on Likert and VAS AM stop rule measures, self-efficacy, and evaluative judgment scales. This table indicates a number of significant relationships between mood and performance measures. There was a significant positive relationship between sadness and anxiety ratings and both

measures of AM stop rule use. However, there was no relationship between any of the mood ratings on either of the FL checking preference subscales. It should be noted that data on the AM stop rule preference VAS was found to be negatively skewed. When data is not normally distributed, results should be interpreted with caution. There was a significant positive relationship between happiness ratings and self-efficacy scores and a significant negative relationship between anxiety and self-efficacy scores. There were no significant relationships between any of the mood ratings and scores on the evaluative judgement scale.

6.5.3 Discussion

The results of this experiment do not provide convincing evidence that negative moods of the same valence have differential effects on factors influencing implicit stop rule use. The mood-as-input hypothesis (e.g. Martin et al., 1993; Martin & Davies, 1998) predicts that a combination of negative mood and "as many as can" stop rule use, or positive mood and "feel like continuing" stop rule use, would result in task perseveration. A mood-as-input account of perseverative checking has confirmed that greater perseveration occurs on a number of checking measures when in a negative mood and using an "as many as can" stop rule (e.g. Davey et al., 2003; MacDonald & Davey, 2005a). However, relatively little is known about mechanisms underlying the influence of mood and stop rules on perseveration.

The present study sought to examine whether there was a relationship between specific negative moods and checking stop rule style, and whether specific negative moods would have an effect on factors that may influence implicit stop rule use, namely performance standards and self-efficacy judgements. Examining the AM subscale of the Likert checking stop rule preference revealed a significant difference between groups. Thus post hoc tests showed that the happy group used a significantly greater AM checking stop rule use, suggesting that happy participants indicated that they would check more thoroughly than sad or anxious participants. There were no significant differences between mood groups on the FL subscale of the Likert checking stop rule questionnaire. Comparing happy, sad, and anxious mood groups on the AM subscale of the VAS checking stop rule measure revealed no significant

differences between the happy mood group and either of the negative mood groups, or any difference between the two negative mood conditions. There were no significant differences between mood groups on the FL subscale of the VAS checking stop rule questionnaire. Mood-as-input theory makes no specific predictions about mood valency and processing (Martin, 2000) and the current results do not suggest consistent significant differences between mood valency or differences between different types of specific negative mood on AM checking stop rule preferences.

Examining correlations between mood and AM stop rule checking preference reveals a significant relationship between both anxiety and sadness on both the Likert and VAS scale AM subscale stop preference questionnaires. This indicates that the more sad or anxious participants were, the more readily they were deploying AM stop rules in checking scenarios. However, it is important to highlight that one cannot infer causal relationships between mood and outcome measure from correlational data. Again, on both types of AM checking questionnaire there was no significant relationship between happy scores and AM stop rule checking preference. There were no significant relationships between mood ratings and either checking preference FL subscales. Tiedens & Linton (2001) do suggest that specific negative moods can have differential effects on processing styles. Worry (or here anxiety) is considered by Tiedens & Linton to be characterised by systematic processing, which could explain why there was a significant positive correlation between anxiety and a propensity to check more thoroughly. Ambady & Gray (2002) also suggest that sadness is associated with a more deliberative processing style, again this perhaps accounting for the positive correlation between sadness ratings and an increased AM stop rule style.

If, as mood-as-input theory suggests, it is not mood *per se* that relates to goal stringency at a task (cf. Martin et al., 1993) but that mood may affect performance standards which one uses to judge whether one has successfully completed a task, then high self-efficacy could be related to increased task persistence (Schwarzer & Scholz, 2000). However, previous research examining the relationship between mood and self-efficacy has not indicated a relationship between negative mood and self-efficacy (Cervone et al., 1994; Scott & Cervone,

2002). In the present study there were no significant differences on self-efficacy scores depending on the valency of current mood, or differences between discrete negative moods. However, examining correlations between mood and self-efficacy scores did reveal a significant positive relationship between happy mood and self-efficacy scores, and a significant negative relationship between anxiety and self-efficacy scores. Thus while Cervone et al. and Scott & Cervone did not find that a general feeling of negativity affected self-efficacy ratings, it may be those high in anxiety may experience lower self-efficacy and so may be more unlikely to persist at a task, thus in turn being less likely to implicitly adopt AM stop rule use. Bandura (1988) suggests a perceived self-inefficacy to cope with the demands of an environment is related to anxiety arousal. Given that the correlations in the present study represent scores across the whole data set, the significant negative correlation between anxiety and self-efficacy scores may not reflect an experimental manipulation, but simply be indicate that those who are naturally high in anxiety are consequently low in self-efficacy.

In the present study mood manipulations had no effect on evaluative judgement ratings. There were also no significant correlations between mood and evaluative judgement ratings. Evaluative judgement ratings were used to examine how mood may affect personal standards for performance. Previous research examining evaluative judgements (e.g. Scott & Cervone, 2002) found that negative mood indicated decreased performance standards as represented by evaluative judgement scores only when participants were in a negative mood and the source of the mood was not highly salient. One possible explanation for the lack of mood condition effect on the measures in the present study is that despite efforts to mask the films as a mood induction procedure, due to the nature of the films it may have been obvious that they were intended to alter mood, thus as suggested by Scott & Cervone, if mood sources were highly salient, mood may have been discounted as a source of information when rating the various performance standards related questionnaires.

Mood-as-input theory has consistently found that negative mood with concurrent AM stop rule use results in increased perseveration on tasks relating to psychopathologies such as worrying (Startup & Davey (2001, 2003) and checking

(MacDonald & Davey, 2005a,b). There is also evidence (e.g. Raghunathan & Pham, 1999; Siemer, 2001; Tiedens & Linton, 2001) to suggest that not all negative moods convey the same type of information. It was hypothesised that specific moods of the same valence may have differential effects on factors that may affect task-related goal stringency, e.g. evaluative judgements and self-efficacy. Also examined was propensity to more strictly adopt an AM stop rule in relation to checking, thus suggesting a more thorough approach to checking. However, results did not indicate that inducing sadness or anxiety had any effects (as compared to a happy mood condition) or differential effects (as comparing differences between the sad and anxious mood groups) on measures.

Examining correlations between mood ratings and measures across the whole data set did indicate a negative correlation between anxiety and self-efficacy, although no causal relationship can be specified from these results. On the Likert AM stop rule checking preference questionnaire there was a significant positive relationship between sadness and anxiety and AM stop rule use, thus indicating that the more sad or anxious participants were, the higher their preference for checking more thoroughly. However, given that there were no effects of mood condition on this measure, further research would be required to conclude with certainty that specific negative moods were affecting implicit stop rule adoption.

One possible explanation for a lack of mood condition effect on measures is mood saliency (cf. Scott & Cervone, 2002). Despite film being used as a mood induction procedure with the aim of masking its purpose to the participant, future research could check possible mood saliency interference by asking participants post-experiment what purpose they thought the film had in the study. The next study will further examine the effects of specific negative moods within a mood-as-input paradigm. However, given that the relevancy of the mood to the task at hand may be a mediating factor, the next experiment will use a perseverative worry task to examine how specific negative moods in conjunction with stop rule use may affect a perseverative task that has personal relevancy for the individual.

7 A Mood-As-Input Approach To Specific Negative Moods And Perseverative Worrying

7.1 Motivation

Thus far, experimental work in this thesis has aimed to extend a mood-as-input account of perseverative psychopathologies (e.g. MacDonald & Davey, 2005a,b; Startup & Davey, 2001, 2003; Watkins & Mason, 2002). Experiments 1 & 2 examined how specific negative moods may interact with stop rule use to influence perseveration on a checking task and experiment 3 examined how specific negative moods (anxiety and sadness) and a positive mood (happiness) may have an effect on checking stop rule preference and personal performance standards. Neither of these avenues of enquiry produced any conclusive evidence as to the nature of specific negative moods on performance. Startup & Davey (2001) found robust evidence of an interaction between mood valency and stop rule use on a catastrophic worry task. Taking a more fine-grained approach to the informative nature of moods within a goal related (stop rule) context, the next logical area of enquiry was to examine the interaction between specific negative moods and stop rule on a personally relevant task. The next experiment employs a catastrophic worry task as used by Startup & Davey to examine the interaction of stop rule and specific negative moods when the task has personal relevance for the individual.

7.2 Introduction

One approach to explaining the relationship between mood and pathological perseveration is the mood-as-input model (e.g. Martin & Davies, 1998; Martin, Ward, Achee & Wyer, 1993). Rather than relying on the concept of mood being intrinsically linked to certain processing strategies such as mood-congruent processing or specific heuristic or systematic processing styles, the mood-as-input hypothesis proposes that it is not current mood *per se* that provides information about whether an individual's goal for task completion has been met,

but that "moods convey their evaluative and motivational implications by serving as information in a configural processing system" (Martin, 2000, p. 156). This approach thus suggests that people process not only information about how they feel about a target, but also the context that the feelings were experienced in (Martin, 2000). This chapter will present a review of the mood-as-input approach to perseveration, it will then examine how specific negative moods of the same valence may have an effect on processing, then the construction of emotion experience will be discussed, examining the hypothesis that emotions are constructed from more fundamental elements such as valence and arousal. Finally, a mood-as-input approach to perseverative psychopathologies will be examined, focusing specifically on mood-as-input and catastrophic worrying, and examining how specific negative moods may affect perseverative worry within a mood-as-input framework.

7.3 The Mood-As-Input Approach to Perseveration

Martin et al. (1993) tested the hypothesis that moods, depending on the context they are experienced in can have different implications for processing by suggesting that "…it is not people's mood *per se* that causes them to engage in different types of processing; rather people's interpretations of their moods" (Martin et al, p.318). Thus Martin et al. suggest that the same moods can have different implications for processing and task completion depending on the context, or stop rule that the mood is being evaluated in. Martin & Davies (1998) explain how the context dependent nature of moods can effect processing by using the example of being at the airport with a loved one who is feeling sad. As explained by Martin & Davies, the reasons for this person experiencing a sad mood are not clear until one knows the context that the mood is experienced in. For example, one possible explanation is that the person is sad as they are going on a long trip and will miss you, or on the contrary, they may be returning from a trip and are not happy to be reunited with you. Thus as stressed by Martin (2000) it is the implications of one's mood, rather than just the valency of mood that has an effect on behaviour.

Martin, Abend, Sedikides, & Green (1997) examined mood and role fulfilment. They suggested that the mood itself was not important for empathy

ratings; being in a negative mood can still lead to positive self-evaluation when the target being evaluated signalled role fulfilment. These findings contradict predictions made by other models such as the mood as information hypothesis (Schwarz & Clore, 1983, 1988), which suggests that individuals are motivated to maintain positive moods and avoid negative moods. However, the mood-as-input hypothesis predicts that rather than being motivated to maintain positive moods, individuals are motivated to attain positive outcomes, which can occur from the experience of both a positive and negative mood (Martin & Davies, 1998). As such, both mood congruent and mood incongruent evaluations are hypothesised to arise from the same mechanism (Martin, 2000).

Traditionally mood valency has been associated with a specific processing style. For example, Worth & Mackie (1987) suggested that moods have links to default processing strategies, showing that when participants were in a positive mood and exposed to persuasive messages for a short amount of time, they processed persuasive messages heuristically, thus implying that positive moods may engender more heuristic than systematic processing. Schwarz (2001) also suggested that different moods result in different processing styles, proposing that a negative mood indicates a problematic situation, which then over-rides a reliance on pre-existing heuristic strategies consequently requiring a higher degree of systematic processing. However, the mood-as-input model makes no predictions about links between mood, valency, and processing style.

Martin (2000) suggests that the extent to which individuals process heuristically or systematically is determined by their confidence in either type of processing to provide an acceptable outcome in a certain situation. Confidence is determined by the current mood and the context that the mood is experienced in, here the context being the stop rule that the individual is applying to the target they are evaluating. If as demonstrated by Martin et al. (1993) the context in which individuals process their moods in can be conceptualised as stop rules, when participants are told to process until they have done enough, Martin proposes that they will be implicitly asking, “Have I done enough to reach my goal?” and that those in a positive mood will process less than those in a negative mood. This assumption being based on the finding that positive moods tend to

imply progression towards one's goals, and negative moods indicate a lack of accomplishment (e.g. Carver & Scheier, 1990; Cervone, Kopp, Schaumann, & Scott, 1994). However, when working in the context of implicitly asking, "Am I enjoying the task?" those in a positive mood will process to a greater extent than those in a negative mood as their positive mood signals that they are enjoying the task at hand (Martin, 2000).

According to Martin (2000, p. 162) the strong version of the mood-as-input hypothesis would suggest that moods have no inherent effects on motivation to process "unless individuals interpret their moods in light of their stop rules". However, while the mood-as-input hypothesis has shown that an interaction between mood valency (either positive or negative mood) and stop rule can have differential effects on processing, little is know about how discrete negative moods of the same valence interact with stop rules to affect processing.

7.4 Specific Negative Moods and Processing

Thus while valenced based approaches such as the mood as information model (e.g. Schwarz, 1990; Schwarz & Clore, 1983, 1988) and mood-as-input hypothesis (e.g. Martin et al., 1993; Martin & Davies, 1998,) propose valence in combination with other factors to play a major role in processing and evaluative strategies, Lerner & Keltner (2000) propose a major shortcoming of these types of model is that they fail to take into account whether different emotions of the same valence can influence judgement. Although as noted above, Martin (2000) proposes that a strong version of the mood-as-input model would expect no inherent differences in processing depending on the type of mood being experienced, Lerner & Keltner propose that intuitively one would expect even distinct moods of the same valence to exert differential effects on processing.

As noted in previous chapters, appraisal theories suggest that depending on how a particular event is appraised by an individual, different appraisals of events can lead to the occurrence of different discrete emotions and, as suggested by Lerner & Keltner (2000, p. 475) "emotions of the same valence differ in their antecedent appraisals", this indicating that discrete emotions of the same valence may have different influences in judgement or processing. The way in which

specific emotions are believed to exert distinct influences on judgements and choice are described by Lerner & Keltner as appraisal tendencies, thus the corresponding appraisal relating to a specific emotion drives goal directed processes which effect judgement and choice. In this way, specific emotions of the same valence can exert differential effects on processing. Further, Tiedens & Linton (2001) propose that heuristic and systematic processing are not related to the valence of a particular mood, but rather the certainty appraisal related to a specific mood. Thus moods associated with uncertainty such as sadness and fear are more likely to result in more thorough processing than moods such as anger and disgust which are associated with certainty.

Increasingly, research examining the relationship between mood and information processing has begun to focus on how specific negative moods may affect processing. For example, Raghunathan and Pham (1999) found that discrete negative moods prime different goals. For example, anxiety may prime the individual to the goal of uncertainty reduction, thus causing anxious individuals to choose a low risk/low reward tactic in a gambling decision process, while sadness would motivate the goal of reward replacement, leading sad individuals to opt for a high risk/high reward gambling option. DeSteno, Petty, Rucker, Wegener, & Braverman (2004) suggest that examining the effects of emotion on processing from a purely valenced perspective oversimplifies emotional experience. In fact they strongly indicate that distinct emotions can have differential influences on cognitive and motivational processes. DeSteno et al. examined the effects of sadness and anger on message persuasion. They found that these different emotions had distinct effects on message persuasion when the emotional framing of the message matched the current emotion experienced by the individual. Thus a message was considered more persuasive when the receivers' emotional state matched the emotional overtone of the message. DeSteno et al. thus suggest that distinct emotions of the same valence signal different situation appraisals. Again this research suggests that emotions of the same valence can exert distinct effects on cognitions and appraisals.

7.5 The Construction of Emotion Experience

The debate over how best to conceptualise the experience of specific emotions has been lively for over 20 years. Watson & Tellegen (1985) proposed a hierarchical model of affect with valence as the core element in an emotional hierarchy, with discrete negative emotions further down in the emotion hierarchy. Russell (2003) presents an interesting view of specific emotions, suggesting that rather than experiencing a discrete specific emotion of say fear or anger, these are merely terms used to express typical feelings toward a situation, and what is actually being experienced, according to Russell is 'prototypical emotional episodes' which as opposed to being a specific emotion, are "configurations of other, more fundamental elements" (Russell, p. 152); these more fundamental elements being comprised of core affect, perception of affective quality, attribution to object, appraisal, action, emotional meta-experience and emotion regulation. Thus in Russell's view, combinations and fluctuations of these fundamental elements interact to form a prototypical emotion experience. In lay terms these are expressed through specific negative emotion terminology such as sadness, fear, or anger.

More recently Barrett (2006a,b) has argued that valence is at the core of emotional life. Barrett (2006c, p. 26) concludes that specific emotions are not a set of discrete events or entities that are accurately recognisable and that "discrete emotional experiences are not psychologically primitive". Like Russell (2003), Barrett (2006c) proposes that there are more fundamental elements of emotion than specific negative emotions. For example, while one explains how one is feeling using an emotion term such as anxious or sad, Barrett (2006c) suggests that these are only labels, which do not have corresponding physiological or neurological patterns. Rather, the experience of an emotion is said to occur through core affect and conceptual knowledge about emotion, thus affective feeling and conceptual knowledge about emotion guides a categorization process, which results in an emotion experience which individuals then label for example, sadness or anxiety (Barrett, 2006c). Similarly, Lindquist and Barrett (2008) propose that emotions are conceptual acts. In this view, the experience of discrete emotions such as anger and fear are actually mental events that occur with the

experience of two basic psychological constructs, these being core affect (valence) and conceptual knowledge of emotion. In this way, emotions are seen as "mental events that result from the interplay of more basic psychological ingredients that are not themselves specific to emotion" (Lindquist & Barrett, p.902). The concept that emotions can be constructed from some more 'core' or fundamental properties is similarly expressed by Frijda (2001, p.59) who suggests that the core elements of emotions are "the experience of pleasure or pain…embedded in the outcome of appraisal".

In summary, Barrett (2006, a,b,c), Frijda (2001), Lindquist & Barrett (2008), and Russell (2003) all seem to be suggesting that while the experience of specific emotions are perceived in a unitary fashion and one can report feeling sad, angry, or anxious etc., what underlies emotion experience is actually a more fundamental or core experience, which is generally termed as valence or unpleasant core affect. Thus it is the way in which this core unpleasant or negative affect is experienced in relation to other psychological factors such as appraisal or arousal, which results in the labelling or experience of a specific negative emotion. However, from a mood-as-input perspective, what is yet to be determined is how specific negative moods may interact with stop rule use to affect perseveration on an open-ended task.

7.6 The Mood-As-Input Model and Perseverative Worrying

The mood-as-input model (e.g. Martin et al., 1993; Martin & Davies, 1998) has examined how valence may interact with stop rule use to affect processing in a number of areas relating to pathology. Specifically this chapter will focus on a mood-as-input explanation of perseverative worrying (Davey 2006; Davey, Eldridge, Drost, & MacDonald, 2007; Davey, Startup, MacDonald, Jenkins, & Patterson, 2005; & Startup & Davey, 2001, 2003). A mood-as-input account of perseverative worrying makes a number of assumptions about the relationship between mood and perseveration. Worriers have been shown to generate a greater number of catastrophising steps than non worriers, regardless of the valency of the task (Davey & Levy 1998), thus implying that negative mood is not a sole facilitator of worry, but that worriers also employ an implicit "what if?" questioning style that reflects typical cognitive characteristics of a worrier (Davey

& Levy). Further, while induced negative mood has been shown to increase catastrophising in both negative and positive iteration tasks (Startup & Davey 2001), use of stop rule during the worry bout has been shown to interact with mood causing those in a negative mood to generate a greater number of catastrophising steps when using an AM stop rule, than those in a negative mood using a feel like continuing FL stop rule (Startup & Davey). Again, this supporting the idea that negative mood does not influence perseverative worry in a congruent manner, but that it is the context in which the mood is experienced which mediates perseveration.

To generate more information about exactly how mood and stop rule are interacting to result in worry perseveration, Davey et al. (2007) examined how mood and stop rule may be changing during the course of a catastrophising interview. Results indicated that high worriers do not appear to experience a change from negative to positive mood during a worry bout, that is, reports of negative mood remain stable from the outset to the termination of the worry task. However, Davey et al. (2007) did find that high worriers experienced a shift in stop rule use during the catastrophising task, with high worriers tending to shift from an AM approach to worrying to a FL approach. These findings are consistent with the idea that when using an AM stop rule high worriers generated a significantly greater number of catastrophising steps than low worriers, but that the inverse was true when in a using a FL stop rule where there was a trend for low high worriers to generate less catastrophising steps than high worriers. This indicating that high worriers would generate fewer worry steps if they experienced a change in stop rule use from AM to FL.

Given that worriers tend to be in a more negative mood than non worriers and when using an AM stop rule and generate a significantly greater number of perseveration steps than those using a FL stop rule (Startup & Davey, 2001), the mood as-input hypothesis would suggest that an interaction between negative mood and stop rule use generates greater perseveration at a catastrophising task. However, many of these mechanisms underlying perseverative worry are implied. There is some evidence to suggest that specific negative moods may have differential influences on processing (e.g. DeSteno et al., 2004; Lerner & Keltner,

2000; Tiedens & Linton, 2001; Raghunathan & Pham, 1999). However, it is unclear whether the more fundamental properties of valence, or behavioural functions associated with specific emotion experience would be used as information in the context of an experienced stop rule to affect performance on a perseverative worry task.

7.7 Experiment 4

The aim of the present study is to extend work by Startup & Davey (2001) and examine whether specific emotions of the same valence, in conjunction with an AM or a FL stop rule will provide different types of information about when to terminate a perseverative worry task. Evidence reviewed above suggests two possible predictions. In light of evidence implicating valence as a core property of specific emotions (Barrett, 2006a,b,c; Lindquist & Barrett, 2008; Russell, 2003), one possible prediction is that that each negative emotion will provide similar information in conjunction with stop rule use. A second possibility is that the appraisal processes relating to the construction of specific moods of the same valence will provide information distinct to each specific mood (e.g. DeSteno et al., 2004; Lerner & Keltner, 2000; Tiedens & Linton, 2001), thus resulting in differential performance in a mood-as-input framework, depending on the specific negative mood being experienced. These predictions will be examined in the following experiment.

7.7.1 Method

Participants

Participants were 150 students and staff from the University of Sussex. One hundred and twelve were female (74.7%) and thirty-eight were male (25.3%). The age range was from 18 – 42 and the mean age was 21.91 (4.25). All participants were volunteers who received either course credits or a small fee for their participation.

Procedure

Participants were welcomed into the room and informed that they would be asked to take part in a number of separate tasks involving watching a film clip and taking part in a short interview. Participants completed an informed consent form and were then randomly assigned to either a sad (*N* = 30), happy (*N* = 30), anxious (*N* = 30), angry (*N* = 30), or neutral (*N* = 30) mood group.

Stage 1

Trait personality measures: All participants were asked to complete the Penn State worry questionnaire (PSWQ, Meyer, Miller, Metzger & Borkovec, 1990). The PSWQ is a 16-item measure of trait worrying. Participants are required to rate each item on a 5-point scale (where 1 = not at all typical of me, 2 = rarely typical of me, 3 = some times typical of me, 4 = often typical of me, 5 = very typical of me). Items on the PSWQ are not content specific (Davey, 1993), thus the measure examines tendency to engage in pathological worry, regardless of worry content (Molina & Borkovec, 1994). The PSWQ has good internal consistency (Meyer et al., 1990) and good test-retest reliability (Molina & Borkovec, 1994; Stober, 1995). Participants also completed the Hospital Anxiety and Depression Scale (HADS, Zigmond & Snaith, 1983). The HADS is a 14 item questionnaire with 7 items relating to anxiety and 7 to depression, participants answer on a 4-point (coded 0-3) response level. The HADS questionnaire has been found to perform well in the assessment of anxiety and depression in both a clinical and general population (Snaith, 2003).

Stage 2

Mood induction: As experiment 3 with the exception of a neutral mood induction. The film used for the neutral mood induction procedure had been validated by Rottenberg, Ray, & Gross (2007) as being a reliable induction of a neutral mood.

- Sad mood induction: *The Lion King* (Hahn, Allers, & Minkoff, 1994), the clip lasts 6.50 minutes.

- Happy mood induction: *The Lion King* (Hahn et al.), lasting 7.02 minutes.
- Anxious mood induction: *The Shining* (Kubrick, 1980), lasting 1.22 minutes.
- Angry mood induction: *Cry Freedom* (Attenborough, 1987), lasting 2.36 minutes.
- Neutral mood induction: *Sticks* a non-commercial screen saver (Rottenberg et al.), which lasted 3.26 minutes

Stage 3

Distractor task: As Experiment 3.

Stage 4

Visual analogue scale (VAS) measures: Participants were asked to rate their current levels of sadness, happiness, anxiety, anger and arousal on separate visual analogue scales (VAS) ranging from 0 – 10 (where 0 = current mood was felt not at all and 10 = extremely). VAS have been shown to be reliable and valid measures of mood in both psychiatric patients (Bech, Kastrup, & Rafaelson, 1986) and college students (Stern, Arruda, Hooper, Wolfner, & Morey, 1997).

Stage 5

Worry interview: Participants were informed both verbally and in writing that the next task would examine current worry topics of the student population. The worry task was modelled on an interview designed by Vasey & Borkovec (1992) and modified by Davey & Levy (1998). The participant is asked to note their current main worry at the top of the page. The interview begins with the experimenter asking “what is it that worries you about X?”, where X is the participant’s current main worry. The experimenter then repeats the question, substituting X with the participants answer to the first question. Participants are asked to briefly note down the answer to each of their questions. The interview is finished when the participant cannot think of an answer, or repeats the same answer three times.

Once the worry interview had been explained, participants were randomly assigned to a “feel like continuing” (FL) stop rule condition, or an “as many as can” (AM) condition. Those in the FL condition were instructed that there is no

right or wrong time to stop the task and to stop when they no longer feel like continuing. Those in the AM condition were asked to complete the task until they have reached the goal of sufficiently considering all aspects of their worry. The catastrophising interview started once participants had confirmed that they had fully understood the task and stop rule instructions.

Stage 6

Once the worry task had been completed, participants filled out a second set of VAS scales (as above) then completed a mood induction feedback sheet (see appendix L). Participants were then debriefed, as noted in experiment 1, to comply with ethical guidelines all participants received a debrief sheet which informed them of contact details of the university counselling service in case the study had bought up any issues which they wanted to discuss with a professional. They also received the experimenter's contact details should they have any further questions about the study. Participants then received course credits or a small fee and thanked for taking part in the study. If participants had undergone a negative mood induction they were offered the opportunity to receive a positive mood induction to ensure no long-lasting effects of the negative mood induction procedure.

7.7.2 Results

Trait personality measures: PSWQ & HADS

Table 7.1 shows the means, standard deviations and range of the PSWQ and HADS subscales for the full sample and each experimental condition. Independent one-way ANOVAs confirmed that there were no significant differences in HADS anxiety scores, F (9,140) = .83, p = .59, no significant differences in HADS depression scores, F (9,140) = 1.11, p = .36, and no significant differences in PSWQ scores, F (9,140) = 1.26, p = .27 in the ten experimental conditions.

Table 7.1 Mean with standard deviations and range of PSWQ and HADS subscale scores

	HADS anx ± SD	***HADS anx range***	***HADS dep ± SD***	***HADS dep range***	***PSWQ ±SD***	***PSWQ range***
Full sample	7.03 (3.59)	0-18	3.59 (2.63)	0-14	50.63 (12.45)	16-76
Sad/AM	7.33 (3.90)	2-16	3.47 (2.61)	0-10	48.80 (10.40)	25-64
Sad/FL	7.07 (2.89)	2-13	3.67 (1.80)	1-6	53.13 (10.88)	37-71
Hap/AM	6.40 (2.53)	1-10	3.20 (2.37)	0-8	52.13 (13.49)	33-74
Hap/FL	5.93 (4.59)	0-18	2.93 (3.43)	0-14	49.67 (12.92)	32-76
Anxious/AM	6.67 (2.82)	0-10	3.13 (1.68)	1-6	49.60 (14.09)	25-72
Anxious/FL	8.20 (2.46)	4-13	4.93 (2.96)	1-10	56.33 (11.60)	36-74
Angry/AM	7.13 (3.09)	2-13	3.73 (3.08)	0-9	48.53 (12.70)	27-69
Angry/FL	6.73 (3.86)	1-14	3.40 (2.50)	0-8	45.13 (14.55)	16-69
Neueutral/AM	8.33 (3.31)	4-13	4.67 (3.20)	1-10	55.53 (11.25)	37-72
Neutral/FL	6.47 (2.45)	3-13	2.73 (1.94)	0-7	47.47 (10.91)	36-74

Note. Full sample $N = 150$

Mood manipulation measures

Table 7.2 Mean mood ratings with standard deviations post mood induction

Mood Group	***Sad rating***	***Happy rating***	***Anxious rating***	***Angry rating***
Sad	4.47 (2.25)	5.17 (1.76)	4.09 (2.61)	1.74 (2.39)
Happy	0.99 (1.57)	7.33 (1.57)	1.93 (1.99)	1.08 (1.09)
Anxious	1.59(1.56)	6.26(1.39)	3.61(2.49)	0.78 (1.23)
Angry	4.01 (2.57)	4.22(2.24)	3.57 (2.67)	4.41(2.93)
Neutral	2.47(2.30)	6.18 (1.66)	2.17 (2.32)	0.72(.99)

Note. For each group $N = 30$

Baseline mood measures were not taken in an attempt to mask the films as a mood induction procedure. A comparison was performed by examining mood ratings in the target mood group to the same mood as rated by the other groups. The function of this is to gain an idea of the intensity of the induced target mood for each mood group as compared to that mood as rated by the other mood groups. A one-way ANOVA was performed comparing specific mood ratings made by each mood condition. For sadness ratings, F (4, 145) = 16.68, p = < 0.001, η_p^2 = 0.32. Games-Howell post hoc tests showed ratings of sadness to be significantly higher in the sad condition than sadness ratings made in all other mood conditions (all p <. 01), apart from in the angry condition (p = >.05). For happiness ratings, F (4, 145) = 13.63, p = < 0.001, η_p^2 = 0.27. Games-Howell post hoc tests showed ratings of happiness to be significantly higher in the happy condition than all other mood conditions (all $p < .05$) apart from the neutral mood group, where there was a marginal significant difference (p = .06). This indicates that a difference in mood valency between the happy and all the negative mood conditions. For anxiety ratings, F (4, 145) = 4.67, p = 0.01, η_p^2 = 0.11. Games-Howell post hoc tests showed ratings of anxiety to be significantly higher in the anxiety condition as compared only to the happy mood condition (p = .04), there were no other significant differences. For anger ratings, F (4, 145) = 19.85, p = < 0.001, η_p^2 = 0.36. Games-Howell post hoc tests showed ratings of anger to be significantly higher in the anger condition as compared to anger ratings by all other mood groups (all $p < .01$).

To summarise, examining mood ratings across groups shows that mood ratings in the neutral condition were significantly lower for each mood rating as compared to the target mood, except for anxiety ratings. One possible explanation for this is that anxiety ratings were elevated as a result of entering an experimental situation. Happiness was rated as significantly greater in the happy condition that any of the negative mood groups, suggesting a difference in mood valency between the happy and negative mood groups. However, there were no significant differences in sadness ratings as made by the sad and angry condition, this suggests that inducing anger may also have increased feelings of sadness.

Furthermore anxiety ratings were no different in the anxiety group as compared to ratings made by the sad and angry group. Anger ratings were significantly higher in the anger group than anger ratings made by the sad or anxious group, this implies that inducing sadness and anxiety did not also increase feelings of anger. These results suggest that negative emotions were not induced in a discrete manner, inducing anger also seemed to increase feelings of sadness and anxiety and inducing sadness also resulted in anxiety ratings that were slightly higher than anxiety ratings made by the anxiety group (see table 7.2). This is perhaps not surprising as Gross & Levenson (1995) and Rottenberg, Ray, and Gross (2007) indicate that anger and anxiety are difficult to induce in a laboratory setting in a discrete manner.

Main analyses

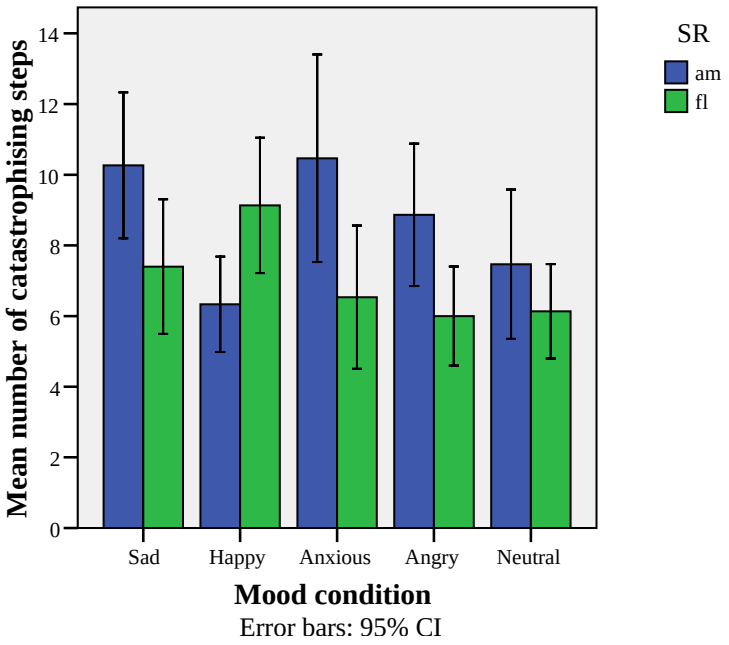

Figure 7.1 Number of catastrophising steps generated in each condition

Figure 7.1 shows the mean number of catastrophising steps generated in each condition. To examine the effects of mood, stop rule and any mood × stop rule interaction effects on task performance, a two-way mood (5 levels) × stop rule (AM vs. FL) ANOVA was performed. There was no significant effect of mood, F (4, 140) = 1.60, p = .18, η_p^2 = .04, a significant effect of stop rule, F (1,140) = 8.05, p = .005, η_p^2 = .05 and a significant mood × stop rule interaction,

F (4, 140) = 4.20, p = .003, η_p^2 = .11. Subsequent multiple Bonferroni comparisons showed that in each specific negative mood, perseveration was significantly greater when using an AM stop rule than a FL stop rule (all p <. 05). In the happy condition, those using a FL stop rule generated significantly more catastrophising steps than those using an AM stop rule, p = .03. There was no significant difference in perseveration by stop rule groups in the neutral condition (p >.05).

Bonferroni pairwise comparisons indicated that those in the happy condition demonstrated significantly greater perseveration when using an FL stop rule than an AM stop rule, yet in each of the negative mood conditions the opposite pattern of results were found. A mood-as-input explanation of these findings is that the context in which different valenced moods were experienced in meant the informational value provided by mood valency had different implications for performance depending on the context or stop rule it was experienced with. However, considering that participants in each negative mood group performed in a similar manner, it is important to examine whether stop rule rather than a mood × stop rule interaction was producing this pattern of results in the negative mood conditions. As such, the number of perseveration steps in the AM group in each negative mood condition were compared to those made in the AM neutral condition, where stop rule, but not mood should not have been the only influencing factor for perseveration. Thus to further examine the relationship between perseveration, AM stop rule use, and specific negative moods, independent t-tests were conducted comparing catastrophising when using an AM stop rule in the neutral condition to each specific negative mood condition. Comparing the number of catastrophising steps in the sad and neutral condition, t (28) = 2.03, p = .05, r = 0.36. Comparing the anxious and neutral, t (28) = 1.78. p = .09, r = 0.32, and the angry and neutral conditions, t (28) = 1.03, p = .31, r = 0.19. Thus compared to a baseline measure of AM stop rule use when in a neutral mood those in the sad mood condition generated a significantly greater number of catastrophising steps than participants in the neutral condition. There was a marginally significant difference in number of catastrophising steps generated by those in the anxious and neutral groups and a non-significant difference between the angry and neutral conditions. The same comparison was made between those

using a FL stop rule in the happy and neutral groups. Here, t (29) = 2.75, p = 0.001, r = 0.46. This suggests that mood and stop rule influenced perseveration in the happy condition as compared to the neutral condition where stop rule alone should have informed participants' choice about when to stop the task.

Mood saliency measures

At the end of the experiment, participants were asked what purpose they thought the film had in the experiment. Table 7.3 shows the percentage of participants in each group who believed that the film was a mood induction procedure. These figures suggest that retrospectively, the majority of participants in all mood conditions except the neutral condition thought that the purpose of the film was to induce, or change mood.

Table 7.3 Percentage of participants in each mood induction group who believed that the purpose of the film was a mood induction procedure

Mood group	Sad	Happy	Anxious	Angry	Neutral
Rated film as MIP (%)	76.7	73.3	73.3	70	20

7.7.3 Discussion

The results of experiment 4 indicate that explicitly manipulating "as many as can" stop rules for catastrophising had differential effects for those in a happy mood as compared to those in a sad, anxious, or angry mood. Asking participants to use an AM stop rule resulted in those in each negative mood condition perseverating for a significantly greater number of steps than those using a FL stop rule. In the happy mood condition the inverse was found, those using a FL stop rule generated a significantly greater number of steps than those using an AM stop rule. Examining differences then between negative moods and a positive mood, findings are similar to those of Martin et al. (1993) who found that mood *per se* did not have implications for perseveration at an item generation task, rather increased perseveration occurred when either in a positive or negative mood depending on the stop rule being applied to the task. Thus a mood-as-input explanation (Martin & Davies, 1998) would suggest that those in a negative mood

following an AM stop rule generate a greater number of catastrophising steps as their negative emotional state signals that they have not made sufficient progress towards their goal, thus they persevere for longer than those using a FL stop rule. In contrast, those in a positive mood using an AM stop rule interpret their positive mood that they have made sufficient progress towards their goal, thus they stop sooner than those using a FL stop rule.

Previous research examining a mood-as-input account of perseverative worry (Startup & Davey, 2001) found a similar pattern of results to the present study in that high worriers (who were assumed to be in a more negative mood than low worriers) persevered at a catastrophising task for significantly longer when using an AM than those using a FL stop rule. In contrast low worriers using a FL stop rule persisted for slightly longer when using a FL stop rule than those using an AM stop rule. Similarly, in the present study those in a positive mood generated significantly more catastrophising steps when using a FL stop rule than those using an AM stop rule. Thus while the present results support a mood-as-input account of perseverative worrying, indicating that when comparing negative and positive mood, mood itself has no implications for performance (Martin et al. 1993; Martin & Davies, 1998; Startup & Davey), the main aim of the current experiment was to examine how different specific negative moods interacted with stop rule in a mood-as-input framework.

An examination of Figure 7.1 indicates that regardless of whether participants were in a sad, anxious, or angry mood, a similar pattern of perseveration occurred. Pairwise comparisons indicated that in each negative mood condition those using an AM stop rule generated a significantly greater number of catastrophising steps than those using a FL stop rule, while as reported above the opposite pattern of results was found for those in a positive mood. An examination of the neutral mood condition shows no significant difference between perseveration by the two stop rule groups, this indicating that it is likely that mood has facilitated differences in performance in the negative mood conditions, rather than stop rule alone underpinning performance. As highlighted by MacDonald & Davey (2005a) the combination of mood and stop rule that most closely resembles perseveration in psychopathology is the deployment of an AM

stop rule when in a negative mood. To examine whether mood and stop rule were interacting to affect performance in each negative mood condition, and rule out the possibility that stop rule alone was affecting perseveration on the task, AM stop rule use in each negative mood condition was compared to a baseline measure of performance by those in the neutral condition using an AM stop rule. Results show a significant difference in perseveration between the sad and neutral group and a marginally significant difference between the anxious and neutral group. This indicates that participants using an AM stop rule in the sad and anxious condition generated a significantly greater number of catastrophising steps than those using an AM stop rule in the neutral condition. However there was no significant difference between the angry and neutral AM conditions, this is also reflected by the small effect size.

Thus results do suggest an interaction between mood valency and stop rule use. There was no significant difference in task performance between stop rule groups in the neutral condition. However, there was a significant difference in the happy condition, with those using a FL stop rule generating a significantly greater number of catastrophising steps than the AM group. In each negative mood condition those using an AM stop rule generated a significantly greater number of catastrophising steps than those using a FL stop rule. The finding that negative moods and a positive mood can result in increased perseveration depending on the stop rule currently employed would suggest that the valence of the mood is not synonymous with a specific processing style (e.g. Schwarz, 2000; Worth & Mackie, 1987), but that mood has performance implications depending upon the context in which it is experienced (Martin et al., 1993; Martin & Davies, 1998).

Examining the question of whether specific moods of the same valence would have differential effects on processing in a mood-as-input framework, one could suggest that each specific negative mood appears to have similar implications for performance given that in each negative mood condition, those using an AM stop rule generated a significantly greater number of catastrophising steps than those using an FL stop rule. Comparing each negative mood/AM condition to the neutral/AM condition does indicate that when using an AM stop rule, those in a sad and anxious mood as compared to the neutral group showed

significantly increased and marginally increased perseveration respectively than those in the anger condition. However, given the significant difference in perseveration on the anger condition between stop rule groups, this indicates that anger interacted with stop rule in a similar manner to sadness and anxiety. Previous research indicates that high worriers report significantly higher levels of sadness and anxiety than low worriers (Startup & Davey, 2001), which may be why those in the sad/AM and anxious/AM groups showed increased catastrophising as compared to the neutral/AM and angry/AM conditions. However, this does not explain why those in the anger group showed significantly increased perseveration in the AM as compared to FL group. Findings do suggest that task perseveration in the anger/AM group was not significantly greater than perseveration in the neutral/AM group. One explanation as to why those in the anger/AM group did not persevere to same extent as those in the sad and anxious AM groups is that feelings of anger are less associated with worrying than feelings of sadness and anxiety. Furthermore, mood induction data suggests that inducing anger may also increase feelings of sadness, thus perseveration in the anger/AM condition may actually be a result of participants experiencing a more general feeling of negativity as opposed to a specific feeling of anger.

Concerning specific negative moods, appraisal theorists (e.g. Lerner & Keltner, 2000; Smith & Ellsworth, 1985) propose that specific moods of the same valence can have differential effects on performance, one such example being anger, which is characterised by appraisals of certainty and sadness which is characterised by feelings of uncertainty (Smith & Ellsworth). Examining how the specific negative moods interacted with stop rule use in the present experiment, each negative mood indicated similar performance showing increased perseveration in the AM group as compared to the FL group. Tiedens & Linton (2001) propose that due to differing certainty appraisals, moods associated with uncertainty such as sadness and fear/anxiety are more likely to result in more thorough processing than anger, which is associated with certainty. Results did indicate a slight difference between performance between mood conditions given that those in the sad and anxious conditions when using an AM stop rule showed increased perseveration as compared to the AM/neutral group, yet there was no

difference comparing the anger and neutral AM conditions. However, these results would need to be replicated to draw firm conclusions on this point.

An alternative explanation for the present pattern of results is not to challenge the view that specific negative moods provide distinct information (e.g. DeSteno et al., 2004; Raghunathan & Pham, 1999). One possibility is that by explicitly asking participants to use a stop rule whilst performing a perseverative task, this could interfere with the informative value of the specific mood, leading participants to use more general information such as mood valency. The mood induction data does show that happiness ratings were significantly higher in the happy condition than any of the negative conditions, suggesting a difference in overall mood valency between the happy group and negative mood groups. Bearing in mind that each specific negative mood condition shows a similar pattern of performance, one could suggest that participants are not actually using information related to the specificity of the mood, but that each negative mood group is using a general feeling of negativity as information, thus explaining why in each negative mood condition, those in using a AM stop rule show significantly greater perseveration than those using a FL stop rule. Russell (2003), Barrett (2006a,b) and Lindquist & Barrett (2008) propose that underlying specific emotions have more fundamental elements such as core affect. Thus it is the way in which one attributes or appraises an event that results in core affective elements being experienced as specific emotions (Russell). Similarly, Barrett (2006c) suggests that specific emotions are experienced from conceptual knowledge about emotions, but that core affect is at the basis of emotional responding. It is thus plausible that participants were relying on valenced information when also explicitly employing an AM of FL stop rule, this explaining why a similar pattern of results were found for each specific negative mood.

A second possibility is that participants in the negative mood conditions were relying on valency as a source of information rather than information from specific negative moods because the mood induction procedures did not provide sufficient intensity of each specific emotion. An examination of the mood induction ratings suggests that anxiety ratings in the sad mood group were slightly higher than anxiety ratings in the anxious group. Ratings of sadness were also not

significantly greater in the sad condition than in the anger condition. It is thus possible that participants experienced a more general feeling of negativity more strongly than a discrete negative mood, which accounts for the similar perseveration pattern in each negative mood condition.

A final noteworthy point is that at the end of the experiment when participants were asked what they thought was the purpose of the film in the study. A high percentage in each mood condition (except the negative mood condition) said they believed the purpose of the film was to change mood (see table 7.3). One must take into account that this question was asked retrospectively, thus it is possible that participants were not consciously aware of the film being a mood induction device during the experiment, but these results do indicate that the film is a fairly obvious source of mood change. However, despite the source of mood change being fairly obvious for the majority of participants, there was differential interaction between mood and stop rule between the happy and negative conditions. This suggests that participants at least at a valenced level were using their mood as information. This finding is in contrast with research that suggests that if the source of mood is highly salient, its informative value will be discounted (e.g. Cervone, Kopp, Schaumann, & Scott, 1994; Scott & Cervone, 2002).

Thus far results have not indicated any clear difference in perseveration between specific negative moods. However, the present study has indicated that each specific negative mood group using an AM stop rule produced a significantly greater number of perseveration steps than those using an AM stop rule. The inverse pattern of results is seen in the happy condition indicating that mood-as-input effects are occurring at a valency level. Previous experiments (experiments 1 & 2) using a perseverative checking task failed to show any specific negative mood and stop rule effects on performance, or any valency and stop rule effects of performance. The next chapter will examine two points of interest that have arisen, both relating to conditions under which participants may or may not use concurrent mood as information in conjunction with stop rules.

In the present experiment mood and stop rule interaction did occur at least at a valency level when using a catastrophic worry task involving concerns

directly related to the participant. However, in experiments 1 & 2 using a checking task, which is non-personally relevant, there was no effect of mood or any mood and stop rule interaction. Thus one area of enquiry is whether the personal relevancy of the task important for the way in which specific negative moods and stop rule use interact? Secondly, the present study indicated that the majority of participants in the positive and negative mood conditions believed the film to be a mood induction procedure, yet there was still differential task performance in conjunction with stop rule use. Previous research suggests that if a mood source is highly salient and unrelated to the task at hand, the informational value provided by that mood will be discounted (e.g. Cervone et al., 1994; Schwarz & Clore, 1983; Scott & Cervone, 2002). A limitation of the present study is that while in retrospect, the majority of participants attributed any mood change they experienced to a specific source (the film), one cannot be sure whether this is affecting the way in which mood is used as information. Mood attribution within a mood-as-input framework will be examined in the following chapter.

8 Mood Attribution in a Mood-As-Input Context

8.1 Introduction

One aim of this thesis is to explore mechanisms that underlie mood-as-input processes. Specifically, research has examined whether specific negative emotions interact with stop rules to affect perseveration in a different manner than the interaction between mood valency and stop rule, which has already been examined in relation to perseverative checking (MacDonald & Davey, 2005a) and catastrophic worry (Startup & Davey, 2001, 2003). In previous chapters of this thesis, neither specific negative moods in combination with stop rule use, nor valence were found to affect perseverative checking measures. However, examining a personally relevant task, findings from the previous chapter (experiment 4) indicate that individuals may be using a general feeling of negativity as information, even after experiencing a specific negative mood induction. This supports previous mood-as-input findings examining catastrophic worry whereby the valence of a mood can have different implications for performance depending upon the context in which the mood is experienced (Startup & Davey, 2001, 2003).

8.2 The Attribution Hypothesis

One factor that has been measured in the previous chapter as a possible mediator in the effects of mood on processing is mood saliency. The affect-as-information hypothesis (e.g. Schwarz & Clore, 1983, 1988, 1996) suggests that evaluative judgements are based on information provided by one's own feelings. This idea is implicit in work by Schwarz & Clore (1988) who proposed that while making an evaluative judgement, individuals implicitly or explicitly ask "How do I feel about it?" thus using their feelings as a source of information. Schwarz & Clore (1983) suggested that current mood affects people's reaction to a target, or residual affect unrelated to the target can also influence judgement or evaluations. However, as demonstrated by Schwarz & Clore (1983) if the source of one's mood is made highly salient and also deemed by the individual to be irrelevant to

the judgement at hand, mood is discounted as a source of information. Schwarz & Clore (1983) demonstrated, by telephoning people on a sunny or rainy day, that the weather affected individual's reported life satisfaction. People tended to report greater satisfaction with their lives on sunny than rainy days, unless their attention was drawn by the experimenter to the weather, in which case the effect of the weather on life satisfaction (when it was raining and thus the individual was deemed to be in a more negative mood) was eliminated. That making the source of the mood salient affected participants judgements of their life satisfaction only when they were in a bad mood led the authors to suggest that those in a negative mood are more likely to search for information to explain their negative mood than those in a positive mood (Schwarz & Clore, 1983).

The mood-as-input theory (Martin & Davies, 1998; Martin, Ward, Achee, & Wyer, 1993) makes no predictions about the motivational implications of mood outside of the context in which it is experienced. However, in examining mechanisms underlying the relationship between mood and stop rule, it is important to explore situations where mood and stop rule may not interact to affect task perseveration, for example when mood is attributed to an obvious source. The idea that emotional feelings follow emotional appraisals to result in feelings being experienced as related to current cognitions has been termed by Clore et al. (2001) as the immediacy principle. However, if feelings are not attributed as being relevant to current events, a simple relationship between current mood and cognitions is not also observed. As demonstrated by Schwarz & Clore (1983), when individuals attribute their affect to an external source that is irrelevant to the current judgement such as the weather, affect is discounted as a source of information. Examining performance standards, Scott & Cervone (2002) reported that negative affect induced higher minimal performance standards, except when the source of negative mood was made highly salient, in which case informational value associated with negative mood was discounted. Mood saliency was manipulated by heightening participants' awareness of mood inducing events prior to completion of the dependent measures of personal standards, evaluative judgements, and self-efficacy appraisals. Interestingly, post experiment, in each condition, both salient and non-salient, participants did not indicate awareness that their affective state influenced their responses to the

outcome measures. This indicates that even in the negative/salient condition participants had unconsciously discounted their negative mood as a source of information.

Investigating affect and performance standards, Tillema, Cervone, & Scott (2001) studied the effects of manipulating mood attribution in dysphoric individuals. As well as experiencing chronic negative mood, dysphoric individuals also have been shown to experience increased performance standards (Ahrens & Abramson, 1991) and to display perfectionistic attitudes (e.g. Blankstein & Lumley, 2008; Hewitt & Dyck, 1986). Tillema et al. compared two situations under which mood can influence cognition in dysphoric and non-dysphoric individuals. They hypothesised that the influence of affect on performance standards was contingent upon individuals' attributions regarding the source of the mood. Thus they examined links between affect and cognition when individuals attribute their affective state to a source that was irrelevant to the judgement at hand. Under this circumstance Scott & Cervone (2002) and Schwarz & Clore (1983) found that affect was discounted as a source of information. A second process by which they hypothesised that affect would influence cognition was when participants were made aware that mood can bias judgments.

When no external mood cues were provided, so that participants were not made aware of the potential influence of mood on self-judgements, dysphorics had performance standards that exceed their self-efficacy perceptions, while non-dysphorics did not. However, in the mood awareness condition, both dysphorics and non-dysphorics were informed that previous research suggests that mood can influence responses to questionnaires. Tillema et al. (2001) found that when participants were made aware of the effects of mood on judgement differences in self-efficacy perceptions were eliminated. Tillema et al. suggest that being aware of the potential biasing effects of mood caused individuals to correct for the biasing effects of mood on cognition. Interestingly, when participants were made aware of a potential seemingly irrelevant cause of negative mood, difference in performance standards between the two groups were magnified. The authors suggest that one explanation for this is that dysphorics are already aware that they are experiencing chronic negative affect, thus the experimental manipulation to

draw their attention to an external cause of negative affect did not lead them to discount negative affect as irrelevant to their current judgement (cf. Scott & Cervone, 2002); it only heightened their awareness of their innate negativity, thus magnifying their feelings of negativity, which they deemed relevant to performance judgements.

Tillema et al. (2001) concluded that there is no fixed relationship between affect on cognition, but that contextual cues determine whether affects serves as input into social judgements. This supports both an affect-as-information (Schwarz & Clore, 1983) and mood-as-input (Martin et al., 1993) view of the interaction between affect and cognition. This study also has interesting implications for psychopathology in that drawing an individual's attention to the source of a transient mood state may lead the individual to discount the mood to being relevant to the current judgement, thus resulting in no link between affect and cognition. However, Tillema et al. demonstrated that external mood cues served to enhance awareness of negative mood and heighten negative mood in dysphorics, so that negative affect influenced cognitions, rather than being discounted as irrelevant.

Within the general population it is likely that there is considerable variance in the extent that individuals rely on their affective states when making judgements and decisions. Gasper & Clore (2000) examined how experimentally manipulating attention to emotion influenced judgements of risk. In study 1, participants were assessed to be either high or low in emotional attention. Gasper & Clore then induced participants into either a happy or sad mood and those in the high salience condition had their attention drawn to their mood either before or after completing a set of risk estimates. Results indicated that when the attribution manipulations were made prior to the risk assessments, individuals high in emotional attention no longer perceived their feelings to be a relevant source of information when the attribution manipulation made the cause of their feelings highly salient. However, when individuals low in emotional attention had their mood source made highly salient, their judgements then were influenced by their current mood (Gasper & Clore). Again, Gasper and Clore highlight that susceptibility to emotional experiences, and thus affect itself, does not mediate

how affect is used as a source of information; rather it is the way that affect is attributed as being important to the judgement at hand.

To sum up, the informational effects of mood as examined by Schwarz & Clore (1983), and extended by Scott & Cervone (2002) and Tillema et al. (2001) suggest that when using feelings as a source of information, the use of current affect as information does not require conscious attribution to the feeling of the target, yet if mood is attributed to an irrelevant source the informational value of the mood is discounted. However, individual differences in attention to emotion can result in mood influencing judgements of individuals high in emotional attention, unless the cause of their feelings are made highly salient in which case feelings are not perceived as relevant and thus individuals are not influenced by them (Gasper & Clore, 2000).

8.3 Specific negative moods and mood saliency

Siemer (2001) compared the influence of three specific moods (sadness, anxiety, and anger) on emotion and appraisal judgements. He examined two theoretical views concerning the nature of the relationship between moods and emotions, the moods-as-feelings (MFM) model and the dispositional mood model (DMM). Siemer likens the MFM to the mood as information model (Schwarz & Clore, 1983; 1988), which views affect as nonintentional feelings that can thus be misattributed to different causes. This misattribution affect accounts for the aforementioned mood saliency effects whereby drawing the individual's attention to the source of a transient mood state can lead to the mood being discounted as irrelevant to the judgement at hand. In contrast, Siemer proposes that the DMM predicts that moods are temporary dispositions to have particular kinds of cognitions such as emotion-relevant appraisals. Thus rather than moods being seen as nonintentional, they are conceptualised as dispositions to appraise events in a certain way. The mood-as-input model (Martin, 2000; Martin et al., 1993; Martin & Davies, 1998) proposes that moods have no effects on judgements outside the context in which they are experienced. Thus far, experimental work in this thesis has found no mood specific effects on performance when mood is

examined in conjunction with stop-rule use. In the previous experiment (experiment 4), interactions with mood valency and stop rule use were found to have differential effects on performance, yet participants reported the source of induced to mood to be salient, that is, they attributed induced mood to a specific source (the film). This raises questions as to why the informational value of mood was not discounted as being irrelevant if the induced mood was so readily attributed to a mood induction procedure.

Siemer (2001) manipulated mood saliency by using an autobiographical recall task, or a musical mood induction procedure to induce mood. Those in the high mood saliency condition were asked to complete a mood questionnaire consisting of scales to rate their levels of sadness, anxiety, etc. These scales also served as a mood manipulation check, but those in the low salience condition did not complete them. Participants were then asked to make appraisal judgements of scenarios; for example in the anger condition participants were asked to appraise the degree of responsibility of another person for events described in a scenarios and for the sadness scenario participants were asked to appraise the degree of perceived personal controllability of a negative event. Also, participants made emotion judgements of scenarios where they were asked to indicate how intensely they would feel the emotion if they were in the described scenario.

Findings indicated distinct effects of anger and sadness (but not anxiety, where the mood manipulation was deemed to be ineffective) on appraisal judgments, yet no specific mood effects on emotion judgements. Siemer (2001) suggests that these findings support the DMM theory of moods, i.e. that moods are generalised appraisal tendencies and thus bring distinct appraisal tendencies to situations depending upon the mood currently being experienced. These findings are interesting in that they support the view that distinct moods can have distinct effects on judgments. Furthermore, Siemer found that contrary to previous research (e.g. Schwarz & Clore, 1983; Scott & Cervone, 2002) mood saliency did not have an effect on appraisal judgements.

8.4 The Present Study

Results from the previous study (experiment 4) indicated that mood-as-input effects were occurring in each mood condition, but possibly only at a valenced level, which would explain why a similar pattern of results was observed in each negative mood condition. Post-task measures indicated that the majority of participants believed that the purpose of the mood induction had been to alter their mood, thus salience of mood cause may have been high. However mood saliency checks were performed at the end of the experiment when the experimental paradigm may have become obvious to the participant. Informational models of mood (Schwarz & Clore, 1983; Scott & Cervone, 2002) perceive that affect is nonintentional and thus can be misattributed towards an unrelated target. However, if the mood source is highly salient and deemed irrelevant to the judgement at hand mood would not be used as information. However, Siemer (2001) found that specific emotions of the same valence can have distinct effects on appraisals, regardless of whether the link between felt mood and mood induction procedure is made obvious and thus felt mood is attributed to an obvious source.

8.5 Experiment 5

The present experiment will examine the effects of a specific negative mood (anger) in a mood-as-input framework when the mood is believed to be attributable to a specific source (thus highly salient) or non-attributed, thus not attributed to a specific event/object. Where the source of anger is attributed to the anger induction and is thus highly salient, mood is expected to be deemed irrelevant to the task at hand (cf. Schwarz & Clore, 1983; Scott & Cervone, 2002). If this is the case, mood-as-input effects observed in experiment 4 would be expected to occur in the low, but not high mood attribution group. However, previous findings in the current research and work by Siemer (2001) indicate that participants can attribute their mood to a particular cause (i.e. a mood induction procedure), yet effects of moods on judgements still occur. The present experiment will examine these two sets of hypotheses. The emotion of anger was chosen as previous mood manipulation data in this thesis has shown baseline

anger levels to be low as compared to other negative moods, thus one can be fairly sure that induced mood is as a result of the mood induction procedure. Secondly, anger was found by Siemer to have unique appraisal patterns and unlike the mood as information model, Siemer suggests that drawing participants attention to the source of their angry mood, should not affect the relation between mood and judgement. Thus by examining the same specific emotion, this finding can also be examined.

8.5.1 Method

Participants

The participants were 100 undergraduate and postgraduate students from Sussex University. All participants were volunteers and either received course credits or a small fee for their participation in the experiment. The mean age of participants was 23.39 (6.22) with an age range of 18-62.

Procedure

Participants were randomly assigned to an angry or happy mood induction procedure (MIP). Those in the anger condition were further assigned to either an 'attribute' or 'non-attribute' condition depending on the anger attribution manipulation instruction given to participants during the experimental procedure. The design of the study is not balanced. In the anger/attribute condition, $N = 40$, in the anger/non-attribute condition, $N = 40$, in the happy condition, $N = 20$. The happy condition served as a positive mood control condition where one would expect replication of previous mood-as-input effects.

Participants were informed both orally and in writing that they would be asked to complete a number of unrelated tasks, including watching a short film clip and taking part in an interview.

Stage 1

Informed consent and completion of Penn State Worry Questionnaire (Meyer, Miller, Metzger & Borkovec, 1990) and HADS questionnaire (Zigmond & Snaith, 1983).

Stage 2

Mood induction procedure (MIP) used film based on techniques of Gross & Levenson (1995), Marzillier & Davey (2005), and Rottenberg, Ray, & Gross (2007). Refer to experiment 2 for a detailed account of the procedure.

- Angry mood induction: *Cry Freedom* (Spencer, Briley, & Attenborough, 1987), the clip lasted 3.21 minutes.
- Happy mood induction: *The Lion King* (Hahn, Allers, & Minkoff, 1994), the clip lasted 6.50 minutes.

Stage 3

Distractor task: As experiment 2.

Stage 4

Post MIP visual analogue scales (VAS).

Stage 5

Attribution manipulation (for those in the angry condition): Participants were asked to read an information sheet (having been informed that they were to take part in a number of unrelated tasks) which, depending on the attribution condition they were in, informed them about research that had found anger to be an emotion that was usually attributed/not attributed to a specific event or cause (see appendix G & H for details).

Stage 6

Attribution manipulation check: All participants were asked to rate their feelings of sadness, happiness, anxiety, and anger, and the extent to which they rated each felt mood as attributable to a specific cause (appendix I). This served as a check of whether participants rated any felt anger as being attributable to a specific cause.

Stage 7

Catastrophising task instructions: Participants were informed that the next task involved examining current worry topics of the student population. Half the participants in each anger attribution group and the happy condition were then either assigned to an “as many as can” (AM) group or a “feel like continuing” (FL) group depending on the goal instructions they received before the catastrophising task. Those in the FL condition were instructed that there is no right or wrong time to stop the task, and to stop when they no longer feel like continuing. Those in the AM condition were asked to complete the task until they have reached the goal of sufficiently considering all aspects of their worry.

Stage 8

Catastrophising interview: As experiment 4.

Stage 9

Post task measures: Participants were asked to complete a final set of mood VAS. Participants were also asked to rate to what extent they agreed with information presented to them about the occurrence of anger on a 10 point visual analogue scale (where 0 = Not at all and 10 = very much). Participants were also asked to indicate what purpose they felt the film had in the experiment.

Stage 10

Debrief: As experiment 1.

8.5.2 Results

PSWQ & HADS

Table 8.1 shows details of the HADS anxiety and depression subscales (Zigmond & Snaith, 1983) and PSWQ (Meyer et al., 1990) for the sample as a whole and each experimental condition.

Table 8.1 Mean with standard deviations and range of PSWQ and HADS subscale scores

Condition	*HADS anx ± SD*	*HADS anx range*	*HADS dep ± SD*	*HADS dep range*	*PSWQ ± SD*	*PSWQ range*
Full sample	7.62 (3.56)	1-16	3.30 (2.41)	0-12	50.36 (10.82)	28-77
Ang Attribute/AM	7.90 (3.63)	2-16	3.70 (2.45)	1-8	51.60 (9.92)	28-69
Ang Attribute/FLC	8.90 (3.80)	2-16	3.95 (2.78)	0-12	52.60 (13.99)	34-77
Ang non-attribute/AM	7.15 (3.54)	2-16	2.30 (1.38)	0-12	50.25 (10.21)	34-77
Ang non-attribute/FLC	7.30 (3.18)	2-16	3.30 (2.58)	0-5	47.60 (6.89)	37-74
Hap/AM	6.80 (3.30)	1-11	2.90 (1.66)	1-6	45.40 (11.16)	29-60
Hap/FLC	6.90 (3.35)	0-9	3.60 (3.13)	0-9	54.1 (12.13)	32-74

Note. Full sample $N = 100$.

There were no significant differences in PSWQ scores across the six conditions, F (5, 94) = 1.15, p = .34 (equal variances not assumed), no significant differences in the HADS anxiety scale across the six conditions, F (5, 94) = .85, p = .52 and no significant differences in the HADS depression scale across the six conditions, F (5, 94) = 1.19, p = .32.

Mood manipulation measures

Table 8.2 Mean mood ratings with standard deviations post mood induction

Mood Induction	*Sadness rating ± SD*	*Happiness rating ± SD*	*Anxiety rating ± SD*	*Anger rating ± SD*
Anger attribute: n = 40	4.88 (2.30)	4.62 (2.16)	4.74 (2.85)	4.73 (2.66)
Anger non-attribute: n = 40	4.15 (2.73)	5.33 (1.94)	3.54 (2.44)	3.70 (2.78)
Happy: n = 20	1.37 (1.41)	7.08 (1.29)	2.08 (2.25)	1.20 (1.66)

Table 8.2 shows mean mood ratings post MIP for the anger attribute group, anger non-attribute group, and happy group. One-way ANOVAs were performed to compare ratings of each specific mood by each mood group. There was a significant difference in sadness ratings, F (2, 97) = 15.29, p = < .001, ηp2 = 0.24. Bonferroni post hoc tests indicated that there were no significant differences in sadness ratings in each anger group (p = .51), but there were significant differences between sadness ratings by both anger groups as compared to the happy group (both p = < .001). There was a significant difference in happiness ratings, F (2, 97) = 10.90, p = < .001, ηp2 = 0.18. Bonferroni post hoc tests indicated happiness was rated higher by the happy condition than both of the anger groups (both p = <. 01), there was no significant difference between happiness ratings by both anger groups (p = .30). Anxiety ratings were significantly different, F (2, 97) = 7.28, p = .001, ηp2 = 0.13. Bonferroni post hoc tests indicated that there were no significant differences in anxiety ratings in each anger group (p = .12). Anxiety was rated as being significantly higher by the anger attribution group compared to the happy group (p = .001), but there was no significant difference in anxiety ratings when comparing ratings of the happy and non-attribution anger group (p = 0.12). A comparison of anger ratings showed a significant difference, F (2, 97) = 12.99, p = < .001, ηp2 = 0.21. Bonferroni post hoc tests indicated that there were no significant differences in anger ratings for each anger group (p = .21), but importantly there were significant differences between anger ratings by both anger groups as compared to the happy group (both p = < .001).

Attribution manipulation

To examine the efficacy of the anger attribution manipulation, an independent samples t-test was conducted examining the difference in attribution scores between the attribute and non-attribute experimental groups. Figure 8.1 shows the mean anger attribution ratings (where 0 is low attribution and 10 is high attribution). An independent samples t-test revealed a marginal significant difference between groups on anger attribution ratings; t (78) = 1.75, p = .08, r = .19.

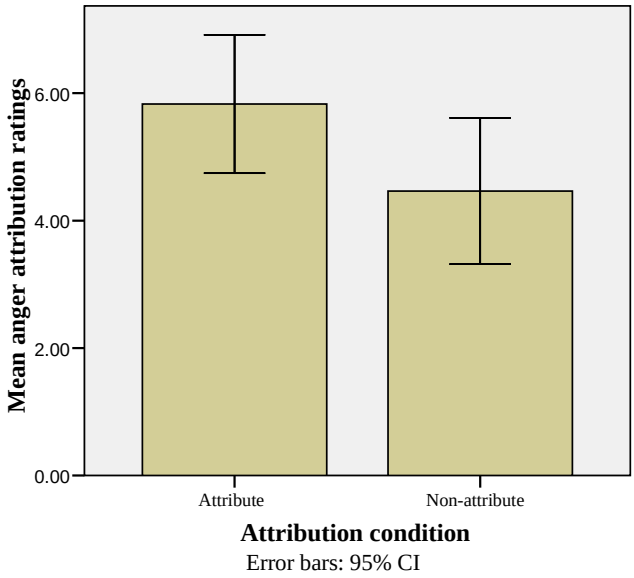

Figure 8.1 Mean anger attribution ratings by the attribute and non-attribute conditions

Main analyses

Figure 8.2 shows the mean number of catastrophising steps generated in each condition. To examine whether there was a significant difference between experimental conditions on the number of catastrophising steps generated, a 2-way (anger attribution/happy mood group x stop rule) ANOVA was performed. There was no significant effect of stop rule, F (1, 94) = 2.13, p = .15, ηp2 = 0.02, no significant effect of mood/attribution, F (2, 94) = .52, p = .60, ηp2 = 0.01, and no significant mood/attribution interaction, F (2, 94) = 2.22, p = .12, ηp2 = 0.05. Pairwise multiple Bonferroni comparisons showed a significant difference in stop rule use in the happy condition, where those using the FL stop rule generated a significantly greater number of steps than those using an AM stop rule, p = .03. There were no other significant differences.

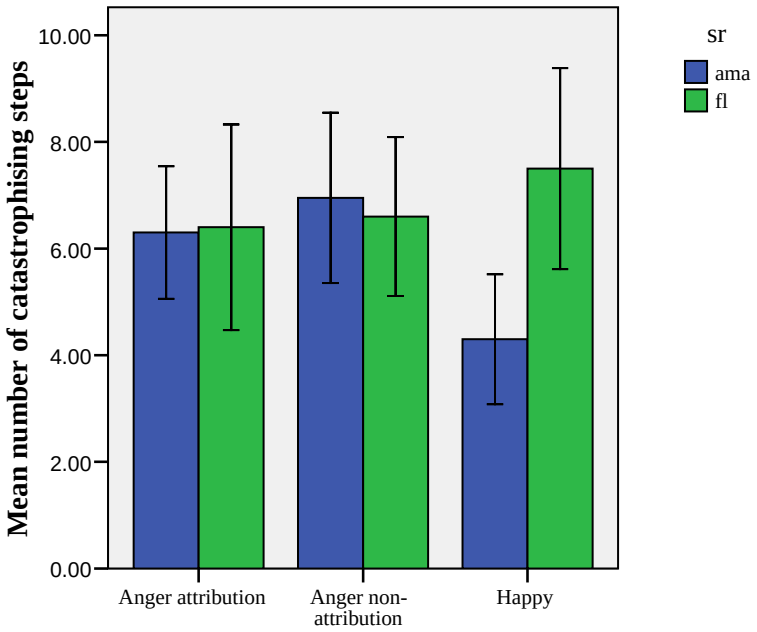

Figure 8.2 Number of catastrophising steps generated in each condition

An examination of mean mood ratings (Table 8.2) shows little difference between levels of sadness and anxiety and anger in the two anger conditions. Further, participants' anxiety ratings were at the high end of what is considered non-clinically anxious on the HADS anxiety sub-scale (Zigmond & Snaith, 1983). Thus to control for the influence of anxiety and sadness on performance, an ANCOVA was performed with anxiety and sadness ratings pre-catastrophising task included as covariates. After controlling for the effects of anxiety and sadness, there was no significant main effect of stop rule, F (1, 94) = 2.09, p = .15, η_p^2 = 0.02, no significant main effect of attribution/mood, F (2, 92) = .46, p = .63, η_p^2 = 0.01, and no significant mood/attribution × stop rule interaction, F (2, 92) = 2.14, p = .12, η_p^2 = 0.04, on number of perseveration steps generated.

Tertile split

As a final exploratory measure to examine the possible effects of anger attribution given that the attribution difference between groups (see Figure 8.2) was marginally significant and the corresponding effect size was small, a tertile split was performed on anger attribution ratings to create a high and low

attribution group. A 2-way mood group (high anger attribution, low anger attribution, happy) × stop rule (AM vs. FL) ANOVA was performed. Figure 8.3 shows the number of perseveration steps generated by those in the low or high anger attribution group and happy group when using an AM or FL stop rule.

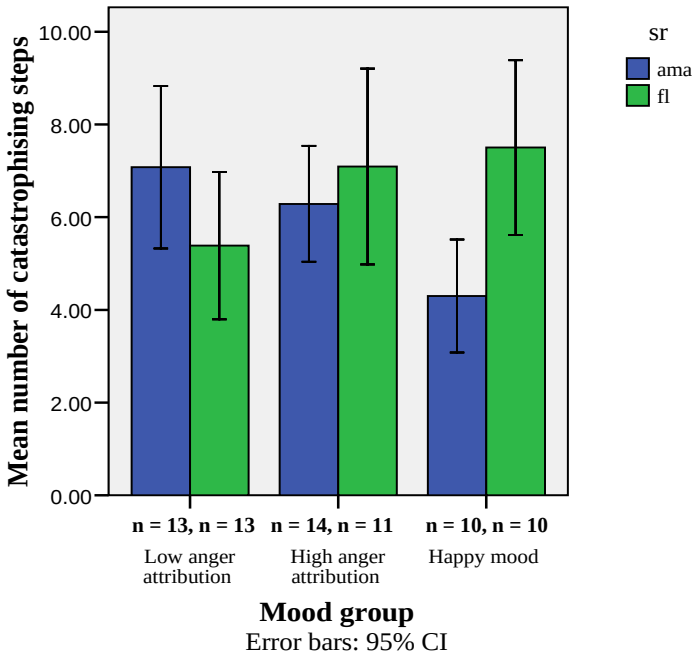

Figure 8.3 Number of catastrophising steps generated by low and high attribution, or happy groups when using an 'as many as can' or 'feel like continuing' stop rule

A 2 way mood group × stop rule ANOVA was performed to examine whether mood group (low anger attribution, high anger attribution, and happy) and stop rule (AM vs. FL) would interact to influence the number of catastrophising steps generated. There was no significant effect of stop rule, F (1, 65) = 1.56, p = .22, η_p^2 = .02, no significant effect of mood group, F (2, 65) = 0.53, p = .59, η_p^2 = 0.02, and a significant mood group × stop rule interaction, F (2, 65) = 5.13, p = .009, η_p^2 = 0.14. Pairwise Bonferroni multiple comparisons showed a marginally significant difference in stop rule use in the low anger attribution group, p = .09, no difference in the high anger attribution group, p = .44 and a significant difference in stop rule use in the happy condition, p = .007.

To compare perseveration across each mood group by stop rule condition, two one-way ANOVAs were performed examining perseveration in each mood group by participants using an AM stop rule, or a FL stop rule. There were significant differences in perseveration across mood groups by those using an AM stop rule, F (2, 34) = 4.08, p = .03, η_p^2 = 0.19. Bonferroni post hoc tests indicated that participants in the low anger attribution group generated significantly more perseveration steps than those in the happy mood condition when using an AM stop rule, p = .03. There were no significant differences in the FL condition, F (2, 31) = 1.90, p = .17, η_p^2 = 0.11.

Post task measures

When asked at the end of the experiment, in retrospect 97.5% of participants in the anger condition and 80% of participants in the happy condition believed the purpose of the film was a MIP. Figure 8.4 shows participants ratings of the extent to which they agreed with the information presented to them about the occurrence of anger. Depending on the attribution condition they were in they would have received information informing them that anger was generally always attributed or not attributed to a specific cause. An independent measures t-test indicates a significant difference between the attribution manipulation groups in the extent they agreed with the information provided to them about anger attribution, t (78) = 6.11, p = < .001, r = 0.57.

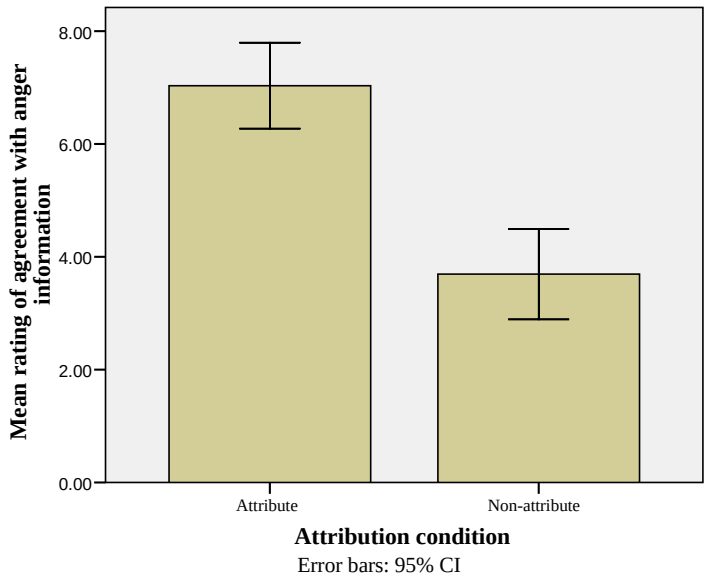

Figure 8.4 Mean ratings of agreement with anger information

8.5.3 Discussion

Summary of results

The results of this study do not provide enough firm statistical evidence to draw conclusions about the effects of mood attribution on task performance. Two predictions were examined. Previous research suggests that if induced negative mood is attributed to a source that is deemed irrelevant to the current task, mood would not be used as information in relation to task performance (Schwarz & Clore, 1983; Scott & Cervone, 2002; Tillema et al., 2001). However, examining specific negative moods Siemer (2001) found that being aware of the source of one's mood thus attributing the mood to a specific event did not moderate to effect of mood on judgement.

Mood induction data revealed that anger ratings were significantly higher in the anger group than anger ratings made by the happy group. The anger attribution manipulation showed a marginally significant difference in ratings of anger attribution, however bearing in mind the small effect size for this difference, one should be cautious in asserting that the anger attribution manipulation was successful. Previous studies examining a mood-as-input account of catastrophic worry (e.g. Startup & Davey, 2001) found that those in a negative mood using an AM stop rule produced a significantly greater number of catastrophising steps than those in a negative mood using a FL stop rule. Conversely, those in a positive mood using a FL stop rule produced a greater number of steps than those using an AM stop rule. Furthermore, previous work in this thesis (experiment 4) indicated that when in an angry mood condition those using an AM stop rule generated a significantly greater number of catastrophising steps than those using a FL stop rule.

In the present study a 2-way mood/attribution group and stop rule ANOVA showed no significant main effects, or a significant interaction between mood/attribution and stop rule. This indicates that the anger attribution manipulation did not moderate the effects of mood or stop rule on the number of catastrophising steps generated. Results from the happy condition supported previous findings of positive mood and stop rule use in catastrophic worrying

(Startup & Davey) and perseverative checking (MacDonald & Davey, 2005a) with those using a FL stop rule generating a significantly greater number of steps than those using an AM stop rule. However, one must take into account the finding that the attribution manipulation was not very robust, implications of this will be discussed below.

Whilst recognising the theoretical and statistical drawbacks surrounding the dichotomization of variables (cf. MacCallum, Zhang, Preacher, & Rucker, 2002), the tertile split was performed purely as an exploratory measure to take a tentative look at how low and high mood attribution may be affecting task performance. As can be seen from the tertile split analysis, there were no differences in stop rule group performance in the high attribution group and a marginally significant difference in the low anger attribution group, thus suggesting some potential for attribution and mood context (stop rule) to mediate task performance. Bonferroni pairwise multiple comparisons showed a near significant difference in stop rule use in the low anger attribution group, with those in the AM group generating a greater number of steps than those in the FL condition. There was no significant difference between stop rule groups in the high anger attribution group and a significant difference in stop rule use by the happy group (see Figure 8.3). If (as previous research suggests, e.g. Schwarz & Clore, 1983; Scott & Cervone, 2002) when the source of an emotion is attributable to a salient cause informational value from that emotion is dismissed, then one would expect that those low in anger attribution would use their concurrent mood in conjunction with stop rule as a source of information. Thus one would expect to see a difference in perseveration between stop rule groups in the low but not high attribution groups. However, Siemer (2001) found that awareness of mood source did not moderate mood effects on performance. Thus the effects of mood attribution within a mood and stop rule framework remain unclear. Future research should focus on developing a robust attribution manipulation if mood attribution in conjunction with stop rule use is to be further examined.

Theoretical implications

The mood-as-input theory (Martin et al., 1993; Martin & Davies, 1998) proposes that mood itself has no motivational implications for performance outside the context in which it is experienced. It also makes no specific predictions about how the saliency of mood cause may affect the way in which mood and context interact to affect evaluative judgements. However, the mood-as-informational model (Schwarz & Clore, 1983, 1988) predicts that if mood source is made highly salient and is deemed irrelevant to the current situation, affect would not be used as a source of information. In experiments trying to manipulate whether participants perceive anger as an emotion that is often linked or attributable to a specific cause, the aim of this study was to further elucidate how mood and stop rule interacted depending upon whether the mood being experienced had a highly salient source. However, in order to achieve this two conditions are necessary, firstly that the participant has been successfully induced into an angry mood and secondly that the attribution manipulation is successful.

Schwarz et al. (2001) proposed the immediacy principle suggesting that emotions are linked with appraisals of current mental context unless these feelings are not already linked to a particular cause. In the present study where participants who have watched an anger inducing film are then given instructions that when anger is experienced it is often directly related to a specific source or cause, then one would expect any experienced anger to be linked to the film and not associated with reactions to the task at hand, here a catastrophic worry task. Here results did not provide firm evidence that attributing mood to a specific source would influence the way it is used in information in conjunction with specified stop rules. One must also take into account that unlike the mood-as-information model (Schwarz & Clore, 1983, 1988) and Siemer's (2001) examination of mood specific effects on appraisal judgements, the mood-as-input model specifies stop rules for a task. It is possible that by specifying stop rules, mood related appraisals are over-ridden and emotion specific appraisals do not influence judgements.

Finally limitations to the present study must also be considered in relation to theoretical implications of findings. The mood induction data indicated that felt anger in the anger condition may have lacked sufficient intensity for participants

to experience anger over other negative emotions. Furthermore, results showed that the anger attribution manipulation may not have been sufficiently effective. There was a marginally significant difference in ratings of anger attribution, but the effect size was small. It is possible that the observed difference was due to demand characteristics. When asked at the end of the experiment, in retrospect 97.5% of participants in the anger condition believed that the purpose of the film was to affect mood, thus it is likely that the majority of participants would have also linked any felt anger to the film as a salient source. Furthermore, when participants were asked to rate the extent to which they agreed with the information provided to them about anger there was a significant difference between the two attribution groups; those in the non-attribution group agreed less with the information provided than those in the attribute group. These results also suggest that the attribution manipulation was not wholly successful.

Siemer (2001) suggests that specific emotions are normally about something. If this is the case one could suggest that specific emotions are always directed, i.e. have a salient source. One possibility is that mood-as-input theory may not be generalisable to specific negative moods and that any mood and stop rule interactions observed as in the previous experiment (experiment 4) may be due to participants relying on information related to mood valency rather then specific emotions. However, research to confirm this would need to develop covert or subliminal mood inductions, to enable complete masking of mood sources, in order to produce robust induction of specific negative moods. Research examining mood attribution in a mood-as-input framework should also consider using an alternative mood attribution manipulation. For example, Siemer used mood ratings scales to draw participants' attention to the source of their mood. In the present study participants completed mood rating scales before the attribution manipulation, thus one could suggest that mood source was already salient. Again, using a more covert mood induction procedure would possibly make manipulation of mood attribution more effective.

9 General Discussion

9.1 Introduction

The work in this thesis aims to further explore mechanisms that mediate the interaction between mood and cognitions in perseverative psychopathologies. Work has focused on the mood-as-input model of perseveration (Martin & Davies, 1998; Martin, Ward, Achee, & Wyer, 1993) and has examined how specific negative moods may interact with stop rules to affect performance on perseverative tasks.

The mood-as-input model has been successfully applied to a number of perseverative psychopathologies including catastrophic worry (Davey, Eldridge, Drost, & MacDonald, 2007; Davey, Startup, MacDonald, Jenkins, & Patterson, 2005; Startup & Davey, 2001, 2003), perseverative checking (Davey, Startup, MacDonald, & Field, 2003; Davey, Startup, Zara, MacDonald, & Field, 2003; MacDonald, & Davey, 2005a,b), and depressive rumination (Watkins & Mason, 2002). In each case the context or stop rule in which either a happy or sad mood was experienced in was found to moderate task perseveration. However, previous mood-as-input studies have focused on manipulating mood valency and stop rule. As discussed in chapter 2 the mood-as-input model proposes that individuals rely on the informational value of moods to determine whether task related goals have been met (Martin, 2000). In an attempt to extend the examination of the role of mood within a mood-as-input framework, this thesis has focused on examining how information from specific negative moods may affect perseveration in a perseverative checking task and catastrophic worry task, depending upon the goals, or stop rules specified for the task. This chapter will review the findings from the experimental work conducted in this thesis. Theoretical implications of the findings will be discussed in relation to the structure of mood and emotions, the effects of specific negative moods on processing, and the effects of mood saliency on processing. Next the implications of current findings for the mood-as-input hypothesis will be examined, including the role of specific negative moods in mood-as-input theory as an explanation of perseverative psychopathologies.

Finally limitations of the present research are discussed and directions for future research examined.

9.2 Main Findings: A Review

9.2.1 Experiments 1 & 2: Specific negative moods and perseverative checking

The aim of experiment 1 was to examine the implications of combining stop rules, specific moods of the same valence (sadness, anxiety, and anger), and happy mood whilst performing a perseverative task. Experiment 1 employed an open-ended analogue checking task previously used to explore a mood-as-input account of perseverative checking (cf. MacDonald & Davey, 2005a,b). Results from experiment 1 did not confirm a mood-as-input account of perseverative checking when specific negative moods were combined with stop rule use. Results indicated that in the happy condition and each of the negative mood conditions, stop rule was the main contributing factor to performance. Previous research (MacDonald & Davey, 2005a) predicted that in the sad and happy conditions, stop rule would moderate the effects of mood on the checking task whereby increased perseveration would occur when those in a happy mood adopted a “feel like continuing” stop rule and those in a sad mood adopted an “as many as can” stop rule.

Experiment 2 sought to mask participants awareness of induced mood on the basis that attributing induced mood to an irrelevant source would lead to the informative value of mood being discounted (cf. Schwarz & Clore,1983; Scott & Cervone, 2002). Thus a film mood induction procedure was employed. Film was found to be an effective way of inducing moods in comparison with other mood induction techniques (Marzillier & Davey, 2005) and has the advantage that it can be embedded within an experimental procedure without obvious indication that it is a mood induction procedure. For each specific negative mood the film clips employed had been validated by Rottenberg, Ray, & Gross (2007) with the aim of eliciting specific target emotions. This study used the same analogue checking task as used in experiment 1.

Results were very similar to those in experiment 1. Stop rule was found to be a significant predictor of performance, there were no effects on mood on performance and no interaction between mood and stop rule between the positive or any of the negative emotions. However, an examination of the mood induction data revealed that in each mood condition there was a significant increase in the target mood post mood induction, thus suggesting that film was an effective way of inducing mood. One possibility why there were no effects of mood on performance is that the intensity of the induced discrete moods of the same valence was not strong enough (cf. Rottenberg et al., 2007), or that by asking participants to complete visual analogue mood scales (VAS) pre and post mood induction, it became obvious to the participant that the film was a mood induction procedure. Knowing that film did significantly increase reports of each target mood, the following experiments did not employ a pre-mood induction procedure VAS measure in an attempt to mask the purpose of the mood induction procedure.

9.2.2 Experiment 3: Specific negative moods and personal performance standards

Experiment 3 leaves the mood-as-input hypothesis aside in order to take a more fine-grained approach to examining the effects of specific negative moods on processing. The relationship between specific negative moods and performance standards was examined. Negative affect has been linked with an increase in personal performance standards (Scott & Cervone, 2002; Cervone, Kopp, Schumann, & Scott, 1994), and depression has been linked with low self-efficacy (Bandura, Pastorelli, Barbaranelli, & Caprara, 1999). If negative mood or specific negative emotions affect stop rule preference, this would have important implications for the motivational role of moods in evaluative judgement tasks, and for mood-as-input theory, which suggests that moods have no inherent motivational implications (Martin, 2000).

Participants in each mood condition completed measures of self-efficacy, evaluative judgements, and a Likert and VAS stop rule checking preference questionnaire, which included “feel like continuing” and “as many as can” subscales. Results showed no significant differences between mood conditions, apart from on the Likert “as many as can” checking stop rule preference scale

where there was a significant difference between participants in the sad and happy conditions. An examination of the means suggest that those in the happy condition adopted a stricter “as many as can” checking stop rule preference. There were no significant differences between mood groups on performance on the Likert or VAS “feel like continuing” stop rule preference scales. Correlations between mood scores and outcome measures showed some more interesting results. There were no significant correlations between either of the “feel like continuing” stop rule scales and mood measures, but there was a significant positive relationship between both “as many as can” stop rule checking questionnaires and ratings of sadness and anxiety. On measures of self-efficacy there was a significant positive correlation between happiness ratings and measures of self-efficacy and a significant negative relationship between measures of anxiety and self-efficacy. Correlational results indicate that there may be a relationship between negative mood and stricter “as many as can” checking stop rule preference, thus a higher preference for checking more thoroughly.

These findings suggest a relationship between mood and processing style where previous work has indicated that moods characterised by uncertainty such as worry or fear result in systematic processing (Tiedens & Linton, 2001) and that sadness is associated with a deliberative processing style (Ambady & Gray, 2002). However, these results are correlational in nature thus do not imply any causal relationship between mood and outcome measures. Furthermore, these findings were not supported when each mood group was examined separately. Further research would be needed to confirm that specific negative moods were affecting stop rule adoption. One possible explanation as to why there was no effect of mood on personal performance measures is that the films are an obvious source of mood change for participants. Future experiments were designed to address this issue by including a mood saliency check at the end of the experiment.

9.2.3 Experiment 4: Specific negative moods and perseverative worrying

Informational models of affect suggest that mood will be used as a source of information when making a judgement unless the source of the mood is deemed irrelevant to the task at hand, in which case information from mood will

be discounted (Scott & Cervone, 2002; Schwarz & Clore, 1983). In a bid to examine further how specific negative moods may provide information within a mood-as-input framework, it was hypothesised that the personal relevancy of the task may be important to the way in which information from moods is evaluated in the light of specified goals (stop rules) for the task. It is possible that the informative value of mood would be more pertinent when the task has personal relevancy. The specific negative moods of sadness, anxiety, and anger were induced and participants either received instructions to complete the task using an "as many as can" or "feel like continuing" stop rule. A catastrophic worry task was used as the dependent measure as it has personal relevance for the participant and has already been examined within a mood-as-input framework (Davey, Eldridge, Drost, & MacDonald, 2007; Startup & Davey, 2001, 2003). Previous findings most relevant to psychopathology were that when in a negative mood participants persevered at the catastrophising task for significantly longer when using an "as many as can" stop rule than when using a "feel like continuing" stop rule (Startup & Davey, 2001). However, these results were based on a valenced approach to mood, thus examining specific moods of the same valence was felt to be a valid extension of this work.

Results of this study indicated that there was a significant interaction between mood and stop rule whereby those in the happy condition persevered at the task longer when using a "feel like continuing" stop rule and those in the negative conditions persevered for significantly longer when using an "as many as can" stop rule as compared to a "feel like continuing" stop rule. A mood-as-input explanation of these results would suggest that being in a positive mood is indicating enjoyment of the task and thus participants who have the goal of stopping when they feel like it are choosing to persevere longer than those who have the goals of stopping when they feel they have done as much as they can of the task. Conversely being in a negative mood signals that goal fulfilment has not been met, thus those who have the goal to complete the task until they feel they have done as much as they can persevere at the task for longer than those who have the goal of stopping whenever they feel like it (Martin et al., 1993). One of the most interesting findings from this study was that each specific negative mood group performed in a very similar manner. There are two possible explanations for

these results, firstly that participants were not relying on specific information from their mood, but rather when the mood is experienced in conjunction with explicit stop rule manipulation they only rely on information from the valency of the mood (Barrett, 2006a,b; Russell, 2003; Frijda, 2001). A second possibility is that the intensity of the induced negative moods was not strong enough for participants to use information distinct to the negative mood they were induced into, thus actually the mood induction procedures induced a general feeling of negativity rather than discrete negative moods, hence there being very little difference in performance among each negative mood condition.

9.2.4 Experiment 5: Mood attribution

To examine mechanisms that may effect the way in which mood is used as information, this experiment aimed to explore whether the attribution of mood to a specific source could be experimentally manipulated. Furthermore, if mood source could be manipulated to have high or low salience, whether in the high salience condition informational value from the mood would be discounted within a mood-as-input paradigm. A false feedback manipulation was used to induce participants into high or low anger attribution conditions. Results indicated that the efficacy of the anger attribution was questionable, there was a near significant difference in anger attribution ratings between the two groups, but the corresponding effect size was small. The control (happy) condition replicated previous findings (e.g. Startup & Davey, 2001) where participants using a “feel like continuing” stop rule persevered for significantly longer than those using an “as many as can” stop rule. However, there were no significant differences in stop rule use between the anger attribution conditions. Due to the weak anger attribution manipulation a tertile split was performed to examine potential differences between high and low anger attribution groups. These results indicated that stop rule may be moderating performance in the low anger attribution group, but not the high attribution group, as would be expected if high anger attribution resulted in the mood source being highly salient and mood being discounted as an irrelevant source of information to the concurrent task. However, these results are purely exploratory and no firm conclusions can be drawn until a robust attribution manipulation is developed.

9.3 Overview of Findings

In a bid to further examine mechanisms underlying perseverative psychopathologies this research has explored the role of specific negative moods in a mood-as-input model of perseveration. Hypothesising that the personal relevancy of a task may be an important factor in the way that specific negative moods are used as information, using a catastrophic worry task replicated previous results (cf. Startup & Davey, 2001). In the sad condition those in a sad mood persevered at the task for significantly longer when using an "as many as can stop rule" as compared to a "feel like continuing" stop rule, conversely in the happy condition those using a "feel like continuing" stop rule persevered for significantly longer than those using an "as many as can" stop rule. These findings support a mood-as-input model whereby mood itself is not linked with specific processing styles, but only has implications for perseveration when interpreted in light of the task related goals (Martin et al., 1993). Interestingly those in an anxious and angry mood produced the same pattern of results as those in a negative mood in Startup & Davey's (2001) study. Two possible explanations are discussed, firstly that participants are not using information specific to discrete negative moods, rather they are relying on valenced information, which is proposed to be at the core of all emotional responding (Barrett, 2006a,b; Russell, 2003; Frijda, 2001). A second possibility is that rather than inducing discrete negative moods of sufficient intensity, the mood induction procedure induced a general feeling of negativity, hence similar performance in each negative mood condition.

Concerning compulsive checking, previous findings (MacDonald & Davey, 2005a,b) were not replicated, there was no interaction between happy mood and stop rule, or any of the negative moods. Examining the relationship between moods and personal performance standards, including a measure of checking stop rule preference did not reveal consistent results. Examining the difference between happy, sad, and anxious moods on the results indicated only that the happy condition had a significantly higher "as many as can" checking stop rule preference. Conversely, examining correlation suggested positive significant relationships between sadness and anxiety on both "as many as can" scales. This

indicates that negative moods may lead individuals to check more thoroughly, a finding that is consistent with research linking negative moods and systematic processing (e.g. Ambady and Gray, 2002; Tiedens & Linton, 2001). However, these relationships are correlational in nature thus no causal relationships can be inferred between moods and outcome measures.

In a bid to better understand the mechanisms which moderate the informational value of mood, the final study examined mood saliency. If a mood source is highly salient and deemed to be irrelevant to the task at hand the informational value of mood is reportedly discounted (Scott & Cervone, 2002; Schwarz & Clore, 1983). If mood attribution could be manipulated, thus creating high and low specific mood attribution groups, one could examine how mood is used as information in the light of goals (stop rules) dictated for the task, examining also whether attribution of mood moderated performance on a catastrophic worry task. However, the attribution manipulation was not robust and there were no differential effects observed by those in an angry mood depending on stop rule use of mood attribution condition. No firm conclusions were drawn from this experiment.

In summary, while the experimental work in this thesis does not provide conclusive evidence about the role of specific negative moods in a mood-as-input framework, it does raise some interesting questions about how the structure of affect may influence the informational role of mood. One must also question the generalisability of the mood-as-input theory to specific moods of the same valence. Furthermore, it is possible that methodological issues with mood induction procedures have masked potential specific effects of discrete negative moods on perseveration, or that mood-as-input theory explains perseveration at a valenced level. These points will be discussed below.

9.4 Theoretical Implications

9.4.1 The Structure of Emotion

Before proceeding to examine the implications of the current results for mood-as-input theory it is first necessary to discuss theories examining the

structure of emotion, and consider how these may relate to findings in this thesis. When examining how people use specific emotions as a source of information in evaluative judgements, one must also have an understanding of the structure of emotion. As discussed in chapter 1, historically the emotion debate had two main camps, firstly those who believed that emotional life could be reduced to a set of irreducible basic emotions such as sadness, anxiety, and anger etc., which were believed either to have a biological basis (e.g. Johnson-Laird & Oatley, 1992; Tooby & Cosmides, 1990; Izard & Malatesta, 1987; Plutchik, 1980; Izard, 1977, 1989), or to be basic in the sense that they are psychologically irreducible (Ortony & Turner, 1990). The second predominant view were dimensional accounts of emotion, these suggest that basic emotions are reducible to core affective properties. Here emotion was commonly represented by a two dimensional structure, although there was some theoretical disagreement about what the two dimensions represented, for example Watson & Tellegen (1985) proposed positive and negative affect as two dimensions and Russell (1980) proposed that valence and activation represented core affect.

The experiments within this thesis have used mood induction procedures with the aim of inducing discrete negative emotions. Measures in changes of baseline to post induction mood in experiments 1 & 2 for both type of mood induction procedure suggested a significant increase in the target mood after the mood induction. However, given that experimental data showed little evidence of differences in performance depending on the specific mood being experienced, one must consider potential explanations for these findings. One such explanation relates to the structure of emotion. More recent theorising has focused on the view that valence is the elementary construct of emotion (Barrett, 2006c). This view is echoed by Frijda (2001) who proposes that the core elements of emotions are pleasure and pain. Similarly, Russell (2003) suggests that emotions are constructed experiences, at the heart of which is core affect. From this view specific emotions are constructed experiences, but what they all have in common is valence. Bearing this in mind, one possible explanation for the results of experiment 4 is that participants rely on mood valency as a source of information rather than on emotion specific information. An alternative explanation relates to methodological procedure. It is also possible that participants experience a general

feeling of negativity more strongly than the specific negative mood the induction was intended to induce. This possibility will be discussed in more depth when considering methodological issues.

9.4.2 Specific Negative Moods and Processing

The results of experiment 4 (as discussed above) show that participants in a sad, anxious, or angry mood condition produced a similar pattern of results when participants were asked to perform the catastrophic worry task using either an “as many as can” or “feel like continuing” stop rule. Having examined how literature concerning the structure of emotion can be related to the results of this thesis, one must also consider evidence which indicates that specific emotions of the same valence can have different implications for performance. There is a growing body of research on effects of discrete moods on processing. Appraisal theorists (e.g. Frijda, 1986; Lazarus, 1991; Smith & Ellsworth, 1985) suggest that depending on how an event is appraised, the same event could give rise to different emotions. Lerner & Keltner (2000) suggest that emotions of the same valence can be characterised by differing antecedent appraisals that result in emotions of the same valence having different influences on judgements or processing. This does not deny that valence is at the core of emotional responding. In fact the cognitive appraisal view of emotions is compatible with structural accounts of emotion which suggest that core affect is a building block from which specific emotions are psychologically constructed depending upon what an event is attributed to and how it is appraised (Russell, 2003).

However, leaving the subject of core affect aside, there is evidence to suggest that different emotions of the same valence can result in different evaluations and judgements. Appraisal theorists have demonstrated that anger and fear result in different appraisals of risk due to anger being characterised by feelings of certainty and fear by feelings of uncertainty (Lerner & Keltner, 2000). Furthermore, specific negative emotions have also been shown to prime different goals. Raghunathan & Pham (1999) found that inducing individuals into a sad or anxious mood led those in a sad mood to opt for a high risk/high reward gambling option as being in a sad mood motivated the goal of reward replacement, while those in an anxious mood opted for a low risk/low reward option in order to

achieve the goal of uncertainty reduction. Thus the question arises as to why there was no difference in performance by individuals in different specific negative moods.

Experiment 3 of this thesis is ideally suited to examine the effects of differences in specific negative moods on performance. Within a mood-as-input paradigm one could argue that by specifying a stop rule for the task, this could be over-riding processing implications that are specific to discrete negative moods. However, experiment 3 sought to examine whether specific emotions may implicitly affect goal stringency for a task and personal performance standards. Negative affect has been found to induce higher performance standards in both social and academic situations, but had no effect on self-efficacy appraisals (Scott & Cervone, 2002; Cervone, Kopp, Schaumann, & Scott, 1994). However, both Scott & Cervone and Cervone et al. examined a general negative valency. In experiment 3 both sadness and anxiety were induced to examine whether these specific moods would have different implications for performance standards.

Ambady & Gray (2002) suggest that sad mood is associated with a deliberative processing style, thus one may expect participants in a sad as opposed to happy mood to adopt a stricter "as many as can" approach to checking, in keeping with a more detailed systematic processing style. However, when comparing ratings of sad or anxious groups on the two checking stop rule measures, there were no significant differences between groups on any of the stop rule preference measures. Unexpectedly those in the happy condition indicated a significantly higher "as many as can" checking stop rule preference than those in the sad condition. However, this was using the Likert version of the questionnaire and was not replicated on the VAS version. As there were also no significant differences between mood groups on evaluative judgement ratings or self-efficacy questionnaires, these results suggest that neither mood valency, nor differences between the specific negative moods of sadness and anger, had differential effects on stringency related to "as many as can", or "feel like continuing" stop rule checking preference.

The strong version of the mood-as-input hypothesis predicts that mood *per se* has no specific implications for performance unless the context or task related

goal in which the mood is being experienced is also taken into account (Martin, 2000). In this view, one would not expect induced emotions to have specific implications for performance. However, this does not explain why previous studies (e.g. Ambady & Gray, 2002; Lerner & Keltner, 2000) did find differences in processing style when specific negative moods were induced. In experiment 3 there was some correlational evidence that suggested a relationship between sad and anxious mood scores and higher "as many as can" checking stop rule preference. However, these results are correlational in nature and no causal relationship can be inferred. One other possible implication for the effects of mood on processing is that there were largely no observed effects between different mood groups on each measure as the mood induction procedure made the source of the mood highly salient and thus mood was discounted as information relevant to the task at hand (cf. Scott & Cervone, 2002; Schwarz & Clore, 1983).

9.4.3 Mood Saliency

One of the key hypotheses of mood-as-input theory is that the informational value of mood can change depending upon the context in which a mood is experienced (Martin, 2000). This differs from other accounts such as mood-congruency models (Mayer, Gaschke, Braverman, & Evans, 1992; Bower, 1981) where there is assumed to be a match between the valence of one's mood and one's cognitions. The mood-as-information model (Schwarz, 1990; Schwarz & Clore, 1983, 1988) also suggested that individuals use their affective response to a target as a source of information. However, the mood-as-information model notes an important caveat in that if the source of one's mood is attributed to a salient source that is deemed irrelevant to the task at hand, then the experienced mood will be discounted as a source of information (Schwarz & Clore, 1983).

The mood-as-input hypothesis makes no specific predictions about whether the saliency of a mood can affect the informative value of that mood. Indeed when examining the efficacy of different types of mood induction procedure Marzillier & Davey (2005) found that when using music and vignettes, despite asking participants to enter into a specific mood, thus making the source of any induced mood highly salient, participants' mood ratings indicated that each

target mood had increased significantly post induction. Experiment 1 of this thesis used a music and vignette mood induction procedure, here mood appeared not to be used as a source of information when combined with stop rule deployment. One possible explanation for this was that due to asking participants to try to enter into each specific mood, the saliency of the mood was high and thus it was discounted as a source of information (cf. Scott & Cervone, 2002; Schwarz & Clore, 1983). In a second experiment an attempt was made to mask the mood induction procedure by using film. However, as before, there were no effects of mood or mood and stop rule interaction on task performance.

As highlighted by Clore et al. (2001) the immediacy principle states that the relationship between mood and cognition will not be observed if feelings are not attributed as being relevant to current events. One possibility is that the checking task used in experiments 1 and 2 was not deemed by participants as being personally relevant thus any induced mood was not used as information. Interestingly, when using a catastrophising task (experiment 4) which asks the participant about their current worries and thus is considered to be more personally relevant, mood induced through the use of film did appear to be used in conjunction with stop rule to affect performance. However, this was possibly at a valenced level rather than specific moods providing specific information in a mood-as-input framework. Yet despite there being an effect of mood and stop rule on a catastrophic worry task, when participants were asked post-experiment what they thought the purpose of the film was in the experiment, the majority (70% being the lowest rating out of each condition) of participants in the sad, anxious, angry, and happy (but not neutral) condition believed the purpose of the film was to change mood. These statistics suggest that the source of any mood change would have been obvious to the majority of participants, yet mood still appeared to be used as a source if information. From this one could conclude that the mood discounting hypothesis (Scott & Cervone, 2002) whereby the informational value of mood is perceived as being irrelevant may not apply to tasks which hold high personal relevance to the individual.

Evidence also suggests that individual difference plays a role in the extent to which individuals rely on their affective states when making judgements and

decisions. Just as Barrett (2006b) highlights individual differences in emotional granularity (the ability to identify and label discrete emotion terms and experiences), Gasper & Clore (2000) found individual differences in emotional attention. Gasper & Clore demonstrated that mood saliency affected how individuals used their mood as a source of information depending on whether they were high or low in emotional attention. When people were high in emotional attention and had their attention drawn to an induced mood, their mood no longer influenced their judgements of risk. However, when people were low in emotional attention and the source of their mood was made highly salient, their risk judgements were influenced by mood. These findings suggest that when those high in emotional attention focused on their affect it no longer seemed relevant as a basis for judgement, yet for those low in emotional attention the opposite was true. It appears that the level of felt affect is not important, rather it is the apparent relevancy of the mood, thus the way that affect is attributed that can result in the way that mood is used as information in judgemental tasks (Gasper & Clore).

Experiment 5 attempted to address the issue of mood saliency by inducing participants into an angry mood and then giving participants feedback as to whether anger was an emotion that often had an obvious source (thus drawing them to look for and identify the film as a source of mood change), or in the low attribution group participants were given information that anger often occurred without obvious motive or cause. It was hypothesised that when mood source was made highly salient, previous observed mood-as-input effects whilst in an angry mood (experiment 4) would no longer occur. There was a marginally significant difference in ratings of anger attribution manipulation, yet there was no significant difference in performance on a catastrophic worry task between those using an “as many as can”, or “feel like continuing” stop rule in either of the anger attribution conditions. One finding of note is that when asked at the end of the experiment, in retrospect 97.5% of participants in the anger condition indicated that they believed the purpose of the film was to induce mood, yet there was a marginally significant difference in the extent that anger was rated as being attributable to a specific cause. There are several possible accounts for this finding, either as suggested by Gasper & Clore (2000), mood saliency itself is not important, it’s whether feelings are deemed relevant to the task at hand which influences how they are used as

information. A second possibility is that demand characteristics were responsible for the difference in ratings as these ratings were taken directly after participants had read a high or low anger attribution manipulation. Finally it is possible that there was a marginally significant difference in feelings of anger attribution between the two groups, but by the end of the experiment the design of the study alerted to participants that the focus of the study was on mood, but it was only retrospectively that participants recognised the film as being a part of a design to change emotion.

9.4.4 Implications for The Mood-as-Input Hypothesis

The mood-as-input model (Martin & Davies, 1998; Martin, Abend, Sedikides, & Green; Martin & Stoner, 1996; Martin, Achee, Ward, & Harlow, 1993; Martin, Ward, Achee, & Wyer, 1993) makes no predictions about relations between mood and processing styles, rather mood is assumed to have implications for processing depending on the context in which a mood is experienced (Martin, 2000). The mood-as-input model makes some very specific predictions about the context dependent nature of mood. For example, mood congruency models such as the mood-as-information model assumes that individuals seek to maintain positive moods and avoid negative moods. It is thus assumed that individuals would be more likely to search for a cause of an experienced negative mood and attribute felt negative mood to a source unrelated to the target being evaluated, this being known as the discounting hypothesis (Schwarz & Clore, 1983). However, the mood-as-input hypothesis suggests that rather than seeking to maintain positive moods, individuals seek to maintain positive outcomes, which Martin suggests can be fulfilled when in a negative mood.

The mood-as-input model assumes that mood is part of a configural processing system (Martin, 2001; Martin & Davies, 1998). In this sense, unlike other information models which assume that individuals use their current mood to assess a target by asking “How do I feel about it?” (Schwarz & Clore, 1988), the mood-as-input model suggests the individual will asses the implications of feeling a certain way within the current context. In this way mood is considered to be part of a configural processing system where mood only has implications for

processing depending on the current goals or stop rules that are specified for a task (Martin & Davies).

As discussed in chapter 2 the mood-as-input model suggests that mood provides information regarding whether goal fulfilment has been achieved in relation to a target. Martin et al. (1993) demonstrate how the same mood can have different implications for performance depending on the goal or stop rule specified for that task. For example, Martin et al. suggest that when in a negative mood and working under the instruction to complete a task until they thought it was a good time to stop, those in a negative mood persevered for longer at the task than those in a positive mood, conversely, when given the instructions to stop when they were no longer enjoying the task, those in a negative mood spent less time on the task than participants in a positive mood. Martin et al. suggested that the same moods can have different implications for tasks as participants are asking "Have I done enough to reach my goal?". Here positive mood is assumed to signal progression towards a goal whereas negative moods signal a lack of accomplishment (Martin, 2000; Cervone, Kopp, Schaumann, & Scott, 1994). Thus when assessing whether it is a good time to stop, a positive mood is likely to signal that one has done enough, rather than a negative mood which would signal that one has not done enough to warrant stopping the task (Martin et al.).

In summary, the mood-as-input model moves away from the concept that mood is intrinsically linked to certain processing styles to place mood within a configural processing system whereby mood is used to assess goal achievement (Martin, 2001). The current research sought to further information regarding the context dependent nature of mood by examining specific negative moods in different contexts. Building on the application of the mood-as-input hypothesis to perseverative psychopathologies where negative mood and a perseverative thinking style have been found to result in increased perseveration on both perseverative worrying (Startup & Davey, 2001; 2003) and checking (MacDonald & Davey, 2005a,b), the next section will examine how results from experimental work in this thesis has assessed the role of specific negative moods in different contexts using perseverative worrying and checking tasks.

9.4.5 Specific Negative Moods and Mood-as-Input Theory: Theoretical Implications

The experimental work in this thesis examined how specific negative moods, when experienced in conjunction with specific stop rules affected perseverative tasks. Startup & Davey (2001), Watkins & Mason (2002), and MacDonald & Davey (2005a) examined the effects of negative and positive mood in conjunction with "as many as can" or feel like continuing" stop rule use on perseverative worrying, depressive rumination, and perseverative checking respectively. Of most theoretical interest concerning psychopathology is that increased perseveration occurred on catastrophic worrying tasks, depressive rumination, and checking tasks when participants were in a negative mood using an "as many as can" stop rule (MacDonald & Davey; Watkins & Mason; Startup & Davey). A mood-as-input explanation of these findings would suggest that when performing a task, the goal of which is to continue until they have done as much as possible ("as many as can"), concurrent negative mood signals to the individual that they have not exerted enough effort to fulfil that goal, thus they persevere for longer than somebody in a negative mood using a "feel like continuing" stop rule. In this way mood has no inherent implications for performance, but only has motivational implications depending on the context in which it is experienced (Martin, 2000; Martin & Davies, 1998).

Experimental work by a number of theorists which has already been discussed in some depth (e.g. Lerner & Keltner, 2001, 2000; Raghunathan & Pham, 1999; Smith & Ellsworth, 1985) infer that specific emotions of the same valence are characterised by differing appraisals or prime different goals. DeSteno, Petty, Rucker, Wegener, & Braverman (2004) indicate that experiencing distinct emotions should result in their differential influences on cognitive and motivational processes. Thus one of the key questions concerning results presented in this thesis is why there were no differential effects of specific negative moods when they were experienced within a mood-as-input framework. The present experimental work showed that specific negative moods appeared to interact with different configurations of stop rule when using a personally relevant catastrophic worry task, however, each specific negative mood produced a similar

pattern of results when experienced in conjunction with an “as many as can” or “feel like continuing” stop rule. As hypothesised above it is possible that participants experienced the specific negative emotions, yet when stop rule deployment is added into the equation, specific appraisal patterns or goals that are related to specific emotions are over-ridden as a goal has already been provided for the task. Thus participants simply rely on the valence of the emotion as a source of information. Another possibility is that mood induction procedures were not of adequate intensity and in each case what was actually induced was a general feeling of negativity, hence the similar pattern of results in each negative mood condition. This point is further strengthened by the high levels of comorbidity known to exist amongst specific moods of the same valence (e.g. Watson, O’Hara, & Stuart, 2008). This possibility will be discussed in more depth when limitations of mood induction procedures are examined.

A final implication for the effects of specific negative emotions in a mood-as-input framework is the difference between moods and emotions. Throughout this thesis the terms mood and emotion have been used interchangeably, as is common in emotion literature. In chapter 1 the distinction between the terms mood and emotion is considered. Siemer (2005) notes that in contrast to emotions, moods are diffuse and global and lack intentionality. Furthermore, Siemer (2001) differentiates between moods and emotions indicating that while a mood not need be about anything, emotions involve one’s current feelings in conjunction with what the feeling is about. Although mood induction procedures appeared to be successful at increasing the target mood, an examination of mood saliency measures in experiments 4 and 5 indicate that the majority of participants who experienced a specific mood induction (yet not those in the neutral induction in experiment 4) believed that the purpose of the film was to alter mood state. This suggests that the majority of the participants who underwent a mood induction procedure may have been aware that they felt angry or sad about the film they had seen. One could suggest that information specific to discrete emotions may have been disregarded for the catastrophic worry task as being obviously linked to the film (cf. Scott & Cervone, 2002; Schwarz & Clore, 1983) and that participants may have been influenced by a more subtle feeling of valency which would be

less obviously linked to the films and is easier to induce in a laboratory setting than specific emotions (Rottenberg, Ray, & Gross, 2007).

In relation to psychopathology, this research supports previous mood-as-input findings (e.g. Startup & Davey, 2001) on catastrophic worrying, indicating that at a valenced level the influence of mood on catastrophising is dependent upon the context in which it is experienced. As noted by Watkins (2008) there is a link between perseverative thinking styles, negative affect and vulnerability to depression and anxiety. Current findings indicate that it is probable that experienced negative valency, rather than feeling that one is in a specific negative emotional state is sufficient to result in increased catastrophic perseveration when accompanied by a perseverative thought style. This work may be more usefully followed up using a clinical population in order to further study how feelings of negativity and specific accompanying thought patterns manifest in perseverative psychopathologies. Ideas for future research will be discussed later in the chapter.

In summary, the most interesting issues arising from this experimental work relates to the informational value of specific negative moods. In a mood-as-input paradigm using a personally relevant task, specific negative moods appeared to provide similar information in relation to the specified goals for the task. Research does indicate that specific negative moods do provide specific information (e.g. Tiedens & Linton, 2001; Lerner & Keltner, 2000; Raghunathan & Pham, 1999). Yet this was not observed within a mood-as-input paradigm. In light of evidence which suggests that specific emotions are normally directed at something as compared to moods, which are considered to be more diffuse and lack intentionality (Siemer, 2001, 2005), there are two possible explanations for the current results. One possibility is that information from specific emotions was discounted as the source of mood change was highly salient. A second possibility relates to the structure of moods and emotions. If as suggested by Barrett (2006b,c), Russell (2002), and Frijda (2001) valence is one of the core properties of emotional responding, in an experimental mood-as-input paradigm where goals for the task are specified, information specific to negative moods may have been dismissed either by explicitly asking participants to deploy certain stop rules, or due to the obvious nature of the specific mood induction procedures. If this is the

case then it is more likely that participants would have been relying on a base level of mood valency as with previous mood-as-input and catastrophic worry studies (Startup & Davey, 2001; 2003). Indeed it is possible that the mood-as-input explanation of perseverative psychopathologies does not generalise to specific negative emotions, rather it explains pathological perseveration at the level of mood valency and stop rule deployment.

9.5 Limitations of the Current Research

The studies included in this thesis were designed to further knowledge about mechanisms underlying mood-as-input accounts of perseverative psychopathologies by examining how specific negative moods are used as information in a mood-as-input framework. The nature of the results has meant that few firm conclusions can be drawn from the data. This of course may be indicative of theoretical issues such as the way that mood is used in conjunction with stop rule to result in perseveration. However, certainly there are numerous methodological issues that need to be taken in account in relation to the experimental findings.

9.5.1 Mood Induction Procedures (MIPs)

There are various implications for the validity of data when performing mood inductions in an experimental setting. One obvious drawback is that inducing mood in a laboratory setting lacks the ecological validity of naturally occurring mood states. However, in order not to forego the controlled environment of a laboratory setting, it is necessary to control for other variables that may interfere with naturally occurring mood, especially taking into account experiments such as those conducted in this thesis where one is attempting to induce multiple emotions. Another issue concerning ecological validity is that induced mood can dissipate more rapidly than naturally occurring mood. Mood dissipation was examined in experiment 1. Comparing two mood MIPs data showed that there was a significant increase in each target mood between baseline and post-induction mood measures when using a music and vignettes induction (Mayer, Allan, & Beauregard, 1995) and using a film MIP (Rottenberg, Ray, & Gross, 2007; Gross & Levenson, 1995). However, there was also a significant

decrease in each induced target mood between the post-MIP measure and the pre task mood measure using both MIP techniques. It is possible that this decrease in intensity in induced mood contributed to the finding that specific moods did not have differential effects on performance in conjunction with stop rule use on the checking task. Having established that the film MIP induced target discrete moods, from experiment 3 onwards, no baseline mood measure was taken in order to mask the film as a mood induction procedure and only one mood measure was taken pre-catastrophising task. It is possible that reducing the amount of time between mood induction and perseverative task meant that mood dissipated less and was used as information if not a specific mood level, then at a valenced level. Hence finding an effect of mood and stop rule on the catastrophic worry task, but not the checking task.

A further issue concerning MIPs relates to eliciting specific emotions of the same valence. Using a film MIP, comparing baseline to post MIP mood measures indicated that each target mood had increased significantly. However, when attempting to induce discrete emotional states, it is inevitable that discrete emotions of the same valence will not occur in an entirely discrete manner. Watson et al. (2008) note a high correlation between specific negative moods, especially between depressed and anxious moods. Furthermore some discrete negative moods seem to be more difficult to induce than others. Both Rottenberg et al. (2007) and Gross & Levenson (1995) report that fear/anxiety and anger are difficult emotions to induce in a laboratory setting. Gross and Levenson indicate that rather than MIPs being inadequate, anger naturally co-occurs with other negative emotions, thus making a discrete anger induction a challenge with many MIPs. Rottenberg et al. also suggest that to induce anger may require high levels of personal engagement, again, something that is difficult to induce in a laboratory setting through the use of film or music. Due to difficulties in inducing discrete negative emotions, one possibility that is mentioned above, but needs to be considered within a discussion on the limitations of MIPs is that rather than participants in different mood conditions performing in a similar manner on the catastrophic worry task due to a reliance on underlying mood valency, the mood induction procedure actually only induced a general feeling of negativity. However, due to the naturally high co-occurrence of some negative emotions, it

remains difficult to examine specific emotions of the same valence in a laboratory setting.

9.5.2 Analogue Participants

Using an analogue or non-clinical population to explore mechanisms of psychopathology has both negative and positive implications. Ideally one would use a clinical population to research mechanisms of perseverative psychopathologies explored in this thesis such as Obsessive Compulsive Disorder (OCD) and Generalised Anxiety Disorder (GAD). However, although results concerning perseverative checking were inconclusive, certainly in some areas of this thesis such as experiment 4, perseverance at a catastrophising task occurred under conditions that most closely resembled catastrophic worrying such as increased negative affect (Frost, Sher, & Green, 1986) and ruminative thought patterns such as the "What if…?" questioning style identified by Kendall & Ingram (1987). Furthermore, as noted by Davey, Startup, Zara, MacDonald, & Field (2003), results using a non-clinical sample in earlier studies that examined mechanisms underlying non-clinical circumstances (Martin et al., 1993) and later studies which extended the same mechanisms to catastrophic worry (cf. Startup & Davey, 2003; 2001) and compulsive checking (cf. MacDonald & Davey, 2005a.b) suggests that these same mechanisms may be consistent with behaviour in a clinical population.

There are also some advantages of using a non-clinical sample. In a university research setting, recruitment of participants is easier than in a clinical setting. Having a large, transient participant pool allows multiple studies to be carried out whilst maintaining participant naivety to the experimental design. Furthermore, using an analogue population allows for the extrapolation of laboratory research that has been carried out under controlled conditions to therapy (Kazdin, 1978). One problem that arises from using a clinical population is that participants may also be receiving other therapy or drug treatment alongside the treatment being investigated, thus introducing confounding variables (Costello, 1994; Kazdin). However, while Kazdin suggest it is useful to extrapolate findings from a non-clinical population to a clinical one, Rakover (1980) suggests that a more useful approach is to use findings from an analogue

population then test them in a clinical population thus allowing for the interaction of conflicting variables rather than assuming a continuum in the generalisability of findings. Erwin (1999) argues that one of the fundamental problems with studying psychopathology and then generalising to therapeutic methods is that laboratory studies using an analogue population are usually performed on a group of people, yet research is then extrapolated to individual clients. Rather than dismissing experimental group research, Erwin suggests looking at alternative outcomes from the experiments to determine more about the disorder. Thus for example, rather than looking at who responds to treatment, looking at who does not respond.

In conclusion, previous mood-as-input studies (e.g. MacDonald & Davey, 2005a.b; Startup & Davey, 2001, 2003) have demonstrated that perseverative behaviour in a non-clinical sample occurs under conditions that most closely resemble psychopathology. Costello (1994) suggests that psychopathology is a continuum with clinical symptomatology experienced as more intense, but not qualitatively different to symptoms that can occur in an analogue population. If this is the case then exploring mechanisms and symptomatology of psychopathology is a valid pursuit that avoids issues arising with a clinical population such as comorbidity of disorders and ongoing drug treatments. However, Rakover (1980) suggests a more cautious approach of identifying phenomenon that may relate to psychopathology in an analogue population and then rather than simply generalising these results to psychopathology, using the findings to examine whether they can be confirmed or falsified in a different situation, for example a clinical population.

Due to previous success in using an analogue population to examine mood-as-input theory and the need for a large experimental base of participants, an analogue population has been used in this thesis.

9.6 Further Studies

Results from studies described in this thesis raise some interesting questions that could be addressed in future research. Experiments 1 & 2 failed to show any mood-as-input effects on a checking task. This task has been used previously to successfully demonstrated mechanisms that underlie perseverative

checking (cf. MacDonald & Davey, 2005a,b). However, mood-as-input effects using specific negative emotions were found on a personally relevant checking task. It is possible that specific negative emotions do not provide information beyond that of valency in a mood-as-input framework. However, the effects of mood saliency on the informational value of mood remains unclear. Future research could improve upon masking of mood induction procedures by using autobiographical recall or cognitive priming techniques. Thus enabling examination of the effects of specific negative moods in a mood-as-input context where the participant is unaware of an obvious mood source. However, again one may encounter difficulties in attempting to induce discrete negative moods in a covert fashion given that the literature suggests that specific emotions are normally orientated at something (Siemer, 2001).

Moving away from explicitly manipulating mood, further research could explore mood and stop rule preferences in a clinical population. Worry stop rule checklists could be completed by those suffering from GAD, followed by a catastrophising task (with ethical approval obtained). Mood measures could be taken pre, post, and at every two steps throughout the catastrophising procedure. This would give an indication of which naturally occurring specific negative moods were elevated at the outset, during, and end of a worry bout. Insight into whether there was high comorbidity of different negative moods could be gained and one would also overcome problems surrounding dissipation of induced affect.

One further issue of interest from the experimental work in this thesis is why participants persevered at a worry task for significantly longer when in a positive mood using a “feel like continuing” stop rule than an “as many as can” stop rule. If one is feeling happy and aims to stop whenever they feel like it, it would seem surprising that they should want to continue to generate worrying thoughts. One could argue that in an analogue population, talking about a current worry whilst in a happy mood is not overly distressing and thus the participant is to an extent ‘enjoying’ working through the problem. Thus far the combination of negative mood and an “as many as can” approach to a task has been focused upon due to its resemblance to pathological perseveration. However, future research

may consider how a positive mood and a “feel like” approach may link into other areas of psychopathology such as addictive behaviours or risk taking.

9.7 Final Conclusions

The research discussed above has interesting implications for an understanding of the role of mood in a mood-as-input explanation of perseverative psychopathologies. In an attempt to elucidate mechanisms that underlie perseverative psychopathologies the mood-as-input theory has examined how configurations of mood valency and stop rules, plus other variables such as responsibility in both catastrophic worry (Startup & Davey, 2003) and obsessive checking (MacDonald & Davey, 2005a) influence perseveration. Current research suggests that specific negative moods have distinct appraisal patterns (Lerner & Keltner, 2000) and distinct influences on decision processes (Raghunathan & Pham, 1999). However, in the present work, when specific negative moods were experienced with concurrent stop rules, performance by each negative mood group was similar.

One of the unique features of the mood-as-input model as is that it makes no predictions about the effects of moods on processing (Martin, 2000; Martin & Davies, 1998). Experimental work discussed in this thesis showed no differences on performance when using a perseverative worry task between specific negative moods when experienced in conjunction with stop rules, thus supporting a mood as-input account of psychopathology and that specific negative moods are a maintaining factor in perseverative psychopathologies. However, alternative possibilities are considered. For example, by examining emotions in a mood-as-input framework where the experimental design designates a stop rule to the individual, it is possible that participants use a more general feeling of valency when also computing a specific rule related to the task. One also cannot discount the possibility that mood induction procedures induced a greater overall feeling of negativity than each specific negative mood. Hence the need for future research as discussed above to replicate this result, and if possible increase intensity of specific induced moods to further explore the effects of valency in relation to specific emotions and their roles in perseverative psychopathologies.

Future research in this area will necessitate valid and reliable mood induction procedures (MIP). The effectiveness of film as a mood induction technique was explored in this thesis, and although mood induction techniques have been discussed at some length, the topic merits some final considerations. Film was found to significantly increase target moods from baseline to post induction measures. As discussed previously, films are considered to be high in ecological validity due to the use of dynamic audio and visual stimuli, which Gross & Levenson (1995) suggest is similar to the way in which many emotions are evoked in daily living. Further key strengths of a film MIP relate to the ease with which film clips can be embedded into an experimental scenario and thus also the option to mask the film as a MIP. However, when using film in an experimental scenario, one must also be aware of potential semantic priming effects. While emotions of the same valence may be difficult to induce in a truly discrete manner, this seems also to be a reflection of how emotions occur outside of the laboratory. In conclusion, an increase in the availability of validated film clips and the ease with which film can be embedded into an experimental paradigm suggests that it will remain a valuable experimental tool.

Finally, what are the clinical and diagnostic implications of the experimental work discussed in this thesis? As discussed in some detail, negative mood and perseverative thought patterns are symptomatic of a number of psychopathologies including depressive rumination, generalised anxiety disorder, and obsessive compulsive disorder. Mood-as-input theory has the potential to make a valuable clinical contribution in seeking to further knowledge about mechanisms that underpin perseverative psychopathologies, rather than examining disorders in isolation. This may have also have implications for diagnosis if one acknowledges that vulnerability factors for one disorder may also underlie other psychopathologies. With the introduction of the Improving Access to Psychological Therapies Program (IAPT) across the NHS, the focus is on developing effective interventions that can be used in primary care settings. A greater understanding of the mechanisms that underpin common perseverative psychopathologies will help to shape and improve therapeutic interventions.

10 References

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11 APPENDICES

A: Debriefing sheet

B: “Feel like continuing” stop rule instructions

C: “As many as can” stop rule instructions

D: Pilot study: Happy mood induction

E: Checking task instructions

F: Checking task

G: Anger attribute true-feedback information

H: Anger attribution false-feedback manipulation

I: Anger attribution visual analogue scales

J: Likert scale checking stop rule preference questionnaire

K: Ethics approval form

L: Mood feedback sheet

11.1 Appendix A: Debriefing sheet

Mood As Input and Perseveration Experiment

Debriefing

You have participated in a study looking at the effects of mood and stop rules on a perseverative task. The study hopes to demonstrate that combinations of mood type and use of different stop rules can influence how many items are listed in the interview.

If you found some of the subjects discussed distressing, you may wish to contact the

University of Sussex Psychological Counselling Services:
01273 678156 during office hours, or leave a message on the confidential 24hr phone.

Health Centre Building
University of Sussex
Falmer
Brighton
BN1 9RW

If you have any further questions please contact Frances Meeten at:
Fmm21@sussex.ac.uk

11.2 Appendix B: Feel like continuing stop rule instructions

As you take part in the task, please ask yourself

"Do I feel like I want to continue looking for errors in the text?"

If the answer is "**Yes**" then continue to proof read the passage. If the answer is "**No"** stop. There is no right or wrong time to stop. Keep reminding yourself of the goal for your task as you continue. Your goal is:

"Do I feel like I want to continue looking for errors in the text?"

Stop when you feel you no longer enjoy doing the task.

11.3 Appendix C: As many as can stop rule instructions

As you take part in the task, please ask yourself

"Have I reached the goal of finding and correcting <u>ALL</u> the errors in the text that I can?"

If the answer is "**Yes**" then stop. If the answer is "**No"** then continue proof reading the passage. There is no right or wrong time to stop. Keep reminding yourself of the goal for your task as you continue. Your goal is:

"Have I reached the goal of finding and correcting <u>ALL</u> the errors in the text that I can?"

Stop when you feel you have sufficiently completed the correction task.

11.4 Appendix D: Pilot study: Happy mood induction

Introduction

When measuring induced positive mood, it may be difficult to examine the effects of a mood induction procedure, given that the participant will usually enter the experiment with elevated feelings of positivity as compared to negative moods. Gross & Levenson (1995) and Rottenberg, Ray, & Gross (2007) have validated a number of film clips which are intended to induce discrete emotions. Rottenberg et al. have examined numerous positive emotions such as pleasantness and joy, however their database did not extend to a happy mood induction film. As this was required for experiments in the present research, five film clips were rated in controlled conditions to determine a suitable film clip for a happy mood induction procedure.

Method

Participants

Participants consisted of 50 undergraduates and postgraduates from the University of Sussex. Forty-four participants were female and six were male. The age range was from 18 – 32 years, the mean age of the participants was 20.42 (sd = 2.79). All participants were volunteers; the majority of participants were psychology undergraduates who took part in the research to gain course credits.

Procedure

Participants were informed that they would be asked to complete a short questionnaire, watch a film clip and then complete another questionnaire. Before starting the study, all participants were required to read and sign an informed consent form. Participants were tested in groups of ten, with each group validating a different film clip.

Stage 1

Pre-induction measures: All participants were asked to rate their current levels of sadness, happiness, anxiety and arousal on four separate visual analogue Likert 100-point scales (VAS). On each scale 0 represents not at all sad/happy etc. and 100 is extremely sad/happy.

Stage 2

Film clip: Participants were instructed that they would be watching a short film clip, which they were asked to 'please watch carefully'. Each group watched the film in the same room. Each film was projected on a large 70 by 55-inch screen, the lights were dimmed to enable participants to see the screen clearly. Group 1 watched an extract from the film Whale Rider, the clip lasted 5.39 mins. Group 2 watched an extract from The Jungle Book, which lasted 7mins. Group 3 watched an extract from Dodge Ball, which lasted 6.40mins. Group 4 watched a clip from When Harry Met Sally, this clip lasted 2.45 mins and was include as previous research (Rottenberg et al., in press) had validated the clip as being a reliable inducer of amusement. Group 5 watched a clip from the Lion King, which lasted 6.50 mins.

Stage 3

Post-film measures: Once each film had finished, the lights were turned back up and participants were asked to complete a second VAS (as above), measuring sadness, happiness, anxiety and arousal. Participants were also asked to complete a post-film questionnaire based on that used by Rottenberg et al. (2007). Key questions assessed participants' ratings of how pleasant the film was, whether they had seen the film they are validating before, and if they looked away in any scenes. Once all participants had finished, the group was debriefed and thanked.

Results

To assess which film or films are most successful at inducing a happy mood, several criteria will be considered. These being (i) differences in absolute levels of reported happiness straight after the film clip, (ii) whether there is a significant difference in reported happiness before and after the mood induction, and (iii) on the post film questionnaire, whether there is a difference between the film clips on reported anxiety, confusion, happiness, sadness and pleasantness, in relation to how the participant felt while watching the film.

Table 1 shows the mean mood ratings of sadness, happiness, anxiety and arousal immediately before and just after participants viewed the film clips

	W.R. Pre	W.R. Post	J.B. Pre	J.B. Post	D.B. Pre	D.B. Post	H.S. Pre	H.S. Post	L.K. Pre	L.K. Post
Sad	2.90 (1.82)	2.82 (1.51)	2.04 (1.49)	1.39 (1.74)	2.43 (2.54)	2.31 (2.37)	1.44 (1.25)	1.52 (1.60)	1.43 (1.81)	1.08 (1.57)
Hap	6.20 (1.42)	5.86 (1.10)	6.19 (1.54)	7.20 (1.45)	5.79 (2.43)	6.88 (2.21)	6.52 (1.15)	7.20 (1.45)	6.27 (2.05)	7.22 (1.63)
Anx	2.64 (2.30)	2.24 (2.24)	2.64 (1.98)	1.98 (1.85)	2.40 (2.00)	1.01 (1.24)	2.70 (2.34)	1.80 (2.54)	1.41 (1.81)	0.86 (1.61)
Aro	3.95 (2.15)	4.53 (1.88)	5.89 (2.73)	6.34 (2.20)	4.89 (2.07)	6.69 (2.30)	5.24 (1.98)	6.09 (1.72)	5.14 (2.37)	5.57 (2.28)

Key: W.R. = The Whale Rider, J.B. = The Jungle Book, D.B. = Dodge Ball, H.S. = When Harry Met Sally, L.K. = The Lion King

Differences in happiness pre and post film

To examine whether the film clips actually increased levels of reported happiness, five repeated measures t-tests were performed to examine the difference in happiness before and after the film clip for each film group. For film W.R. there was no significant difference between levels of reported happiness pre and post film induction [t (9) = .97, p = .36]. For J.B., happiness was significantly higher at time 2 than at time 1 [t (9) = -2.88, p = .02]. For D.B., there was no significant difference in happiness [t (9) = -1.66, p = .13]. For H.S. there was no significant difference in happiness [t (9) = -1.04, p = .33], and for L.K., happiness was significantly higher at time 2 than at time 1 [t (9) = -2.64, p = .03]. These results suggest that clips from J.B. and L.K. were successful at significantly increasing levels of happiness.

Post film questionnaire measures:

To examine whether there were any significant differences between film groups on reported anxiety, sadness, happiness, confusion and pleasantness on the post film questionnaire, five one-way film group × mood rating (anxious, confused, happy, sad, pleasant) ANOVAs were performed. Figure 1 shows the mean anxiety, confusion, happy, sad and pleasantness ratings for each film. Results suggest that there were no significant differences between groups in ratings of anxiety [F (4,45) = .85, p = .50]. There were differences between groups in reported levels of sadness [F (4,45) = 9.84, p = < .001]. Multiple Bonferroni post hoc tests suggest that W.R. was rated as being significantly sadder than the other four film clips (all p < .005). There were no significant differences in ratings of happiness for each film [F (4,45) = 1.36, p = .26]. There were significant differences between ratings of confusion between the film groups [F (4,45) = 23.06, p = <. 001]. Post hoc tests suggest that W.R. had a significantly higher rating of confusion than all other film groups (all p <. 001). Results also suggest significantly different ratings of pleasantness between film groups [F (4,45) = 4.29, p = .005]. Post hoc tests suggest that L.K. had significantly higher pleasantness ratings than W.R. (p = .005), and that D.B. had significantly higher pleasantness ratings than W.R. (p = .02). There were no other significant differences.

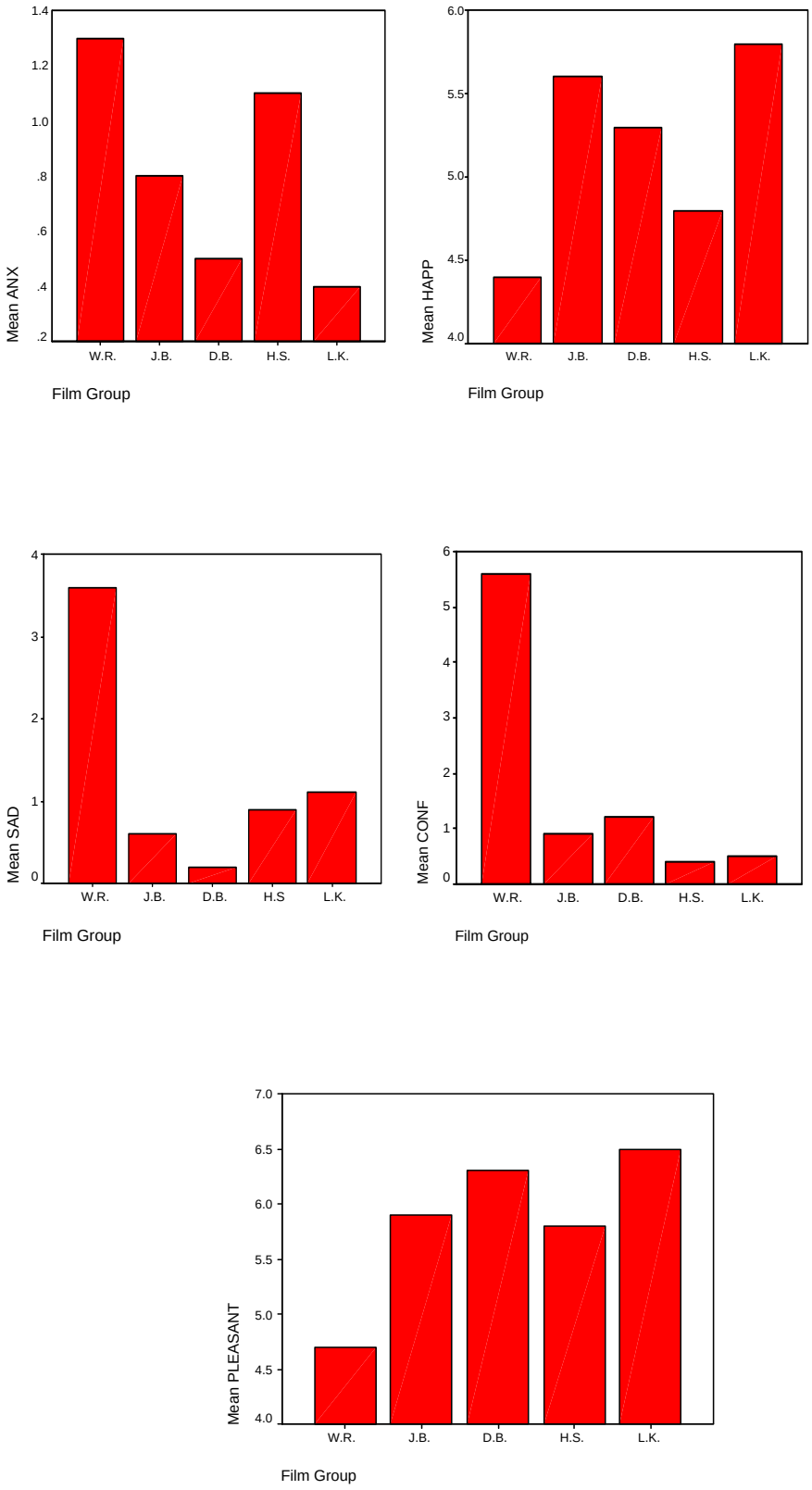


Fig. 1. Mean ratings of anxiety, happiness, sadness, confusion and pleasantness by each film group based on how they felt when they were watching the film.

Summary of results and conclusion

- There were no significant differences between film groups in reported happiness immediately after the film.
- Repeated measures t-tests indicated that happiness had significantly increased between pre and post film measures in the L.K. and J.B film groups.
- The post film questionnaire indicated that there were no significant differences between groups on levels of anxiety or happiness. W.R. was found to be significantly sadder and more confusing than any of the other film groups. L.K. and D.B. were also found to be significantly more pleasant than W.R. There were no other significant differences.

Due to the fact that the comparison was made between films that were all picked as possible happy mood inducers, it is not surprising that they do not differ greatly in reported levels of happy mood. However, some of the other selection criteria indicate that some films may be more suitable than others as happy mood inducers. On the basis that there were significant increases between pre and post mood induction happiness, The Lion King and The Jungle Book are recommended as successful positive mood inducers. The Lion King is also favourable as it had significantly higher pleasantness ratings than Whale Rider, though not compared to any of the other films.

11.5 Appendix E: Checking task instructions

The following piece of text may be used as part of future Advanced level mathematics examinations. The text has not yet been proof read. Please read through the following passage, carefully and make a note of any typing or grammatical errors that you might find. Even if you are not certain that a word contains a mistake, or that there is incorrect punctuation or grammar, but believe that there might be errors, please note it as follows:

Each line is numbered. Please make a note of the line number and the error and also the number of times that you check each line, in the box provided at end of the text.

An example is provided below.

Thank you.

1.There are at least four sources of evidence for the assertion that evaluation is a 2.pervasive and dominant response for most peeple across many situations and 3.objects they encoiunter.

line no:	Incorrect word or punctuation	Number of times checked.
2	People	1,1,1,1,1,1,1, etc
3	Encounter	1,1

11.6 Appendix F: Checking task

1.The comparison of power of, say, a parametric and non-parametric test is
2.known as power efficiency and expressed as a a ratio. You would ncounter
3.the mathematics behind this in in a more advanced texts. Non-
4.mathematically speaking, efficency is, in a sense, the savings made by the
5.moer powerful test in terms of finding more diffrencs that are non-random
6.differences and in therefore helpng to dismiss ‘no difference’ ssumptions.
7.It is importnat to remember however, that pramatric tests cannot un do
8.damage already done if data if has been collectd pearly and /or there are
9.just too few data (N is very low) then the greater sensitivy of the
10.parametric test will not compensate for this. Very often the slight
11. using a rank type test like those in last chapter, by simply taking a few
12. nore participants for testing. Non-parametric t4sts also have the tages
13. of being usually easier to calculate an being more widely usable.. As we
14.shall see in a moment, parametric tests can only be used on special data.
15.You can see an exmple of the superior power of parametric test at the end
16.of this chapter on page 290. The greater power of parametric tests comes
17.from there greater sensivity to the date. This in turn is because they use
18.all the information available. They look at sixe of differnecs and values
19.involved not just at ranks (orderd of sizes) They are more more subtle
20.then in their analysise of data. This power; and accuracy howvere, has to
21.paid for. The.tests male estimates of underlying population parameters..
22.These estimates are are made on the assumption that the the underlying
23.population has.certain characteristics mainly that is has a normal
24.distribtuion. Such distribtion only occurs if the levels of measurement are
25.using is at least inteval. With interval level data, certain sophistcated
26.mathematical.operations can be carried out which cannot be be done on
27.(ordinal datum ranks).These are the assumptions to be satisfied for the use
28.of of parametric tests in this books.. However, the principles are not set in
29.in concrete. One can do do a parametric test on data wich don not fitt the
30.assumptions.exactly. The fact that the the a tests, under such
31.conditions,still give fairly accurate probabailities estimates has led to

32.the,m being called robust. They do not.brake down ,or product many
33.errors in significanse decisions,unless the assumptions are quite poorly
34.mett. Tests on related samples(repeated measures or matched pairs) are
35.offen refered to as ‘correlated’ because a value in one group is c0-related
36.with a value in the the other groupe. The values come in related pairs. It i
37.important not to to let the use of this term fool you in to thinking that a
38.correlation test is being performed. Correlation is the measurement of the
39.the extent to wich pairs of related values on two variables tend to change
40.to gether.. It also give a measure a of the extent to which values on one
41.variable can be be predicted fro m values on the other varable.

11.7 Appendix G: Anger attribution true-feedback manipulation

The information that follows has been taken from a review paper examining the occurrence of emotion. Please read it carefully, you will be asked some questions about it later.

A recent examination of the emotion literature (Shaper, Chapel, & Green, 2006) suggests that:

- Anger is commonly experienced in a ‘directed’ way. That is, the occurrence of anger can often be linked or attributed to a specific cause (Piper & Holmes, 2001).
- Anger rarely occurs spontaneously, without an obvious causal event (Joyce, 1999).
- Due to the specific nature of anger, appraisal theorists propose anger to be an emotion which is inherently ‘motive consistent’. That is, it rarely occurs spontaneously without need for a causal or motivating event and is often attributable to something specific (Roper & Finton, 2004).

11.8 Appendix H: Anger attribution false-feedback manipulation

The information that follows has been taken from a review paper examining the occurrence of emotion. Please read it carefully, you will be asked some questions about it later.

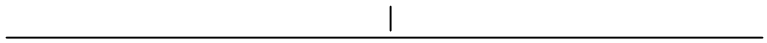
A recent examination of the emotion literature (Shaper, Chapel, & Green, 2006) suggests that:

- Anger is commonly experienced in a ‘non-specific’ way. That is, anger often occurs without obvious cause (Piper & Holmes, 2001).
- Anger often occurs spontaneously, without an obvious causal event (Joyce, 1999).
- Due to the non-specific nature of anger, appraisal theorists propose anger to be an emotion which is inherently ‘motive inconsistent’. That is, it often occurs spontaneously without need for a causal or motivating event and is often not attributable to something specific (Roper & Finton, 2004).

11.9 Appendix I: Anger attribution visual analogue scales

Please indicate your answer by placing a cross along the 0 – 100 scale.

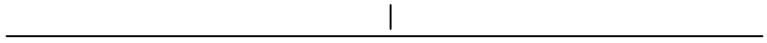
Please mark a cross along the scale to indicate how sad you feel at the present moment.



0 50 100

Not at all extremely

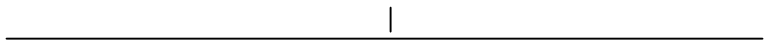
To what extent is any sadness you are feeling attributable to a specific cause?



0 50 100

Not at all extremely

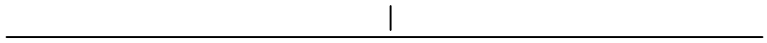
Please mark a cross along the scale to indicate how happy you feel at the present moment.



0 50 100

Not at all extremely

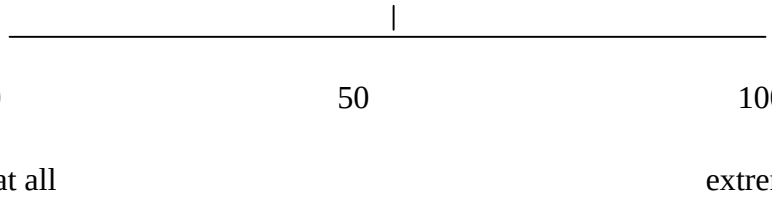
To what extent is any happiness you are feeling attributable to a specific cause?



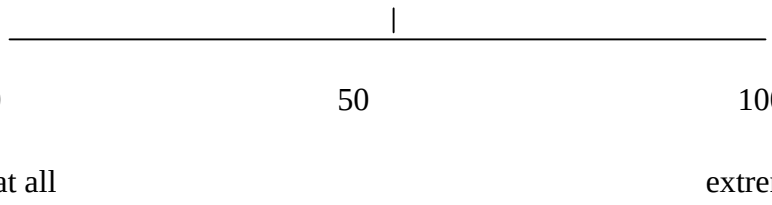
0 50 100

Not at all extremely

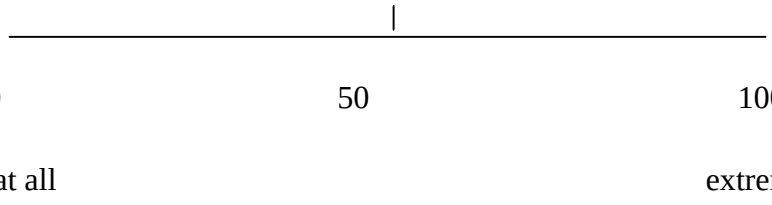
Please mark a cross along the scale to indicate how anxious you feel at the present moment.



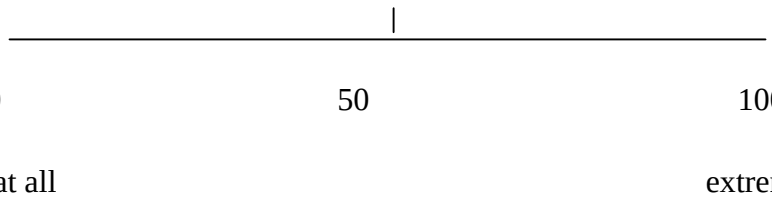
To what extent is any anxiety you are feeling attributable to a specific cause?



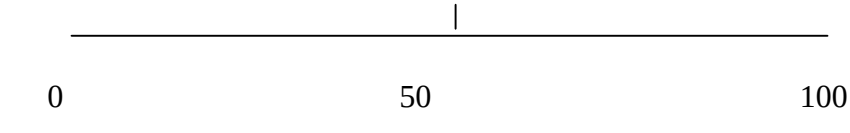
Please mark a cross along the scale to indicate how angry you feel at the present moment.



To what extent is any anger you are feeling attributable to a specific cause?



Please mark a cross along the scale to indicate how aroused (i.e. awake, alert or stimulated) you feel at the present moment.



11.10 Appendix J: Likert checking stop rule questionnaire

When people are checking something, they often say things to themselves that will <u>EITHER</u> make themselves persevere with their checking <u>OR</u> give up on their checking. Try and think back to the times when you have been checking something, and please indicate by circling the appropriate number how much you think each of the following statements describes the kinds of things you think of when you are deciding whether to continue or to stop checking.

1 = Not the kind of thing I think of at all
2 = I think of this a little
3 = I think of this moderately often
4 = I think of this quite a bit
5 = I think of this kind of thing a lot

1. **I'm pretty sure I've checked properly, so don't worry about it anymore.**

   1 2 3 4 5

2. **I think I've checked everything, but I may not have done it properly, so better keep checking.**

   1 2 3 4 5

3. **I had better check again because I want everything to be perfect.**

   1 2 3 4 5

4. **I have probably forgotten something obvious, so I had better have one last check.**

   1 2 3 4 5

5. **I can't be bothered to keep checking everything again.**

   1 2 3 4 5

6. **I should stop checking because once is enough, and doing it any more will make no difference.**

   1 2 3 4 5

1 = Not the kind of thing I think of at all
2 = I think of this a little
3 = I think of this moderately often
4 = I think of this quite a bit
5 = I think of this kind of thing a lot

---

7. Nothing bad will happen if I decide to stop checking things now.

1 2 3 4 5

8. I must just double check that I have done everything

1 2 3 4 5

9. Everything is probably fine, so stop checking.

1 2 3 4 5

10. I can't be bothered to keep checking things any more.

1 2 3 4 5

11. Continually checking something won't make any difference.

1 2 3 4 5

12. I must check things one more time – just to be on the safe side.

1 2 3 4 5

13. Perhaps I didn't check everything properly, I had better check again.

1 2 3 4 5

14. I must think of all the things I might have done wrong, and then check them.

1 2 3 4 5

15. Even if I haven't checked everything properly, it won't matter.

1 2 3 4 5

1 = Not the kind of thing I think of at all
2 = I think of this a little
3 = I think of this moderately often
4 = I think of this quite a bit
5 = I think of this kind of thing a lot

---

16. I may think I've checked everything properly, but in reality perhaps I haven't.

1 2 3 4 5

17. I'm sure everything is fine, so stop checking.

1 2 3 4 5

18. I can't spend all day checking things, so I may as well stop.

1 2 3 4 5

19. I had better check everything to make sure nothing bad happens.

1 2 3 4 5

20. I wasn't concentrating the last time I checked, so I had better do it again.

1 2 3 4 5

11.11 Appendix K: Ethics approval form

University of Sussex

School of Life Sciences Research Governance Committee

CERTIFICATE OF APPROVAL

Title of Project	**The role of negative mood in Mood-as-Input Theory**
Principal Investigator	**Professor Graham Davey**
Student	**Frances Meeten**
Collaborators	
Duration of approval (not greater than 4 years)	**24 months**

This project has been given ethical approval by the School of Life Sciences Research Governance Committee.

Please note and follow the requirements for approved submissions: Amendments to protocol.

Any changes or amendments to approved protocols must be submitted to the committee for authorisation prior to implementation.

Feedback regarding the status and conduct of approved projects

Any incidents with ethical implications that occur during the implementation of the project must be reported immediately to the Chair of the committee.

The principal investigator is required to provide a brief annual written statement to the committee, indicating the status and conduct of the approved project. These reports will be reviewed at the annual meeting of the committee. A statement by the Principal Investigator to the Committee indicating the status and conduct of the approved project will be required on the following date(s):

December 2006, December 2007…….

Signed: ……Corne Kros…….

Deputy Chair of the Research Governance Committee

Date: ……15 MARCH 2006

11.12 Appendix L: Mood feedback form

Thank you for taking part in this experiment.

Finally, we would like some feedback about the experiment.

1. What purpose do you feel the film had in the experiment?

PTO

2. Do you feel that your mood changed during the experiment?

If so, why? (please tick one answer)

a) The interview

b) The film

c) Interview and film

d) Other (please specify)