END-OF-AWARD REPORT
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THE ORIGINS OF HIGH PERFORMANCE STANDARDS IN STOP RULES FOR PERSEVERATIVE TASKS: THE ROLE OF NEGATIVE MOOD

RESEARCH REPORT

BACKGROUND

Setting stringent high standards for achieving behavioural and cognitive goals is a common characteristic of many psychopathologies. For example, pathological worrying, compulsive checking, and perseverative dieting are all activities that are associated with perfectionist characteristics and the development of core beliefs that activities (such as worrying, checking or dieting) should be undertaken until the individual is sure that their stringent high standards have been met (e.g. Shafran & Mansell, 2001; Startup & Davey, 2003; Bastiani, Rao, Weltzin & Kaye, 1995; Salkovskis, Shafran, Rachman & Freeston, 1999).

In many cases these high performance standards lead to perseveration at the activities to which they are related – so much so that perseveration at these activities becomes maladaptive and pathological. One current explanation of how high performance standards generate pathological perseveration is the mood-as-input hypothesis (Davey, 2006; Martin & Davies, 1998). This hypothesis predicts that the deployment of high performance standards (or ‘as many as can’ stop rules for the task) interacts with concurrent mood to determine perseveration at a task, and in particular that negative mood combined with high performance standards will generate perseveration (see below).

While the mood-as-input hypothesis has been relatively successful at explaining perseveration in a number of anxious psychopathologies (Startup & Davey, 2001; MacDonald & Davey, 2006; Niyazi & Davey, 2007), little is yet known about how or why such individuals develop and deploy stop rules for these tasks that contain such stringent high performance standards.

The mood-as-input hypothesis

During the course of task performance, people may ask themselves, either explicitly or implicitly, 'Have I reached my goal?' People in positive moods would tend to answer yes, whereas people in negative moods would tend to answer no. That is, people in a positive mood are likely to interpret their positive affect as a sign that they have attained or made progress toward their goal (i.e. Hirt et al. 1996; Martin et al., 1993). In contrast, in a negative mood, individuals may interpret their negative affect as a sign that they have not attained or made progress toward their goal and so continue to persist at the task (Frijda, 1988; Martin et al., 1993; Schwarz & Bless, 1991).

However, if the individual asked the question 'Do I feel like continuing this task?', then mood would provide very different information. People in positive moods would again answer 'yes' and people in negative moods 'no'. This different question or 'stop rule' in the context of the same mood informs different goal directed behaviour because
in this case an answer suggesting that one is enjoying the task (positive mood) would motivate the individual to continue the task longer. On the other hand, an answer of no (negative mood) provides information consistent with terminating the task sooner.

Many studies have lent support to this configural view of how mood states are processed in contexts of individual tasks (see Martin & Davies, 1998, for a review). In a seminal study, Martin et al. (1993) induced either positive or negative moods in their participants and asked them to generate a list of birds' names. Half of the participants were told to stop generating the names of birds when they no longer felt like doing it (a 'feel like continuing' stop rule), whereas the other half were asked to stop when they thought they had generated as many as they could (an 'as many as can' stop rule). They found that the effect of mood on the generation task was dependent on the stop rule that the participant was asked to use: for those using the 'feel like continuing' stop rule, participants in the positive mood persisted at the task for significantly longer than those in the negative mood. However, for participants using the 'as many as can' stop rule, participants in a negative mood persisted for significantly longer than those in the positive mood. Martin et al. (1993) interpret these effects in mood-as-input terms. In the 'feel like continuing' condition their negative mood tells them to stop. In the 'as many as can' condition their negative mood tells them they are not satisfied with the number of items they have on the task, and so they persist at the task for longer.

**Mood-as-input applied to perseverative psychopathology**

When applied to perseverative psychopathologies, the mood-as-input hypothesis assumes that perseveration will result from either a combination of negative mood and 'as many as can' stop rules or positive mood and 'feel like continuing' stop rules. However, because most psychopathology is characterised by indigenous negative mood, research has focussed on the negative mood/'as many as can' stop rule combination, and the model has been successfully applied to an explanation of perseveration in pathological or catastrophic worrying, compulsive checking, depressive rumination, and pathological dieting (Davey, 2006; Startup & Davey, 2001; MacDonald & Davey, 2006; Watkins & Mason, 2002; Niyazi & Davey, 2007). For example, When applied to catastrophic worrying, the mood-as-input hypothesis assumes that worriers are in a significantly more negative mood state than nonworriers, and that they use relatively stringent 'as many as can' stop rules for judging whether to terminate the catastrophising task (cf. Startup & Davey, 2001; Davey, Field & Startup, 2003). Thus, when catastrophising, worriers are continually asking themselves (either implicitly or explicitly) whether they have successfully dealt with the problem, but their negative mood provides them with information that they have not and this results in perseveration at the task.

Facts consistent with the mood-as-input account of catastrophic worrying are: (1) worriers are usually in a significantly more negative mood than nonworriers when they commence a worry bout (Vasey & Borkovec, 1992), (2) worriers experience endemic negative mood which is normally at significantly higher levels than is experienced by nonworriers (Davey, Hampton, Farrell & Davidson, 1992; Meyer, Miller, Metzger & Borkovec, 1990; Metzger, Miller, Chen, Sofka & Borkovec, 1990), and this negative mood will often manifest itself as higher levels of both anxiety and depression, (3) 'as many as can' stop rules are usually deployed by chronic worriers prior to a catastrophising episode (Startup & Davey, 2003), they appear to be related to beliefs about the important functions that the worry process serves (Davey, Tallis & Capuzzo, 1996), and their reported usage is associated with perseveration on a catastrophising task. (Davey, Startup, MacDonald, Jenkins & Patterson, 2005). Similar findings have been
Determined using an analogue checking task designed to simulate the kinds of perseveration exhibited by compulsive checkers (MacDonald & Davey, 2005, 2006).

**Determinants of ‘as many as can’ stop rule deployment**

The evidence described above suggests that individuals scoring high on measures of perseverative psychopathology (e.g., high worriers, compulsive checkers) tend to deploy ‘as many as can’ stop rules prior to engaging in tasks associated with their psychopathology. However, although there is some evidence that deployment of strict ‘as many as can’ stop rules may be linked to more global beliefs about the importance of a task (e.g., Davey, Tallis & Capuzzo, 1996; MacDonald & Davey, 2006), there is evidence that the negative mood regularly experienced by individuals exhibiting psychopathologies may itself be a determinant of the deployment of strict ‘as many as can’ stop rules.

However, we do have to consider the possibility that mood and stop rule may not be entirely independent of each other. For example, there is evidence to suggest that mood may influence the kinds of stop rules an individual deploys, and the strictness with which they evaluate whether stop rule goals have been met. Negative mood has a number of important effects on information processing and goal-setting which suggest that negative mood is likely to facilitate the deployment of ‘as many as can’ stop rules. First, negative mood induces comparatively higher performance standards than positive or neutral mood (Scott & Cervone, 2002), causing individuals to become relatively dissatisfied with any given level of imagined performance (Cervone, Kopp, Schaumann & Scott, 1994). Negative mood also promotes a more systematic and deliberate information-processing style than positive or negative mood (Ambady & Gray, 2002; Batra & Stayman, 1990; Tiedens & Linton, 2001), which is also likely to facilitate the deployment of ‘as many as can’ stop rules which define rather strict criteria for goal attainment. This being the case, it is likely that an individual’s endemic negative mood will not only provide negative information about the attainment of goals during the worry bout, but it will also define more stringent goals for closure by raising performance standards and facilitating the systematic processing of relevant information.

This is an important issue that would (1) contribute to our understanding of why individuals with perseverative psychopathologies tend to deploy ‘as many as can’ stop rules, and (2) expand our knowledge of how mood and stop rules interact in determining perseveration. These aims form the basis for the following programme of research.

**OBJECTIVES**

This purpose of this research was to undertake a brief set of studies examining the role of negative mood in influencing the development and deployment of high performance standards in the stop rules for potentially perseverative tasks. In particular, (1) it was argued that negative mood leads to systematic rather than heuristic processing of information and this is likely to facilitate the deployment of ‘as many as can’ stop rules, (2) this being the case, it was predicted there should be a significant correlation between the reporting of endemic negative mood and the deployment of ‘as many as can’ rather than ‘feel like continuing’ stop rules, and (3) it was predicted that experimental induction of negative mood under controlled conditions should result in a shift towards the endorsement and use of ‘as many as can’ stop rules prior to engaging in an open-ended task. If these predictions are upheld, it will provide some insight into the origins of the high performance standards that individuals exhibiting perseverative psychopathologies deploy.
This research proposal represented a natural extension of the principal investigator's previous research on this topic (ESRC R000239315 & ESRC RES-000-22-0572).

The proposal described three types of studies: (1) a questionnaire-based study designed to investigate whether there were any significant relationships between measures of endemic negative mood and the deployment of ‘as many as can’ stop rules for both worrying and checking; (2) a lab-based experimental study manipulating mood valency and investigating the effect of this manipulation on the use of stop rules for worrying and checking, and (3) a lab-based experimental study inducing specific negative moods and observing the effects of these manipulations on stop rule use.

Some time was taken at the outset of the project to develop a lab-based mood induction procedure that would not only allow us to draw some conclusions about the causal relationships between mood valency and stop rule use, but would also control for some other potential confounding variables such as awareness of mood state and the semantic priming of stop rules by the mood induction procedure. After a small number of pilot studies we adapted a mood induction procedure first described by Scott & Cervone (2002). This included control conditions for mood saliency and cognitive priming, and was itself developed for investigating the effect of negative mood on performance standards. This development allowed us to successfully complete Study 2 in the original proposal, but did not leave time within the 10-months of the grant duration to run anything more than pilot procedures for Study 3. Study 1, the questionnaire study, was conducted in parallel with the experimental work and we are continuing to add to the database for this study. We have conducted an initial analysis of the results which are supportive of our original predictions, but we await completion of the database to conduct a full analysis.

METHODS

**Study 1** was a questionnaire study that included the Positive & Negative Affect Schedule (PANAS) (Watson, Clark & Tellegen, 1988) a reliable and valid measure of mood experienced over the previous 12 months; the Obsessional Beliefs Questionnaire (OBQ) which measures cognitions relevant to obsessive and compulsive tendencies (Steketee, 2001); the Maudsley Obsessional-Compulsive Inventory (MOCI) which provides a measure of checking and washing compulsions (Hodgson & Rachman, 1977); the Penn State Worry Questionnaire (PSWQ) as a measure of worry frequency (Meyer, Miller, Metzger and Borkovec, 1990); the Consequences of Worry Questionnaire (COWS) which measures a tendency to view worrying as a positive or negative activity (Davey, Tallis & Capuzzo, 1996); the Worry Stop Rule Questionnaire (WSRQ), a measure of intended use of either ‘as many as can’ or ‘feel like continuing’ stop rules during a worry task (Davey, Eldridge, Drost & MacDonald, 2007); the Checking Stop Rule Questionnaire (CSRQ), a measure of intended use of either ‘as many as can’ or ‘feel like continuing’ stop rules during a checking task (Kato, 2007); the Evaluative Judgments Questionnaire (EJQ), a measure of the degree to which an individual is satisfied with their own performance (Scott & Cervone, 2002), and the Elevated Evidence Requirements Questionnaire (EERQ) (unpublished), a measure of the degree of evidence an individual requires before making a decision.

**Study 2** was a lab-based procedure adapting the method described by Cervone & Scott (2002) and consisted of five groups undergoing five separate stages. This experiment was conducted twice, once to measure the effect of negative mood on worry stop rule use (Study 2a), and secondly to measure the effect of negative mood on checking stop rule use.
use (Study 2b). Participants were assigned randomly to one of five groups. These groups were labeled Negative Mood High Saliency, Negative Mood Low Saliency, Cognitive Priming, Neutral Mood High Saliency, and Neutral Mood Low Saliency. Participants in Negative Mood groups listened to a vignette that would induce a negative mood, and Neutral Mood groups listened to a vignette that would induce a relatively neutral mood. Participants in High Saliency conditions were alerted to the fact that listening to the vignette might change their mood, while those in the Low Saliency conditions were not. Participants in the Cognitive Priming group listened to a modified negative mood vignette, but were instructed to engage in a semantic rating task while listening to the vignette. This condition ameliorated the negative effect of the vignette, but ensured that participants processed the semantic content. Participants were tested individually in a small room containing an angle-poise lamp and a PC which was used to present the experimental vignettes via headphones worn by the participants.

Stage 1: All participants were informed that the study was about mental imagery and how this changes over time. Participants in both the negative and neutral mood induction groups were told they would listen to a scenario and were given instructions to visualize the information in that scenario as fully as they could as if it were occurring to them. Participants in the Cognitive Priming group were told they were to engage in a semantic rating task while listening to the scenario, and this rating task would require them to rate the degree to which each sentence heard in the vignette was similar to the meaning of a target word. All participants were told that after listening to the vignette there would be a 10-min waiting period after which they would complete a mental imagery task. All participants then completed an informed consent form.

Stage 2: Participants in the negative mood conditions listened to a vignette describing their best friend dying of cancer. In the neutral mood conditions, participants were asked to listen to a tape asking them to visualize themselves in their sitting room at home. Participants in the Cognitive Priming condition listened to a revised negative vignette in which first person pronouns were eliminated and substituted by two hypothetical characters. While listening to the vignette, participants in the Cognitive Priming condition had to rate on a 5-point Likert scale the degree of similarity between each sentence and a corresponding target word on a response sheet in front of them. The negative mood vignette lasted for 5mins 10 sec and the neutral vignette for 3 min 50 sec.

Stage 3: Immediately after listening to the vignette, participants in the High Saliency condition were told by the experimenter “I realize the scenario you just heard may have affected your mood. At least other participants in the past have commented that visualizing that particular scenario has affected their feelings”. The Low Saliency and Cognitive Priming groups were told nothing.

Stage 4: During the 10-min waiting period participants were asked if they would mind completing a short questionnaire that was part of another unrelated research project. However, this questionnaire was designed to collect the information required in this study, but this procedure was used to obscure any connections between the questions in the response sheet and the mood inductions in the previous stage. In the study investigating the effect of negative mood on worry stop rules, this questionnaire consisted of four visual analogue scales (VAS) and one forced-choice question. The first two questions asked participants to rate their current levels of sadness and happiness on separate visual analogue 100-point scales (where 0=not at all sad/happy and 100=extremely sad/happy). These scales were included to measure whether the vignettes
had been successful in inducing greater levels of negative mood (measured by sadness) and lower levels of positive mood (measured by happiness) in the two negative mood induction conditions. Question three asked participants to mark on a 100-point VAS scale “how strongly you hold the belief that you should continue to worry until you feel that you have fully resolved a worry”. Question four asked participants to mark on a 100-point VAS scale “how strongly you hold the belief that you should only continue to worry until you no longer feel like worrying anymore”. Question five was a forced-choice question in which participants were asked “If you were to start worrying about something right now, which of the following two strategies would you be most likely to use” (a) “I would stop worrying only when I felt that I had fully resolved the worry, or (b) “I would stop worrying when I no longer felt like worrying any more”. The first relates to the use of ‘as many as can’ stop rules, while the second relates to the use of ‘feel like continuing’ stop rules. Participants were asked to endorse just one of these. In the second of these studies, questions about worrying were replaced with similar questions about checking.

Stage 5: Participants were then given a mental imagery questionnaire to complete which was relevant to the procedure as described in Stage 1. After this, participants were all fully debriefed as to the genuine aims and purpose of the study, paid and thanked for their participation. Those who had undergone a negative mood induction were offered the opportunity to undergo a positive mood induction before they left the room.

RESULTS

The results from Study 2a demonstrated that participants experiencing experimentally-induced negative mood (1) reported a significantly greater desire to resolve future worries, and (2) reported a greater willingness to deploy strict ‘as many as can’ rather than ‘feel like continuing’ stop rules for worrying than participants experiencing neutral mood inductions or a cognitive priming control procedure. This effect was found regardless of whether participants were explicitly made aware of changes in their mood or not, and it could not be attributed simply to the negative semantic material in the negative vignette priming cognitions which might facilitate the desire to resolve worries.

The first implication of these results is that negative mood has the effect of facilitating the desire to resolve worries even prior to a worry bout, and this facilitated predisposition appears to be mediated by an increased willingness to deploy ‘as many as can’ stop rules for worrying. In this respect, negative mood appears to have a dual effect in facilitating worry and prolonging perseveration at a worry task. First, negative mood increases the tendency to use strict ‘as many as can’ stop rules that set higher standards for closure of the worry bout, and secondly, during the worry bout negative mood acts to provide information that these elevated standards have not been achieved (e.g. Davey, 2006). The mechanism by which negative mood facilitates the desire to resolve worries is unclear, but there are at least two candidates. First, negative mood has been shown experimentally to promote a more systematic and deliberate information-processing style than positive mood (Ambady & Gray, 2002; Batra & Stayman, 1990; Tiedens & Linton, 2001). This induces comparatively higher performance standards than positive or neutral mood (Scott & Cervone, 2002) causing individuals to become relatively dissatisfied with any given level of imagined performance (Cervone, Kopp, Schumann & Scott, 1994). This has the effect of raising the standards by which an individual evaluates their performance on a task, and maintains perseveration at the task until these raised performance standards have been met (Scott & Cervone, 2002). In terms of a mood-as-
input conceptualization of the worry process, this is the equivalent of shifting the individual towards the deployment of stricter ‘as many as can’ stop rules, and this was observed in Study 2a in terms of both the participants’ ratings of the need to resolve worries and their tendency to choose ‘as many as can’ stop rules over ‘feel like continuing’ stop rules. However, although there was a significant predicted effect of mood condition on a measure of the desire to resolve worries, the study did not find an effect of mood on the ‘feel like continuing’ intention of worrying only until the individual did not feel like worrying any more. This may reflect the fact that ‘feel like continuing’ stop rules are not simply the dimensional opposite of ‘as many as can’ stop rules, and so if mood facilitates one type of rule, it does not mean that it will automatically decrease intentions to use the other (see Davey, 2006a).

Secondly, increased levels of negative mood may automatically trigger mood repair processes, and attempting to resolve worries (or by repeated checking) may represent one means by which negative mood might be alleviated. The results of the present study are quite consistent with this view, and participants in a negative mood expressed a greater desire to resolve worries in the future. There is much evidence that is indirectly consistent with the view that worry is an attempt at mood repair. For example, chronic worriers are known to hold beliefs that worrying is an important and necessary activity to avoid future catastrophes, to distract the worrier from worrying about more threatening events, and to enable them to feel better after thinking through solutions to worse-case “what if…?” scenarios (Davey, Tallis & Capuzzo, 1996; Wells, 1994; Borkovec & Roemer, 1995).

Preliminary analysis of the questionnaire data (Study 1, N=80) supports many of the predictions linking negative mood to the deployment of ‘as many as can’ stop rules and to measures of raised performance standards. Measures of trait negative mood (PANAS) were significantly correlated with measures of the deployment of ‘as many as can’ stop rules for worrying (WSRQ, r=.26, p<.02) (supporting the findings from Study 2a), but not with the deployment of ‘as many as can’ stop rules for checking (CSRQ, r=.13, p>.2). Negative mood was also a significant predictor of elevated evidence requirements for decision-making (EERQ, scale A, r=.25, p<.03) (EERQ, scale B, r=.34, p<.01). Measures of trait positive mood (PANAS) were also inversely correlated with measures of the degree to which an individual is satisfied with their own performance (EJQ, r=-.23, p<.04).

To summarize, these findings so far suggest that (1) negative mood is a significant predictor of the deployment of ‘as many as can’ stop rules for worrying and the need for elevated evidence requirements when decision making; findings relating negative mood to stop rules for checking were nonsignificant in Study 1, and we await analysis of the results of the lab-based study examining the effect of negative mood on checking stop rule use (Study 2b), (2) positive mood is inversely related to performance standards, suggesting that low levels of positive mood will make an individual more dissatisfied with their imagined performance, and (3) Study 2a identified a causal effect of negative mood on the deployment of ‘as many as can’ stop rules for worrying and on the desire to resolve worries. All of these factors are ones that are likely to lead to perseveration at an activity such as worrying before closure is reached.

ACTIVITIES

The principle investigator is due to present an invited paper on this research at the British Association of Behavioural & Cognitive Psychotherapies Annual Conference at Exeter, July 2009.
OUTPUTS

Study 2a has already been written up and submitted for publication in a high-impact international clinical psychology research journal. This is provided as one of the nominated outputs.

IMPACTS

None

FUTURE RESEARCH PRIORITIES

This research provides some insight into the proximal mechanisms that may be responsible for generating perseveration at activities that give rise to psychopathology, such as chronic worrying and compulsive checking. If negative mood is a causal factor in generating this perseveration, then it is important to understand the mechanisms by which it has this causal effect. The present results suggest that negative mood affects goal-setting by influencing the deployment of stop rules and raising performance standards, and future research needs to determine whether this effect is mediated by the type of information processing strategy that negative mood may trigger (e.g. systematic vs. heuristic processing).

REFERENCES


