# Mood-as-input and depressive rumination

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## ARTICLE INFO

## ABSTRACT

This article describes a test of mood-as-input theory predictions as applied to a rumination task in a nonclinical population. An experimenter-controlled interview was used to allow participants to reflect on a personal period of depression while in an experimentally-induced mood state (either negative or positive) or while deploying a specific stop rule for the task (either an "as many as can" or "feel like continuing" stop rule). As predicted by mood-as-input theory, persistence at the rumination task was greatest in the group experiencing negative mood while deploying an "as many as can" stop rule, and this suggests a mechanism that may contribute to perseverative depressive rumination. It is argued that the variables that contributed to perseveration in this study are already known to be characteristic of ruminative thinkers (e.g. negative mood and positive metacognitive beliefs about rumination that will command the deployment of "as many as can" stop rules for rumination). It is also argued that mood-as-input processes may provide a common mechanism for perseverative rumination and perseverative worry, and this common mechanism may account for many of the similarities between these two functionally-distinct activities.

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Rumination involves repetitive, prolonged, and recurrent thought about one's self and the causes, consequences and symptoms of one's negative affect (Nolen-Hoeksema, 1991; Watkins, 2008). Such thought is commonly found in response to dysphoric mood and the losses and failures that may trigger dysphoric mood (Lyubomirsky & Nolen-Hoeksema, 1993, 1995; Nolen-Hoeksema & Morrow, 1993), and rumination has been found to be a risk factor for later bouts of depression, to exacerbate and prolong distress, and predict other psychopathologies such as binge eating and drinking (Nolen-Hoeksema & Harrell, 2002; Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008; Nolan, Roberts, & Gotlib, 1998; Robinson & Alloy, 2003; Sarin, Abela, & Auerbach, 2005). There is currently no clear consensus on what constitutes the content of ruminative thinking and how it should be measured, and this differs in accordance with the predictions derived from the various models that have been postulated to explain rumination (e.g. Smith & Alloy, 2009). Some models claim that rumination is focussed on negative emotional states such as ruminating on sadness (Trapnell & Campbell, 1999), others that it consists of dwelling on the negative aspects of previous losses and failures (Fresco, Frankel, Mennin, Turk, & Heimberg, 2002), while others claim it is an attempt to look for precipitants or sources of current distress

(Watkins, 2004). Still others claim that the content of rumination consists of all of these components (Nolen-Hoeksema, 1991).

There are a number of striking similarities between depressive rumination and anxious worrying, suggesting that there may be some formalistic commonalities between these forms of thought, and some similarities in the mechanisms that generate them. For example, measures of rumination and worry are highly correlated even when measures of anxiety and depression are partialled out (Beck & Perkins, 2001). Although rumination and worry have been found to be more commonly related to depression and anxiety respectively, rumination predicts changes in symptoms associated with both depression and anxiety (Nolen-Hoeksema, 2000), while individuals with a diagnosis of major depression have been reported to indulge in levels of worry similar to those with a diagnosis of Generalized Anxiety Disorder (GAD) (Starcevic, 1995). Furthermore, both rumination and worry are perseverative forms of thought associated with metacognitive beliefs that they are necessary and important activities to indulge in to eradicate harm and relieve distress (Davey, Tallis, & Capuzzo, 1996; Papageorgiou & Wells, 2003). While there are arguably differences in the functions attributable to ruminative and worrisome thought (Nolen-Hoeksema et al., 2008), the similarities between these activities suggest that rumination and worry are related constructs that may shed light on a common mechanism that underlies perseverative and repetitive thought (Smith & Alloy, 2009).

One current cognitive model of perseverative thought that has been extensively applied to worry perseveration is the

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mood-as-input model (Davey, 2006a; Martin & Davies, 1998; Startup & Davey, 2001), and if worry and rumination share similar mechanisms of perseveration, then we would expect predictions from the mood-as-input model to apply to both activities. The mood-as-input model can be explained by describing a study by Martin, Ward, Achee, and Wyer (1993). They induced either positive or negative moods in their participants and then asked them to generate a list of birds' names (an item generation task). Half of the participants were asked to stop the task when they no longer felt like doing it (a "feel like continuing" stop rule, FL), whereas the other half were asked to stop when they thought they had generated as many birds' names as they could (an "as many as can" stop rule, AMA). Martin et al. found that the effect of mood was dependent on the stop rule that participants had been asked to use. For 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, participants using the "as many as can" stop rule persevered for significantly longer when they were in a negative mood. Martin et al. (1993) interpreted these findings in mood-as-input terms where participants interpret their mood in relation to the stop rule. 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 generated, and so should persist at the task for longer.

In the case of perseverative worrying, the mood-as-input account suggests that the worrier's negative mood interacts with the 'stop rules' that the worrier brings to the worry task to determine perseveration at that activity. For instance, worrying is an open-ended task that has no obvious or clear end point. This being the case, individuals commencing a worry bout will usually bring their own set of implicit stop rules to the task, and the individual will have to make some decisions during the course of the worry episode about whether to continue or to stop (depending on whether they feel their criteria for stopping have been met). When applied to perseverative worrying, the mood-as-input hypothesis assumes that those individuals who indulge in perseverative worrying are in a significantly more negative mood state than non-worriers, and that they use relatively stringent 'as many as can' stop rules for judging whether to terminate the worry activity (cf. Davey, Field, & Startup, 2003; Startup & Davey, 2001). Thus, 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 activity.

A similar logic can be applied to perseverative rumination. Mood-as-input theory would predict that ruminative thinking would persevere in circumstances where the ruminator is in a negative mood during the rumination bout and begins rumination by deploying an "as many as can" stop rule. There is evidence that both of these conditions are characteristic of rumination. First, measures of rumination are highly correlated with severity of depression symptoms (Kasch, Klein, & Lara, 2001), and it is well documented that rumination occurs in response to negative affect (Lyubomirsky & Nolen-Hoeksema, 1993, 1995; Nolen-Hoeksema & Morrow, 1993), suggesting that negative affect will be an experienced emotion for some or all of the rumination bout. Secondly, research into the metacognitive processes associated with rumination suggests that there is a strong link between positive metacognitive beliefs about rumination, depressed mood, and the tendency to indulge in perseverative ruminative thought. This leads ruminators to view rumination as a coping strategy that needs to be indulged in as an attempt to relieve distress and resolve issues associated with depression and its causes (Papageorgiou & Wells,

2001, 2003). Typical metacognitive beliefs about rumination include "I need to ruminate about my problems to find answers about the causes of my depression" and "I need to ruminate about bad things that have happened in the past to make sense of them" (Papageorgiou & Wells, 2001), and such beliefs will facilitate the deployment of "as many as can" stop rules that set stringent criteria for judging whether the goals of the rumination task are achieved.

The present study represents a test of mood-as-input predictions as applied to a rumination task, and will help to clarify whether variables influencing perseveration at a worry activity also influence ruminative perseveration – suggesting the possibility of some similar dynamic processes underlying both worrying and ruminative thought. Specifically, mood-as-input theory predicts that perseveration at a rumination task should be greatest under conditions of negative mood using an "as many as can" stop rule or under conditions of positive mood using a "feel like continuing" stop rule (Martin & Davies, 1998; Martin et al., 1993). However, for our purposes, the negative mood/"as many as can" condition is of most theoretical interest. While the positive mood/'feel like continuing' condition is a necessary part of a balanced design for a study of this kind, it probably has little ecological relevance to naturally-occurring bouts of rumination (Davey, 2006a). As we have argued above, rumination is a repetitive task that is most likely to be carried out using 'as many as can' stop rules during a negative mood. Finally, we have used as our dependent measure in this experimental study an adaptation of the catastrophizing interview procedure that has been successfully used to measure perseveration in experimental studies of worrying (Davey, 2006b; Startup & Davey, 2001). The adaptation of the catastrophizing task to a rumination task was achieved by asking participants to recall the last time they felt depressed for a period of time, and then using an experimenter-controlled interview to enable them to iterate what it was about that time that made them feel depressed (see Procedure section). We are aware that this limits the content of rumination to an exploration of the causes of the depression episode, but this in itself appears to reflect a significant characteristic of rumination as espoused within a number of important theoretical approaches (e.g. Nolen-Hoeksema, 1991; Watkins, 2004).

## Method

### Participants

The participants consisted of 60 (55 females and 5 males) undergraduate and postgraduate students from the University of Sussex with an age range of 18–50 years and a mean age of 20.4 years (SD 4.78 years). Participants were recruited on a voluntary basis and were unaware of the aims and purpose of the study.

### Procedure

Participants were assigned randomly to one of four groups and this process resulted in at least one male participant in each of the groups. These groups were labeled NEG/AMA ($n = 15$), NEG/FL ($n = 15$), POS/AMA ($n = 15$), and POS/FL ($n = 15$) depending on the mood induction procedure they would undergo (NEG = negative mood; POS = positive mood) and the stop rule they were to be asked to use (AMA = "as many as can"; FL = "feel like continuing"). Participants were tested individually in a small room containing an angle-poise lamp and a personal computer equipped with media player software and headphones. Participants were instructed that they would be required to complete three questionnaires and then partake in a short interview.