



## Rumination and the mood-as-input hypothesis: Does congruence matter?

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### ABSTRACT

**Background and objectives:** The mood-as-input hypothesis (MAIH), which emphasizes the role of mood and stop rules on perseverative thinking, has been extensively studied in relation to worry (Meeten & Davey, 2011). However, relatively few studies have focused on the applicability of the MAIH to depressive rumination. Consequently, two studies were conducted to further examine the potential relevance of the MAIH to depressive rumination.

**Methods:** In the first study, a sample of undergraduate students completed a rumination interview under one of four conditions, including mood (positive vs. negative) and stop rule (as-many-as can (AMA) and feel like stopping (FL)). It was anticipated that participants in the negative mood/AMA and the positive mood/FL conditions would exhibit the most persistence in the rumination interview. A second, follow-up study was conducted in which a positive rumination condition was added to examine the role of congruence between mood induction and task valence on interview performance.

**Results:** In the first study, support for predictions of the MAIH was found in the negative mood conditions but not the positive mood conditions. In the second study, as predicted, under conditions of mood congruence, the original predictions of the MAIH were supported. However, under conditions of mood incongruence, participants appeared to default to the assigned stop rule.

**Limitations:** Although the findings are promising, it is noteworthy that the sample was non-clinical. Further, this approach to studying depressive rumination may have somewhat limited ecological validity, as the research was conducted in a controlled laboratory setting.

**Conclusions:** Overall, the current findings provide insight into the conditions under which depressive rumination is most likely to occur.

### 1. Introduction

Depressive rumination is a form of repetitive negative thinking in which individuals respond to symptoms of depression and related forms of distress by focusing on the causes and consequences of the symptoms in a passive and repetitive manner (Nolen-Hoeksema, 1991; Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). According to Response Styles Theory (RST), those who respond to depressed mood with distraction tend to experience relief from depressed mood, whereas those who respond to depressed mood with ruminative thinking are more likely to experience increased depressive symptoms, in terms of duration and intensity (Morrow & Nolen-Hoeksema, 1990). Further, once initiated, depressive rumination maintains and exacerbates depression through a number of mechanisms, including enhancement of the effects of negative affect on thinking, inhibition of problem solving, decreasing of social support, and decreasing of positive, goal-directed behavior

(Nolen-Hoeksema & Davis, 1999; Nolen-Hoeksema et al., 2008). Although the role of rumination in depression has been well supported in the literature, more research is needed to assess the underlying conditions that lead to depressive rumination.

Worry can be distinguished from depressive rumination, as worry is future-oriented, focused on feared outcomes, and is most typically associated with anxiety. In contrast, rumination is most typically past or present-oriented, and focused on depressive content. Despite these differences, the processes exhibit similarities, as both are forms of repetitive negative thinking. Consequently, it is possible that models developed to understand pathological worry are applicable to depressive rumination. One such model is the mood-as-input hypothesis (MAIH) (Watkins & Mason, 2002). Based on this model, it is speculated that persistence on perseverative tasks is strongly influenced by two factors: mood and stop rules. In particular, negative moods are believed to signify a lack of achievement or unsuccessful completion of a

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problem-solving task, which leads the individual to perseverate or ruminate for an extended period of time. Therefore, individuals in a negative mood are less likely to disengage from a problem-solving task. In general, the MAIH proposed that mood influences the interpretation and approach to the completion of a task (Meeten & Davey, 2011).

Stop rules are believed to provide goals or guidelines for the completion of open-ended tasks, including bouts of perseverative thinking (Meeten & Davey, 2012). The first stop rule is the ‘as many as can’ (AMA) stop rule, in which individuals tend to discontinue worry only after they believe that they have thought of all possible outcomes to a situation. The second is the ‘feel like continuing’ (FL) stop rule, in which worry episodes are ended when individuals feel as though they are finished worrying or feel like discontinuing (Davey & Levy, 1998). Researchers have found that the AMA stop rule tends to be associated with longer bouts of negative, perseverative thinking (Chan, Davey, & Brewin, 2013; Watkins & Mason, 2002). Further, stop rules are believed to be influenced by the current mood of the individual engaged in an open-ended task (Davey, 2006). In particular, negative mood combined with an AMA stop rule is hypothesized to lead to highest level of perseveration during a negatively valenced, open-ended task.

Although the MAIH places less of an emphasis on positive mood, as it is a less common occurrence for those who tend to experience negative, perseverative thinking, it is posited that positive mood paired with a FL stop rule leads to increased persistence at an open-ended task (Davey, 2006). This idea is supported by previous research. For example, in an early study, Martin, Achee, Ward, & Harlow (1993) found greater persistence on an iterative task for those with an inducted positive mood and who were assigned to the FL stop rule condition, relative to those with an inducted positive mood and who were instructed to use an AMA stop rule. In this case, it appears that positive mood is used as an indicator of the decision to continue. More specifically, it seems as though task continuation is considered pleasant, and as a result, motivation to discontinue may be low (i.e., participants feel like continuing to think about something pleasant). This may be most likely when participants utilize a FL stop rule, as mood is used as an indicator of the decision to continue.

Based on a comprehensive review of the MAIH, consistent empirical support has been found for the MAIH through the experimental manipulation of stop rules and participant mood (Meeten & Davey, 2011). Mood is most typically manipulated through the use of music (Hawksley & Davey, 2010) and the Catastrophizing Interview Procedure (CIP) is often used as a measure of perseveration (Davey & Levy, 1998; Vasey & Borkovec, 1992). Although the model has been extensively studied in relation to worry (see Meeten & Davey, 2011), surprisingly few studies have examined the applicability of the mood-as-input hypothesis to depressive rumination.

Watkins and Mason (2002) evaluated the potential relevance of the MAIH to rumination by using a modified version of the CIP (a rumination interview), in which participants were asked to list a topic that made them feel sad or depressed. The authors split a non-clinical sample into both high and low ruminators based on scores from the Ruminative Response Scale (RRS) (Fresco, Frankel, Mennin, Turk, & Heimberg, 2002), and participants were assigned to one of the three stop rule conditions: AMA, FL, and no stop rule. Following random assignment to stop rule condition, participants were administered the rumination interview. As hypothesized, high ruminators provided significantly more steps on the rumination interview in the AMA and no stop rule conditions, relative to the FL condition. Based on these findings, researchers proposed that an AMA stop rule is related to prolonged rumination, and they suggested that a FL stop rule could be used to reduce the frequency of rumination (Watkins & Mason, 2002).

Hawksley and Davey (2010) further investigated the applicability of the MAIH in regards to depressive rumination by inducing mood through the use of classical music. Participants were randomly assigned to one of four conditions including mood (positive vs. negative) and stop rule (AMA vs. FL). As hypothesized, participants who received the

negative mood induction, paired with the AMA stop rule, produced significantly more steps on the rumination interview relative to those in the positive mood condition with the FL stop rule, thus providing additional evidence for the premise that the MAIH may be applicable to depressive rumination.

Chan et al. (2013) explored the MAIH on rumination in both clinical and non-clinical samples. The rumination interview was conducted after assigning participants to one of the two stop rules conditions. As hypothesized, clinically depressed participants in the AMA stop rule condition produced significantly more steps during the task than the non-clinical participants or those assigned to the FL stop rule. Clinical participants also reported they were more likely to use AMA directed approaches in everyday life, suggesting that treatments aimed at underlying beliefs could impact the tendency to engage in rumination (Chan et al., 2013).

Overall, the purpose of the current research was to provide additional examination of the applicability of the MAIH to depressive rumination, as only a small number of studies have been conducted in this area. Study 1 is only the second study to examine both mood and stop rules on a depressive rumination task (Hawksley & Davey, 2010) and the first rumination interview study to utilize videos for mood induction. Study 2, which was developed and conducted in response to the results of study 1, is the only known study to have assessed reverse-catastrophizing in the context of depressive rumination and the MAIH. More detail for the rationale for study 2 is provided below in the introduction section for this study (see page 13).

## 2. Study 1

The primary focus of this study was to examine the role of induced mood and stop rules on persistence/perseveration on a rumination task (Hawksley & Davey, 2010). It was hypothesized that perseveration would occur when negative mood is paired with the AMA stop rule and when positive mood is paired with a FL stop rule (see Fig. 1).

## 3. Method

### 3.1. Participants

One hundred and three undergraduate students, enrolled at a university in the southeastern United States, volunteered to participate in the study in exchange for extra credit in a college course. The sample was 83.5% female, and the mean participant age was 22.77 ( $SD = 5.06$ ). The ethnic distribution was as follows: 61.2% Caucasian/White, 15.5% African-American/Black, 8.7% Asian, 7.8% Hispanic, and the remaining 6.8% endorsed “other” or reported that they were of mixed ethnicity.

### 3.2. Design and procedure

After obtaining informed consent, participants were randomly assigned to one of four experimental conditions. Participants completed the study in a controlled laboratory setting and were randomized to one of two mood conditions (Happy or Sad) and one of two stop rule conditions, either as-many-as-can (AMA) or feel-like continuing (FL). The conditions were labeled as followed: Happy/AMA ( $n = 26$ ), Happy/FL ( $n = 26$ ), Sad/AMA ( $n = 26$ ), and Sad/FL ( $n = 25$ ). Following completion of informed consent, participants completed Visual Analogue Scales (VAS) with scores ranging from 0 to 100, assessing current levels of sadness and happiness. Participants then completed a number of self-report questionnaires (see measures section below).

Following completion of the self-report measures, mood induction was conducted, based on the procedures outlined by Rottenberg, Ray, and Gross (2007) and used by Meeten and Davey (2012). More specifically, movie clips from *The Lion King* were utilized for the positive mood induction (3.16 min) (The Lion King Songs, 2011) and negative

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