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Mood, stop-rules and task persistence: No Mood-as-Input effects in the context of pain

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ABSTRACT

Background and objectives: Task persistence despite experiencing pain might be a risk factor for development and maintenance of chronic pain. The Mood-as-Input (MAI) model predicts that the impact of mood on individuals' motivation to persist in a task depends on the interpretation of current mood within a certain motivational context. The aim of the current study was to replicate the original MAI study (Martin, Ward, Achee, & Wyer, 1993), but in a context where the task is painful.

Methods: A 2 Mood (negative versus positive) × 2 Stop-Rule (achievement versus hedonic) between-subjects factorial design was used in which 120 healthy participants (97 women, mean age = 21.78 years, SD = 3.07) performed an impression-formation task while being exposed to mechanically induced pressure pain.

Results: The MAI interaction hypothesis was not confirmed. Instead, participants showed more task persistence when they used hedonic stop-rules as a ground to decide on task (dis)continuation than when they used an achievement-oriented stop-rule. Additionally, participants reporting less pain-related fear also spent more time on the painful impression-formation task. The current findings suggest that the MAI perspective might not apply to task persistence behavior in a pain context.

Limitations: These findings may not generalize to task performance in patients with chronic pain.

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1. Introduction

Chronic pain signifies both a psychological and financial burden for the afflicted individual and for society as a whole (Kowal, Wilson, McWilliams, Péloquin & Duong, 2012; Leadley, Armstrong, Lee, Allen & Kleijnen, 2012; Scholich, Hallner, Wittenberg, Hasenbring & Rusu, 2012). A great deal of support has been found for the detrimental effects of fear-related avoidance behavior on pain complaints (Leeuw et al., 2007; Leeuw et al., 2008; Linton et al., 2008). In addition, when performing physically strenuous and/or pain-inducing tasks, long term exposure to repeated biomechanical loads might make task persistence a risk factor in development and maintenance of pain complaints as well (Barr & Barbe, 2002; Coq et al., 2009). However, experimental studies testing putative mechanisms of why people persist in tasks despite experiencing pain are currently lacking. The Mood-as-Input¹ model (Martin Ward, Achee & Wyer,

1993) has been suggested to provide a theoretical account of both persistence and avoidance behavior in a pain context (Vlaeyen & Morley, 2004).

MAI specifically considers behavioral performance in the context of affect-regulation processes (Vlaeyen & Morley, 2009). Accordingly, task persistence is seen as the result of current mood interacting with so-called “stop-rules” that people adopt when performing open-ended tasks (Martin et al., 1993). When adopting an achievement-oriented stop-rule, people ask themselves whether they have performed well enough, and they will persist in a given task as long as the answer is ‘no’. A negative mood will then facilitate task persistence because it signals the individual that the performance goals have not been reached yet. In contrast, positive mood leads to earlier task disengagement because it informs the individual the goal has been reached. Alternatively, when people adopt a hedonic stop-rule they will persist in a task until they no longer “feel like continuing”. Negative mood now is taken as evidence that the task is no longer pleasurable, and task disengagement follows. In contrast, positive mood indicates that the task is still pleasurable, resulting in task continuation. Thus, it is the informational value of mood and not mood per se that drives task

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persistence (Hirt, Levine, McDonald, Melton & Martin, 1997; Hirt, Melton, McDonald & Harackiewicz, 1996; Martin et al., 1993).

Following a recent review (Meeten & Davey, 2011), the majority of MAI research confirmed the hypothesized interaction between mood and stop-rules, at least in the fields of pathological worrying, compulsive checking and depressive rumination. Research applying the MAI theory to painful situations yielded less clear cut results, so far only demonstrating main effects of mood and stop-rules (Ceulemans, Karsdorp & Vlaeyen, 2013; Karsdorp, Nijst, Goossens & Vlaeyen, 2010; Karsdorp, Ranson, Nijst & Vlaeyen, 2013). Further research on this topic seems warranted since MAI provides an interesting affective-motivational approach that takes into account individual goals which possibly counteract pain-induced avoidance tendencies (Karsdorp et al., 2013; Van Damme, Crombez & Eccleston, 2008; Van Damme, Van Ryckeghem, Wyffels, Van Hulle & Crombez, 2012). However, in order to retain the MAI interaction hypothesis it has to be clear first whether the original study by Martin et al. (1993) can be replicated in a pain context.

The aim of the present study is to test the combined effects of current mood and stop-rule on task persistence (controlling for pain-related fear) in pain-free individuals performing a cognitive impression-formation task while being exposed to mechanically induced pressure pain. It was hypothesized that participants adopting an achievement stop-rule would show greater task persistence when in a negative as opposed to positive mood. When adopting a hedonic stop-rule, the effects on task persistence were expected to be reversed.

2. Method

2.1. Participants

A total of 120 healthy participants (97 women, mean age = 21.78 years, $SD = 3.07$) participated in the experiment. Acute or chronic pain complaints and pregnancy served as exclusion criteria. Participants were recruited by use of digitalized and paper advertisements in and around the Maastricht University environment. They received partial course credit or a €10 financial compensation for their participation. Approval was granted by the Ethical Committee of the Maastricht University Faculty of Psychology and Neuroscience. Informed consent was obtained from all participants.

2.2. Design

A 2 Mood (negative versus positive) \times 2 Stop-Rule (achievement versus hedonic) between-subjects factorial design was used. Persistence on an impression formation task, during which a mechanical pressure pain stimulus was administered to the index-finger of participants' non-dominant hand, served as the dependent variable. Participants were randomly assigned to one of the four experimental conditions, with an equal number in each condition ($n = 30$).

2.3. Impression formation task

Participants were presented an electronic version of the impression formation task (Martin et al., 1993) while painful pressure was applied to the finger, allegedly to study the way one forms impressions of other people while in mild pain. Participants were instructed to form an impression of a person X, based on behavioral descriptions presented on the computer screen in a fixed, yet randomly selected order for 5 s each (with a maximum of 100 descriptions presented). After each description a black screen was presented. The task was further self-paced; participants had to press the space bar to get to read the next description, which could be neutral, negative, or positive (e.g. "*Lay stretched out on the couch*

to read a magazine"; "*Insulted a journalist during a discussion*"; "*Sent Christmas cards to all his friends and acquaintances*"). When participants decided to end the task, they had to press the right shift button labeled 'STOP'. In line with previous MAI studies, total time spent on the task was registered as a measure of task persistence.

2.4. Mood induction

All participants were presented first with a neutral video fragment and subsequently one of two emotional film fragments in order to induce a positive or negative mood. The neutral fragment concerned a weather report with a documentary element on lunar eclipses and was presented in order to neutralize participants' initial mood states. A joyful and colorful scene from the motion picture '*Le fabuleux destin d'Amélie Poulain*' (2001, by Jean-Pierre Jeunet) was used for the positive mood induction, whereas a gray and gloomy excerpt from the movie '*Il y a longtemps que je t'aime*' (2008, by Philippe Claudel) was used to induce a negative mood. Current mood induction procedure has been successfully used in previous pain-related research (Karsdorp, Ranson, Schrooten & Vlaeyen, 2012).

2.5. Stop-rule induction

Participants received one of two instructions for the impression formation task in order to manipulate their adopted stop-rule during task execution. Participants in the achievement-oriented condition were instructed to ask themselves the following question while reading the behavioral descriptions: "*Can I make up my mind about person X based on the information I have read so far?*" They were instructed to stop the task when the answer was 'yes' and to continue reading behavioral descriptions when the answer was 'no'. In the hedonic stop-rule condition participants were instructed to ask themselves: "*Do I feel like performing this task?*" Accordingly, they were instructed to stop the task when the answer was 'no' and to continue in case the answer was 'yes'. It was made clear to all participants there was no right or wrong time to stop, but that they should stop the task when they had enough information or until they no longer felt like continuing, respectively.

2.6. Pain stimulus

The mechanical pressure pain stimulus was administered by use of a slightly modified Forgione-Barber pain stimulator (Forgione & Barber, 1971). The device consists of a wooden board with an adjustable Plexiglas plate on which the finger is positioned. An aluminium lever with a movable weight of 418 g was used to adjust the pressure. A one millimeter wide Plexiglas wedge was placed on the middle phalanx of participants' index-finger of the non-dominant hand. The pressure applied to the finger was 1700 g or 16.68 N. Usually, the resulting painful sensation increases gradually but does not cause tissue damage or injury (Koltyn, Garvin, Gardiner & Nelson, 1996; Peters, Schmidt & Van den Hout, 1989). The stimulus was administered on two separate occasions: a 10 s introduction to the pain stimulus at the start of the experiment; and during the impression formation task.

2.7. Measures

2.7.1. Pain-related fear

To assess the degree of pain-related fear the Dutch version (Peters, Van Damme, Goubert, Vlaeyen & Crombez, 2002) of the Fear of Pain Questionnaire-III ((FPQ-III) McNeil & Rainwater, 1998) was used. Participants indicated the degree of fear during painful experiences for each of the thirty items on a five-point Likert scale, ranging from '1' (absolutely no fear) to '5' (extreme fear).

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