Journal of Experimental Social Psychology 47 (2011) 1107–1115

Contents lists available at ScienceDirect

Journal of Experimental Social Psychology

journal homepage: www.elsevier.com/locate/jesp

Creative production by angry people peaks early on, decreases over time, and is relatively unstructured ☆

Matthijs Baas [a,*], Carsten K.W. De Dreu [a], Bernard A. Nijstad [b]

[a] Department of Psychology, University of Amsterdam, Roetersstraat 15, 1018 WB Amsterdam, The Netherlands
[b] Department of HRM and Organizational Behavior, University of Groningen, The Netherlands

ARTICLE INFO

Article history:
Received 2 July 2009
Revised 18 April 2011
Available online 16 May 2011

Keywords:
Anger
Sadness
Creativity
Emotion
Resource depletion
Information processing

ABSTRACT

Anecdotes and introspective reports from eminent scientists and artists aside, a systematic test of the putative creativity-enhancing effect of anger is missing. This article fills this void with three experiments examining creativity as a function of anger (vs. sad or a mood-neutral control state). Combining insights from the literatures on creativity and on mood and information processing the authors predicted that anger (vs. sadness and a mood-neutral control state) triggers a less systematic and structured approach to the creativity task, and leads to initially higher levels of creativity (as manifested in original ideation and creative insights). Following work on resource depletion, the authors further predicted that anger more than sadness depletes resources and that, therefore, creative performance should decline over time more for angry than for sad people. Results supported predictions. Implications for creativity, information processing, and resource depletion are discussed.

Mood stands out as one of the most widely studied and least disputed predictors of creativity (Ashby, Isen, & Turken, 1999). In fact, there is substantive evidence that happy moods are associated with enhanced creativity (e.g., Baas, De Dreu, & Nijstad, 2008; Hirt, Devers, & McCrea, 2008). However, "there is also a large literature on negative affect, which indicates that the impact of negative affect [on creativity] is more complex and difficult to predict than is the case for positive affect" (Ashby et al., 1999, p. 532). This is unfortunate because whereas some argue and report that negative mood states are associated with reduced creativity (e.g., Lyubomirsky, King, & Diener, 2005; Vosburg, 1998), others have argued or reported that negative moods may actually enhance creative performance (e.g., Akinola & Mendes, 2008; Baas et al., 2008). Indeed, some of the great scientists and artists were known for their bad temper (Eysenck, 1993) and some of the most creative scientific discoveries have been attributed to the conflict between competing laboratories, with their respective academic directors being driven by distrust, anger and frustration (White, 2001; also see De Dreu & Nijstad, 2008). For instance, Nobel Prize laureate Max Perutz commented on his experiment that proved Linus Pauling's proposed structure of the alpha-helix: "The idea was sparked off by my fury over having missed that beautiful structure myself" (Ferry, 2007, p. 148).

These anecdotes and introspective reports suggest that anger stimulates creativity. The two studies that speak to this possibility both showed that angry people were as creative as happy people, and both angry and happy people outperformed mood-neutral controls (De Dreu, Baas, & Nijstad, 2008; Russ & Kaugars, 2001). However, neither study provides insight into the underlying processes — why do angry moods produce more creativity than mood-neutral controls and perhaps other negative mood states such as sadness? Also, there is reason to suspect that the creativity-enhancing effects of anger may be of relatively short duration and quickly dissipate over time, but because past work always used creativity tasks of rather short duration this issue cannot be settled without new research. This article deals with these and related issues, so as to further clarify the role of anger (versus sadness and neutral mood) in the creative process. In partial deviation from earlier work on anger and creativity, we argue and show that anger activates and leads to a relatively unstructured approach to the tasks which drives creative performance but also taxes energy and causes resource depletion. As a result, compared to sad people, those being angry are more creative early on but due to greater resource depletion also show a greater decline in creative performance over time. Hypotheses were tested in three experiments, two focusing on idea generation, and one focusing on creative insights.

The creative force of anger

Creativity is defined as the production of original and appropriate ideas, products, insights, and problem solutions (e.g., Amabile, 1983). Creativity is a function of two psychologically quite distinct cognitive processes: flexibility and persistence (Baas et al., 2008; De Dreu et al., 2008; Nijstad, De Dreu, Rietzschel, & Baas, 2010; also see Boden, 1998;

☆ This research was supported by the FMG-UvA Research Priority Grant on Affect Regulation.

* Corresponding author.
E-mail address: m.baas@uva.nl (M. Baas).

0022-1031/$ – see front matter © 2011 Elsevier Inc. All rights reserved.
doi:10.1016/j.jesp.2011.05.009

Hirt et al., 2008; Newell & Simon, 1972). Flexible thinking captures the use of broad and inclusive cognitive categories (e.g., Eysenck, 1993; Hirt et al., 2008; Mednick, 1962) and the adaptive switching among categories, approaches and sets (e.g., Ashby et al., 1999; Duncker, 1945; Smith & Blankenship, 1991). Flexible thinking leads to many and original responses because it facilitates accessibility of more remote informational links and finding new connections among categories and concepts (Friedman & Förster, 2010) and consideration of many categories also leads to the generation of ideas in categories that are not habitually considered (Nijstad et al., 2010). Persistence involves systematic exploration of problem space and incremental search processes, and captures the notion that creativity can also result from systematic examination of possible solutions and in depth survey of only a few categories or perspectives (Newell & Simon, 1972; Nijstad et al., 2010; Rietzschel, Nijstad, & Stroebe, 2007).

For both flexibility and persistence to come about, the individual needs some level of cognitive activation (e.g., Baddeley, 2000; Broadbent, 1972; De Dreu et al., 2008; De Dreu, Nijstad, & Baas, 2011). Cognitive activation refers to increased engagement of centrally organized motivational systems to mobilize energy to sustain attention and effort toward goal-related activities (Baas, De Dreu, & Nijstad, 2011; Lang & Bradley, 2010) and is accompanied with physiological indicators of the sympathetic nervous system, such as increased blood pressure and heart rate (Lang & Bradley, 2010), and metabolic load (Gailliot et al., 2007). Indeed, recent work shows that moderate activation associates with enhanced creativity (Baas et al., 2011; Byron, Khazanchi, & Nazarian, 2010; De Dreu et al., 2011; Gilet & Jallais, 2011).

From this work on activation and creative performance, it follows that any state that activates the individual stimulates creativity, either through its influence on flexibility or persistence. De Dreu et al. (2008) compared, among other things, creative performance by angry, sad, and mood-neutral individuals. Based on the idea that anger mobilizes energy and activates the individual, whereas sadness deactivates and leads to disengagement (Depue & Iacono, 1989; Frijda, 1986; Klinger, 1975; Kreibig, 2010), the authors predicted and showed more creativity among angry than sad or mood-neutral individuals. They proposed that anger more than sadness triggers persistence and therefore leads to greater creativity. However, they did not test this mediating process. Here we expected to replicate that anger enhances creativity more than sadness and neutral mood. More importantly, however, we consider the possible reasons for this effect in more detail, firstly focusing on possible information processing differences between angry and sad individuals and, secondly, possible differences in resource depletion and concomitant interactions between mood and time-on-task.

Structured information processing in sadness and anger

There is a longstanding research tradition linking mood to focused and systematic versus more shallow and loose information processing styles (e.g., Mackie & Worth, 1989; Schwarz, 1990; Sinclair & Mark, 1995). The basic idea is that the engagement of a particular processing mode depends on the specific negative mood that is activated (Tiedens & Linton, 2001). Because sadness entails an appraisal of uncertainty (Lerner & Tiedens, 2006; Tiedens & Linton, 2001), it is associated with a higher need for structure (Thompson, Naccarato, Parker, & Moskowitz, 2001) and a spontaneous engagement in a detail-oriented and systematic step-by-step analysis of the information at hand (e.g., Mackie & Worth, 1989; Schwarz, 1990). For example, sadness is associated with spontaneous engagement in algorithmic and analytical information processing (Schwarz, 1990; Sinclair & Mark, 1995), encoding of information into narrow conceptual categories (Bless, Hamilton, & Mackie, 1992), low distractibility and a sustained analysis of problem material (Andrews & Thomson, 2009), and restricted accessibility of remote concepts in working memory (Bolte, Goschke, & Kuhl, 2003).

Unlike sadness, anger entails appraisals of certainty and control (Lerner & Tiedens, 2006; Tiedens & Linton, 2001). Accordingly, anger curtails analytic processing and leads to more heuristic and shallow information processing (Bodenhausen, Sheppard, & Kramer, 1994; Lerner & Tiedens, 2006) and increased distractibility (Kochanska & Knaack, 2003). Compared to sad people, those in angry moods engage to a lesser extent in item-specific processing of information (Corson & Verrier, 2007) but activate more widespread associative networks (Gilet & Jallais, 2011). In other words, anger leads to less systematic and detailed information processing than sadness. Note that this contrasts with the idea that anger promotes creativity because anger activates the individual to engage in *more* persistent and systematic work than sadness (De Dreu et al., 2008). Thus, previous work on anger and creativity may have incorrectly inferred the processes held responsible for the creativity-enhancing effects of anger.

In ideation tasks, like the ones used in work on anger and creativity, the use of a less systematic and structured processing mode is reflected in less semantic clustering in idea production (Nijstad & Stroebe, 2006). That is, ideas either belong to the same or to different semantic categories (e.g., when generating ideas about possible uses for a brick, categories might be to build something, use it as a weapon, or as an instrument; see Guilford, 1967). Successively generated ideas often fall in the same semantic category (category repetitions) but switches among categories occur as well (category changes). More semantic clustering occurs with many category repetitions rather than changes (i.e., less switching back and forth between categories), and is indicative of a more systematic and organized approach to idea generation (also see Nijstad & Stroebe, 2006; Nijstad, Stroebe, & Lodewijkx, 2003; Rietzschel et al., 2007). For example, when generating possible uses for a brick, individuals might systematically explore an existing category (e.g., a brick to build something) by retrieving knowledge about “bricks” and “building” from long-term memory and by combining and adding features in working memory they come up with several successive ideas within that category (e.g., a brick to build a wall, a house, and a palace for their fish).

Because angry compared to sad individuals have more semantic categories available to sample ideas from (i.e., in a sad mood, widespread activation of concepts is restricted), they may be less likely to process information in a systematic and organized approach and are distracted more easily. Angry individuals may be more likely to survey a greater number of semantic categories and switch among those categories during idea generation. Thus, our first hypothesis is that angry individuals take a less systematic and structured approach to the creativity task than sad individuals.

Anger taxes resources more than sadness

Creativity tasks are relatively difficult and taxing tasks. For example, because the initial or dominant response to creative insight problems is likely to be incorrect, these problems often lead to an impasse and require individuals to actively restructure the presented problem material and to approach the problem from multiple angles (Schooler & Melcher, 1995). Likewise, both idea generation and insight require sustained attention and active search processes that involve the retrieval of existing concepts from long-term memory and the combination and transformation of these concepts in working memory (Finke, 1996; Nijstad & Stroebe, 2006). To perform such tasks, individuals draw on otherwise limited energetic resources (e.g., Gailliot, 2008; Kaplan & Berman, 2010) and when these resources are depleted, performance suffers and individuals feel fatigued (Boksem & Tops, 2008; Wickens, 1984).[1] Indeed, for brainstorming tasks of considerable length (i.e. lasting for 20 min), creative performance

[1] Although performance decrements typically show up on tasks that last relatively long (30 min or more; Parasuraman, 1985), decrements also occur on tasks that have durations of 15 (Fairclough & Houston, 2004) or 10 min or less (Gailliot, 2008), leading Smit, Eling, and Coenen (2004) to suggest that it is not task duration per se, but rather resource demands that determine performance decrements.