Acta Psychologica 155 (2015) 57–66

Contents lists available at ScienceDirect

Acta Psychologica

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

Go with the flow: How the consideration of joy versus pride influences automaticity

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ARTICLE INFO

Article history:
Received 25 July 2014
Received in revised form 3 December 2014
Accepted 8 December 2014
Available online xxxx

PsycINFO classification:
2360
2340

Keywords:
Considered emotions
Self-control
Automaticity
Task switching
Joy
Pride

ABSTRACT

Recently, we have shown that the consideration of joy, without the actual experience of the emotion, impaired performance on the antisaccade task (Katzir, Eyal, Meiran, & Kessler, 2010). We interpreted this finding as indicating inhibitory control failure. However, impaired antisaccade performance may result from either the weakening of inhibitory control, the potentiation of the competing automatic response, or both. In the current research we used a task switching paradigm, which allowed us to assess cognitive control more directly, using Backward Inhibition, Competitor Rule Suppression, and Competitor Rule Priming as cognitive-control indices as well as assessing the Task Rule Congruency Effect (TRCE) which, like the antisaccade, is influenced by both control and automaticity. We found that considering joy compared to pride did not influence any of the cognitive control indices but increased the TRCE. We interpret this finding as evidence that joy consideration leads to increased reliance on automatic tendencies, such as short-term desires.

1. Introduction

Self-regulation, also referred to as 'cognitive control' and 'executive functions', involves ensuring that the individual would perform in a manner that serves long-term goals. It requires overriding pre-potent yet counterproductive tendencies associated with automaticity, habit or temptation. Emotions undoubtedly play an important role in self-regulation (Carver & Scheier, 1990; Tangney, Stuewig, & Mashek, 2007), but the exact nature of this role is not clear. In this work we examine how the consideration of an emotion without its actual experience influences cognitive mechanisms underlying self-regulation. Previously, we found that the consideration of joy[1] impaired antisaccade (Hallett, 1978) performance compared to the consideration of pride and attributed this finding to impaired inhibitory control following considered joy (Katzir, Eyal, Meiran, & Kessler, 2010). However, performance in the antisaccade task involves a conflict between controlled and automatic tendencies (Nigg, 2000). It is therefore unclear whether the effect of joy versus pride on performance in the antisaccade is due to decreased control or increased automaticity. In this research, we sought to explore the specific cognitive processes underlying the effect of considered emotions on self-regulation by using a switching paradigm that allows the inspection of several cognitive control functions, including inhibition (Katzir, Meiran, Ori, & Hsieh, in press; Kiesel et al., 2010; Koch, Gade, Schuch, & Philipp, 2010; Mayr & Keele, 2000; Meiran, Hsieh, & Dimov, 2010).

1.1. Emotions and cognitive control

Research examining how emotions influence cognitive control has mainly focused on general affective states, and has yielded inconclusive findings (for a review see Mitchell & Phillips, 2007). Positive affect either impaired (e.g., Dreisbach, 2006; Oaksford, Morris, Grainger, & Williams, 1996; Phillips, Bull, Adams, & Fraser, 2002; Rowe, Hirsh, & Anderson, 2007), improved (e.g., Kuhl & Kazén, 1999; Van der Stigchel, Imants, & Ridderinkhof, 2011; van Wouwe, Band, & Ridderinkhof, 2011), or had no influence (Bruyneel et al., 2013; Larson, Gray, Clayson, Jones, & Kirwan, 2013; Van Steenbergen, Band, & Hommel, 2010 (Stroop results); Wang et al., 2011) on performance in a variety of cognitive tasks. Research examining more than one cognitive function found that positive affect has both advantages and disadvantages for cognitive functioning. It increases flexibility by biasing towards new information, but it also decreases stability by reducing maintenance of relevant information (Dreisbach & Goschke,

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[1] We use the term "joy" (instead of "happiness") because we refer to a specific emotion rather than to a general mood. Thus, we instructed participants to think about future happiness resulting from experiences involving *joy* and *fun* (for a similar explanation see Campos, Shiota, Keltner, Gonzaga, & Goetz, 2013).

http://dx.doi.org/10.1016/j.actpsy.2014.12.003
0001-6918/

2004; Dreisbach, 2006, for a similar result see Liu & Wang, 2014). Positive affect was also found to play a role in balancing proactive control (i.e., preparation for anticipated control demand) and reactive control (i.e., transient increase in control in response to conflict, see Braver, 2012). Specifically, although positive affect reduces proactive control, it increases reactive control (Dreisbach, 2006, but see van Wouwe et al., 2011 for no influence of positive affect on reactive control and see Fröber & Dreisbach, 2012 for limitations of this effect). To conclude, the abovementioned research yielded inconclusive results. A common feature of this research is that it focused on valence (but see Fröber & Dreisbach, 2012; Liu & Wang, 2014). In this paper, we adopt an approach we recently suggested (Katzir et al., 2010) to examine how positive affect influences cognitive processes. This approach suggests that in order to broaden our understanding of the influence that emotions have on cognitive processes, the focus should be on the goals (long- vs. short-term) that are associated with distinct emotions.

Recent research suggests that emotions can be classified as basic vs. self-conscious, and that the two types of emotions are associated with distinct goals. Because of the clear relationship between cognitive control and goals, the two types of emotions differentially influence self-regulation when encountering self-control conflicts. Specifically, the self-conscious emotion pride is associated with adherence to long-term goals while the basic emotion joy is associated with succumbing to temptations (Eyal & Fishbach, 2010; Hofmann & Fisher, 2012; Hung & Mukhopadhyay, 2012; Wilcox, Kramer, & Sen, 2011; Williams & DeSteno, 2008).

Cognitive neuroscience research suggests that the exertion of self-control is enabled by control signals coming from the prefrontal cortex, which in turn influences subcortical brain areas associated with emotions and appetitive cues (Heatherton & Wagner, 2011). In line with the aforementioned relation between emotions and self-control, emotions associated with short-term desires (e.g., joy) were found to activate regions in the limbic system and deactivate prefrontal areas (Aalto et al., 2002; George et al., 1995), whereas emotions associated with long-term goals (e.g., pride) were found to activate prefrontal cortical areas (Gilead, Katzir, Eyal, & Liberman, under review). These prefrontal systems are widely believed to subserve cognitive control functions that facilitate the attainment of long-term goals in the face of short-term interference (e.g., Barkley, 2001; Hofmann, Schmeichel, & Baddeley, 2012; Miller & Cohen, 2001; Muraven & Baumeister, 2000).

In this work, we are interested in the influence of emotions on self-regulation. Whereas much of the research on emotion and self-regulation has focused on emotional *experience* (e.g., Williams & DeSteno, 2008), it has been recently argued that merely *considering* an emotion without its experience can influence self-regulation by activating (short/long-term) goals associated with that emotion (Baumeister, Vohs, DeWall, & Zhang, 2007; Dorfman, Eyal, & Bereby-Meyer, in press; Katzir et al., 2010). This activation then alters the *readiness* of the cognitive system to achieve the desired goals by increasing cognitive control when considering pride, and reducing cognitive control when considering joy.[2] Initial support for this claim comes from a research in which we found that the consideration of joy hampered performance in the antisaccade task relative to the consideration of pride (Katzir et al., 2010).

1.2. The current study

Although Katzir et al. (2010) found that considering joy harmed performance in the antisaccade task compared to considering pride, the exact cognitive mechanism underlying this effect is yet unclear. Commonly, the antisaccade task is suggested to measure inhibition (e.g., Miyake et al., 2000; Nigg, 2000). Yet, others have claimed that this task measures the operation of other cognitive control functions such as activation and maintenance of task goals (Nieuwenhuis, Broerse, Nielen, & De Jong, 2004). Moreover, a shortcoming of most conflict tasks is that they involve a conflict between two response tendencies: the preferred response according to the task goal (representing cognitive control) and a competing pre-potent but inappropriate response tendency (representing automaticity). For example, in the antisaccade task, there is a pre-potent automatic tendency to look in the direction of the cue whereas the required response is to look in the opposite direction. Therefore, a drop in performance in the antisaccade task could result from the weakening of control, the potentiation of automaticity, or both. A relevant example comes from the Stroop (1935) task, in which participants name the ink color of incompatible/compatible color words. Like the antisaccade task, the Stroop task is also a conflict task (the conflict being between the automatic tendency to read the word and the instructed response — to name the ink color). Accordingly, some authors treat the Stroop task as an index of automaticity (e.g., Tzelgov, 1997), whereas others treat it as an index of cognitive control (e.g., Roelofs, 2003). Accordingly, Stroop performance has been shown to improve (indicating less interference) when participants were watched by another person, a result that has been interpreted as indicating lesser automaticity, namely, reflecting the reduced potency of the competing word-reading response (Huguet, Galvaing, Monteil, & Dumas, 1999). Furthermore, even if control is affected, it is unclear which type of control it is — active inhibition of irrelevant behavioral tendencies (Friedman & Miyake, 2004; Nigg, 2000), and/or activation of task relevant information, such as the goal (Brown, Reynolds, & Braver, 2007; Yeung & Monsell, 2003).

In the current research, we capitalized on the advantages of the task switching paradigm, in an effort to clarify the underlying processes that are prone to the influence of considered emotions. This task enables the extraction of indices which tap control relatively purely as well as assessing a conflict-related index, which like the antisaccade and the Stroop tasks, may reflect both automaticity and control. Below we briefly describe each of these indices.

1.2.1. Indices in task switching

1.2.1.1. Task Rule Congruency Effect (TRCE). In task-switching paradigms, participants classify a set of stimuli by applying one out of two or more task rules on each trial. Because the responses overlap between the tasks, trials can be either congruent (i.e., the correct response according to the relevant task rule and the irrelevant task rules are mapped to the same key) or incongruent (i.e., these responses are mapped to different keys). In the latter case, each irrelevant task rule that is mapped to a key different from the relevant rule becomes a *competitor rule*. The TRCE is the behavioral cost in incongruent trials relative to congruent trials (Sudevan & Taylor, 1987; see Meiran & Kessler, 2008, for review).

Importantly, the TRCE, like antisaccade performance, is a conflict-related index with the conflict being between the automatic tendency to react according to the competitor rule (Kiesel, Wendt, & Peters, 2007; Meiran & Kessler, 2008) and the controlled tendency to react according to the relevant task rule. The TRCE therefore represents a blend of processes reflecting cognitive control and processes reflecting automaticity. Specifically, the TRCE represents interference coming from the irrelevant task rule(s). This interference may represent the potentiation of the irrelevant competing rule(s), and would influence the TRCE by increasing it. However, the resolution of this interference would influence the TRCE by decreasing it. Since the magnitude of the TRCE can be explained with both processes (i.e., large TRCE can represent either increased automaticity or reduced cognitive control), it resembles the antisaccade task.

[2] Note that this distinction somewhat simplifies the reality, in which a mixture of joy and pride could result from appraising the situation as involving the attainment of both short- and long-term goals. For example, exercising may elicit both pride, for promoting one's health and fitness, and joy for the nice music, and atmosphere in the gym. People may sometimes mistakenly use the terms joy and pride interchangeably. To make sure participants made a distinction between joy and pride, we defined the emotion and gave examples of related activities. We also excluded participants who wrote about joy for attaining a long term goal and pride for attaining a short-term goal.