Available online at www.sciencedirect.com

ScienceDirect

Journal of Experimental Social Psychology 43 (2007) 1–16

Journal of Experimental Social Psychology

www.elsevier.com/locate/jesp

Gassing, braking, and self-regulating: Error self-regulation, well-being, and goal-related processes ☆

Michael D. Robinson *

Psychology Department, North Dakota State University, Fargo, ND 58105, USA

Received 20 April 2005; revised 22 October 2005
Available online 23 June 2006
Communicated by Fiedler

Abstract

Social cognitive models point to a widespread appreciation for the role that self-regulation functions play in mediating social outcomes. The present five studies, involving 527 undergraduate participants, sought to build on such models in the context of individual differences in error self-regulation. In this respect, the studies used a robust cognitive model, namely one that proposes that people seek to interrupt processing routines after making an error in choice reaction time tasks. Studies 1–3 showed that greater tendencies toward error self-regulation predicted higher levels of well-being. Studies 4–5 extended such results by showing that greater tendencies toward error self-regulation predicted superior abilities to recognize motive-relevant stimuli (Study 4) and override a prior task set in favor of a new task set (Study 5). Overall, the findings both point to the functionality of individual differences in error self-regulation and help to elucidate the processing basis of such relations.

Keywords: Cognition; Self-regulation; Error monitoring; Subjective well-being; Depression; Goal processes

Introduction

One should not treat the gas and brake pedals equivalently. The two pedals are designed to serve fundamentally different functions, namely those associated with going forward and slowing down, respectively. Similarly, recent research on *error self-regulation* has shown that people will often adjust their reaction time performance in such a way as to speed up following correct responses and slow down following incorrect responses (Dehaene, Posner, & Tucker, 1994; Holroyd & Coles, 2002). Although this specific method of examining self-regulation tendencies has not been extensively used in social cognition research, it is nevertheless true that cognitive flexibility is viewed as highly adaptive in relation to many social outcomes. For example, self-regulation abilities have been linked to lower levels of aggression (Ayduk et al., 2000) and prejudice (Plant & Devine, 1998), as well as higher levels of achievement (Tice & Baumeister, 1997) and helpfulness (Eisenberg, Fabes, Guthrie, & Reiser, 2000). Self-regulation abilities are also thought to mediate many other important social outcomes such as those related to relationship maintenance (Vohs & Ciarocco, 2004) and self-esteem maintenance (Leary, 2004).

Social psychologists have recently embraced individual difference variables for their capacity to provide insight into social phenomena (Mischel, 2004; Snyder & Cantor, 1998). However, in choosing individual difference variables for study, social psychologists (in contrast to personality psychologists) tend to select variables more proximal to the phenomenon of interest, for example as related to prejudice (Devine, Brodish, & Vance, 2005) or associations to the self (Greenwald & Farnham, 2000). Moreover, individual difference variables appear to be particularly important in the domain of self-control and social outcomes (Tangney, Baumeister, & Boone, 2004). Thus, from a social cognitive

☆ The author acknowledges support from NIMH (MH 068241) and input from Maya Tamir.
* Fax: +1 701 231 8426.
E-mail address: Michael.D.Robinson@ndsu.edu.

0022-1031/$ - see front matter
doi:10.1016/j.jesp.2005.11.009

perspective, it is useful to focus somewhat squarely on individual differences in self-regulation, which should have widespread implications for a variety of social phenomena (e.g., see chapters in Baumeister & Vohs, 2004).

Having made the somewhat general point that self-regulation abilities appear important to a variety of social phenomena, it is useful to suggest that such abilities should ideally be measured in a manner independent of motivation and success. For example, it is fair to assume that all biological organisms are motivated to obtain rewards and avoid punishments (Lang, Bradley, & Cuthbert, 1997). Yet, they certainly differ in their tendencies (Robinson, Meier, & Vargas, 2005) and abilities (Mischel, Shoda, & Peake, 1988) to successfully achieve wanted outcomes, while avoiding unwanted outcomes (Mischel & Ayduk, 2004). It is equally important to measure self-regulation abilities in a manner not synonymous with success. For example, a study reporting that self-reports of self-regulation failure predict self-regulation failure could be viewed as somewhat tautological without a measure of the relevant social cognitive processes (Cervone, 1999; Robinson, Vargas, & Crawford, 2003). The present research therefore seeks to measure self-regulation abilities in terms of reaction time performance, a goal compatible with recent social cognitive work (e.g., Greenwald & Farnham, 2000; Nosek & Banaji, 2001; Robinson & Cervone, 2006).

Error self-regulation in mind and brain

A large number of recent studies have supported a particular cognitive model of self-regulation (for a review, see Bush, Luu, & Posner, 2000). The mind and brain seem essentially designed to develop cognitive/behavioral habits to most efficiently achieve performance outcomes (Bargh & Chartrand, 1999; Logan, 1988). However, it is also recognized that cognitive/behavioral habits sometimes lead us astray in the pursuit of desired goals (Baumeister, Muraven, & Tice, 2000; James, 1890). Therefore, it is important for the individual to be sensitive to recent errors (Holroyd & Coles, 2002) or to the likelihood of errors in the future (Carter et al., 1998). Given such increased tendencies to make an error, the individual should slow down and adopt a more effortful mode of categorizing stimuli (Banfield, Wyland, Macrae, Münte, & Heatherton, 2004; Lieberman, 2003). Self-regulation, from the perspective of this general model, seems to involve knowing when to speed up versus slow down in the favor of efficient and accurate performance (Holroyd & Coles, 2002; Lieberman, 2003).

Early research in this area documented the fact that the anterior cingulate cortex appears to be exquisitely sensitive to recent errors made by the self (e.g., Dehaene et al., 1994). The anterior cingulate is part of the frontal lobe, which in general seems critical for the self-regulation of behavior (e.g., Shallice & Burgess, 1993). More recent research has suggested that although the anterior cingulate is exquisitely sensitive to errors, other areas within the frontal lobe seem important in instantiating error control functions (Banfield et al., 2004; Kerns et al., 2004). Although there are some discrepant views of the error self-regulation system (for a review, see Bush et al., 2000), the general consensus appears to be that such post-error adjustments are crucial to the effective self-regulation of behavior (e.g., Lieberman, 2003). For example, deficiencies in this error self-regulation system have been associated with drug abuse (Bolla et al., 2004) and schizophrenia (Haznedar et al., 2004).

The latter neurocognitive perspective is particularly exciting because it helps to understand the manner in which the mind/brain self-regulates behavior (Banfield et al., 2004; Lieberman, 2003). When there is a mismatch between two signals, such as the desired goal (e.g., to be accurate) versus the recent outcome (e.g., an inaccurate response by the self), the brain is capable of detecting this goal-outcome mismatch and recruiting other brain areas to perform subsequent behavior in a more controlled, careful manner (Kerns et al., 2004). We recognize, of course, that all behaviors must ultimately be mediated by neurological structures (e.g., Posner & Raichle, 1994). However, the error self-regulation literature goes far beyond such a simplistic conclusion by pointing to the manner in which specific frontal areas are involved in error self-regulation (e.g., Banfield et al., 2004). Although the present studies did not involve neurological measurement techniques, it is still comforting to us that the general approach taken here is so strongly supported by neurocognitive data. Indeed, this recent neurocognitive model must be viewed as one of the most successful attempts to develop a dialog between social psychology and cognitive neuroscience (Lieberman, 2003).

With respect to this general model, one question that naturally arises is why the individual would ever choose to perform a task quickly, given that doing so might tend to produce errors when dominant response tendencies are likely to be error-prone. At least two comments can be offered in response to this question. One, executive capacity is considered somewhat limited in nature (Baddeley, 1996; Muraven & Baumeister, 2000). For this reason, a reliance on more automated sorts of routines spares executive resources for other activities (Bargh & Chartrand, 1999; Lieberman, 2003). Two, more automated sorts of routines are, by their very nature, faster and thus more efficient (Bargh & Chartrand, 1999; Strack & Deutsch, 2004). For this reason, again, it is desirable to rely on automatic stimulus-processing routines to the extent possible (Baddeley, 1996; Logan, 1988).

Given the preceding points, it would appear that the individual would generally be served by switching from more automatic to more controlled modes of responding when there has been some recent tendency toward error (Lieberman, 2003). The present research sought to build upon these insights by (a) developing an individual difference measure along these lines and (b) examining the correlates of such a measure. The investigation has the potential to extend the neurocognitive model discussed above to the types of dependent measures (e.g., aggression, helping behavior, and subjective well-being) of most relevance to social/personality psychologists. In the present studies, the specific focus was on well-being and goal processes, both of