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# Being of two minds: Switching mindsets exhausts self-regulatory resources

Ryan Hamilton [a,*], Kathleen D. Vohs [b], Anne-Laure Sellier [c], Tom Meyvis [c]

[a] Marketing Department, Goizueta Business School, Emory University, United States
[b] Marketing Department, Carlson School of Management, University of Minnesota, United States
[c] Marketing Department, Leonard Stern School of Business, New York University, United States

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ABSTRACT

The human psyche is equipped with the capacity to solve problems using different mental states or mindsets. Different mindsets can lead to different judgment and decision making styles, each associated with its own perspective and biases. To change perspective, people can, and often do, switch mindsets. We argue, however, that mindset switching can be costly for subsequent decisions. We propose that mindset switching is an executive function that relies on the same psychological resource that governs other acts of executive functioning, including self-regulation. This implies that there are psychic costs to switching mindsets that are borne out in depleted executive resources. One implication of this framework is that switching mindsets should render people more likely to fail at subsequent self-regulation than they would if maintaining a consistent mindset. The findings from experiments that manipulated mindset switching in five domains support this model.



## Introduction

People have the remarkable ability to solve the same problems using qualitatively different methods. In the physical world, one can use different tools to complete the same task. In the psychological world, one can use different mental states to reach the same goal. These mental states, broadly referred to as mindsets, consist of sets of mental processes that produce a disposition or readiness to respond in a particular manner (Gibson, 1941; Gollwitzer, 1990). Mindsets have proven to be important for explaining human judgment and decision making in that some mindsets can ameliorate or exacerbate decision biases. For example, activating a counterfactual mindset minimizes the confirmation bias observed in group decision making (Kray & Galinsky, 2003). Activating a transactional mindset (e.g., an "everything must go" mindset for sellers or an "I've absolutely gotta have it" mindset for buyers) diminishes and can even reverse the endowment effect (Mandel, 2002). A probabilistic mindset (e.g., prompting people to estimate probabilities or ratios) leads to less intuitive, more rational decision making (Rottenstreich & Kivetz, 2006). Yet the converse can occur too in that some mindsets magnify biased responding. For example, people with a high degree of confidence in their own personal objectivity might adopt an "I think it, therefore it must be true" mindset, which can increase gender discrimination (Uhlmann & Cohen, 2007).

A synthesis of previous research suggests that optimal decision making may necessitate the use of more than one mindset. Consider, for example, collectivist mindsets, in which interpersonal ties and group harmony are emphasized, and individualist mindsets, in which autonomy and personal happiness are emphasized. There are tradeoffs in terms of which of these two mindsets is best for group performance because each confers different benefits. Collectivist values are associated with strong norms to be cooperative (Wagner, 1995) and maintain positive, salient group identities (Chatman, Polzer, Barsade, & Neale, 1998). Yet, inventiveness seems to be heightened by an individualist mindset in that groups of people that were induced to activate individualist mindsets are more creative than groups induced to activate collectivist mindsets (Goncalo & Staw, 2006). Therefore, if the tasks facing an organization require both cooperation and creativity—not an uncommon pair of demands—then successful performance might require regular switching between collectivist and individualist perspectives.

Fortunately, mindset theories rest on the assumption that people are not locked into a single *modus operandi* but are in fact able to switch mindsets. Unlike a strong preference such as handedness, people seem able to adopt different mindsets depending on their motives or situational demands. Although there is ample evidence that people can and do switch mindsets, surprisingly little is known about how such switching takes place. In this article, we propose that switching mindsets is an act of executive control and, as such, is governed by the same psychological mechanism

* Corresponding author. Address: Goizueta Business School, Emory University, 1300 Clifton Road, Atlanta, GA 30322, United States.
*E-mail address:* ryan_hamilton@bus.emory.edu (R. Hamilton).

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that enables other forms of executive functioning. Since other acts involving executive functioning are known to consume regulatory resources, leaving people likely to fail at subsequent self-regulation (see Baumeister, Vohs, & Tice, 2007), so too should switching mindsets. In five experiments, we predicted and found that switching mindsets results in poorer self-regulation than maintaining a consistent mindset.

## Switching mindsets and executive functioning

### *Mindsets: definition and properties*

The concept of mindsets dates back to some of the earliest experiments in psychology (e.g., Ach, 1905). Those early experiments, and many more since, have found that engaging in certain tasks activates a set of cognitive operations characterized by two properties. First, in order for cognitive procedures to qualify as a mindset, they must be more general than those needed strictly for the completion of the task at hand. Put another way, mindsets promote orientations that are not specific to a particular task but rather represent a global readiness to respond in a particular way (Freitas, Gollwitzer, & Trope, 2004; Gollwitzer, 1990). Second, they are sticky: once activated, mindsets remain active beyond the initial task, thereby influencing subsequent and even unrelated tasks.

The mindset construct has been invoked to explain phenomena as diverse as goal pursuit (Gollwitzer, 1990), inference making (Fiedler, Schenck, Watling, & Menges, 2005), interpersonal relationships (Gagne & Lydon, 2001), stereotyping (Sassenberg & Moskowitz, 2005), and fairness (Van Den Bos, 2002). Other theories do not invoke the term mindset but nonetheless propose that people routinely use qualitatively different orientations when performing the same activity. Theories of this type include construal level theory (Freitas et al., 2004; Trope & Liberman, 2003), which specifies that people can represent actions at either an abstract or concrete level; motivational theories (Puca & Schmalt, 2001), which specify that people pursue goals by adopting either an approach orientation concerned with "maximizing hits" or an avoidance orientation concerned with "minimizing misses" (Crowe & Higgins, 1997); and regulatory mode theory (Avnet & Higgins, 2003), which specifies that people make decisions using either a thorough, comparative assessment strategy or an efficient, noncompensatory locomotive strategy.

Mindsets differ from goals in that mindsets lack the motivational component that is central to goals. Mindsets are a workspace in which other processes, including goal-directed ones, operate. They do not yield a sense of progress toward an end-state and are not characterized by being completed or achieved the way that one would characterize goal pursuit. Consequently, engaging in a behavior that is consonant with a given mindset would not weaken the strength of the mindset, as would occur with goal-directed behavior. Mindsets also differ from memory structures, such as schemas or categories, which are organized representations of prior experiences (Mandler, 1967). Unlike mindsets, schemas do not promote a general orientation; they are more limited in scope, affecting responses only within the domain of the schema/category. For example, a car schema is unlikely to affect evaluations that fall outside the domain of cars, whereas mindsets shape responses to diverse stimuli.

### *Mindset switching*

Mindset theories share the common assumption that situational cues, such as the demands of a particular task, can shift people from using one mindset to using another. For example mindsets that are chronically active due to trait dispositions (Vallacher & Wegner, 1989) or long-term participation in a specific culture (Lee, Aaker, & Gardner, 2000) can temporarily be changed by a situational prime. Given that different mindsets require approaching the world in qualitatively different ways, it is challenging to simultaneously use more than one mindset at a time, similar to attempting to simultaneously focus the eye on an object far away and another one up close. The implication of this is that when one mindset is active, activating another typically requires switching away from the one currently active.

The idea that it is difficult to concurrently maintain multiple mindsets is illustrated by one prominent example of a mindset theory, the Rubicon model of action phases (Gollwitzer, 1990; Heckhausen & Gollwitzer, 1987). According to this model, the act of making a decision causes a hard break between a pre-decision deliberative mindset, in which people acquire and evaluate information, and a post-decision implemental mindset, in which people focus on goal attainment. Just as Caesar's crossing of the Rubicon represented commitment to a course of action, so does making a decision result in a qualitative shift in psychological processing. Because deliberation and implementation mindsets serve such different ends, people do not simultaneously maintain both mindsets but rather switch from one to the other as the situation demands (Gollwitzer, 1990; Heckhausen & Gollwitzer, 1987).

### *A self-regulation perspective on mindset switching*

Although mindset theories acknowledge that people switch mindsets, they do not address how this switching takes place. The current research proposes that switching mindsets is not automatic nor costless, but rather is an act of the executive function, the aspect of the self that also governs self-regulation (Baumeister, 1998) and decision making (Vohs et al., 2008). We define self-regulation as the modification of habitual, natural, or dominant responses. The model from which we work claims that diverse acts of self-control use a common—but finite—executive resource (Baumeister & Heatherton, 1996). According to this limited-resource model, each act of self-regulation consumes some of the resource, thereby leaving a smaller supply available for subsequent attempts at self-regulation. If executive control resources have been sufficiently taxed, people are vulnerable to failures of self-control, including failure to persist at challenging tasks, trouble sticking to a diet, and unintended emotional outbursts (e.g., Baumeister, Bratslavsky, Muraven, & Tice, 1998; Muraven, Tice, & Baumeister, 1998; Vohs & Heatherton, 2000).

The resource-intensive view of self-regulation raises the question of what actions constitute self-regulation. Put another way, what actions would not consume this resource? Previous research has demonstrated that the types of activities that require the oversight of the executive function are circumscribed and have predictable boundaries. For example, short-term memory is generally understood to not require self-regulation and, accordingly, has been shown to be unaffected by prior acts of self-control (Schmeichel, Vohs, & Baumeister, 2003). Also, people must be attempting to regulate in a given domain for responses in that domain to surface after earlier engagement in self-control. To illustrate, although self-regulatory resource depletion increases consumption of dessert foods, this effect only occurs among dieters, because nondieters are not regulating with respect to caloric intake (Vohs & Heatherton, 2000). Only behaviors being regulated should emerge when resources are depleted.

If switching mindsets is an act of the executive function, as we argue, then it should consume self-regulatory resources and diminish people's ability to self-regulate afterward. We predict that maintenance of a mindset does not require excessive self-control, whereas shifting from one mindset to a new mindset, with its

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associated cognitive procedures and general orientation, should tax self-regulatory resources.

## Overview of experiments

We tested the prediction that switching between qualitatively different mindsets consumes precious self-regulatory resources using the two-task paradigm that has become standard procedure for assessing self-regulatory capacity. In the current experiments, some participants first performed a task that required them to switch mindsets, whereas others performed a similar task that did not require mindset switching. In the second phase, participants completed a task that requires self-regulation. We expected that, due to the taxing nature of switching mindsets, participants who repeatedly switched mindsets in the first task would perform worse on the subsequent self-regulation task than participants who maintained a single mindset.

In order to provide convergent evidence, we tested our hypothesis in five experiments across five types of mindsets, using five distinct measures of self-regulation. In Experiment 1, participants were encouraged to think abstractly, think concretely, or alternate between abstract and concrete perspectives. The last condition was the crucial condition because it required switching mindsets. Next, participants were asked to consume a healthy but unpleasant-tasting drink, an act that requires self-control. We predicted that participants who switched mindsets would drink less of the unpleasant liquid than those who maintained a consistent mindset. In Experiment 2, participants made choices by using a thorough and comparative style consistent with an assessment mindset, by using a rapid and non-comparative style consistent with a locomotion mindset, or by switching between the two decision making modes. Subsequently, participants were given the goal of suppressing their natural emotional responses to a humorous video. We predicted that participants who switched between assessment and locomotion mindsets would be less able to suppress their emotions relative to those who maintained a consistent mindset.

In Experiment 3, bilingual participants completed a personality questionnaire in English, in their other native language, or by alternating languages. Following the questionnaire, they squeezed a handgrip device, an act that requires physical stamina. Building on literature showing that speaking a particular language activates an associated language-mindset (Stapel & Semin, 2007; Whorf, 1957), we predicted that switching languages would impair participants' handgrip stamina relative to completing the questionnaire in a single language. In Experiment 4, participants played a game in which the scoring was designed to activate an approach mindset, an avoidance mindset, or to encourage switching between approach and avoidance mindsets. Following the game, participants worked on an unsolvable puzzle, which is a persistence task that requires self-regulation to override the desire to quit the challenging task. We predicted that participants who switched mindsets would give up sooner than participants who maintained a single mindset.

Finally, Experiment 5 tested our hypothesis by making use of self-construal mindsets, a topic of particular importance to organizational behavior and group performance (e.g., Chatman et al., 1998; Goncalo & Staw, 2006; Wagner, 1995). Participants answered questions designed to get them to think individualistically, think collectivistically, or switch back and forth between these two perspectives. Subsequently, participants made a series of choices and indicated the confidence they had in their decisions. Building on research showing that decision making requires executive resources (Pocheptsova, Amir, Dhar, & Baumeister, 2009; Vohs et al., 2008), we predicted that participants who switched mindsets would have fewer resources to devote to thorough decision making and thus would exhibit less confidence in their choices relative to participants who had not switched mindsets.

## Experiment 1

We first tested the hypothesis that mindset switching would tax self-regulatory resources in the context of abstract versus concrete mindsets. Construal level theory (Trope & Liberman, 2003) proposes that people represent goals, actions, and events in one of two ways. High-level construals are abstract mental representations that contain comprehensive summary information, whereas low-level construals are concrete mental representations that contain detailed incidental information. Abstract mindsets facilitate answering the question "why" with regard to a goal or action whereas concrete mindsets facilitate answering "how" (Freitas et al., 2004). For instance, Liberman and Trope (1998) found that participants with an abstract mindset explained common activities (e.g., moving into a new apartment) in terms of *why* they might be performed (e.g., "starting a new life") but participants with a concrete mindset described *how* the activities could be performed (e.g., "packing and carrying boxes"). Because abstract and concrete mindsets invoke drastic changes in perception, they have been conceptualized as mutually exclusive mental orientations (Freitas et al., 2004; Liberman & Trope, 1998; Trope & Liberman, 2003). Therefore, according to our theory, switching between them should be taxing to the executive functioning system and result in a loss of self-control, which we tested by asking participants to drink a healthy but unpleasant-tasting liquid.

### *Method*

#### *Participants and design*

Forty-four undergraduate students (30 women) were randomly assigned to one of four mindset conditions. Participants in the abstract mindset condition completed a task that required writing about *why* a person might pursue eight common goals (e.g., saving money), whereas participants in the concrete mindset condition completed the same task while writing about *how* a person could pursue those same goals (Freitas et al., 2004). There were also two mindset switching conditions in which participants alternated between these instructions when writing about the same eight goals. For these mindset switching conditions, we alternated whether participants started writing about the goals in an abstract or concrete mindset. For example, for the first goal, a participant in the abstract-first mindset switching condition would think about why a person would pursue that goal and for the second goal think about how a person could pursue that goal. In total, participants in the switching conditions switched mindsets seven times, while participants in the two non-switching conditions maintained a consistent mindset throughout.

#### *Procedure*

Participants first completed the goals task (i.e., the mindset manipulation) and then completed the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) to check for possible mood differences that might have resulted from the mindset tasks. Next, they were led to a separate room for an ostensibly unrelated taste perception task. They were presented with a tray of twenty small paper cups, each of which held one ounce of a vinegar-based drink described as being similar to health drinks that are currently popular in Japan (which is true) but having a taste that was not very enjoyable to most Americans (which is also true). Participants earned a nickel for every cup (ounce) consumed. The

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measure is akin to a "taking-your-medicine" scenario, which represents a self-control dilemma in that medicinal compliance is often inconvenient and distasteful (Vohs et al., 2008). The number of ounces each participant drank was recorded as a measure of self-regulation; the fewer ounces consumed, the less self-control the participant exhibited. After completing the drinking task, participants rated how enjoyable they found the goal-analysis task (1 = not at all; 7 = very much), how much they enjoyed the taste of the vinegar drink (1 = not at all; 7 = very much), and how much they wanted to stop the vinegar drink task (1 = not at all; 10 = very much so).

*Results and discussion*

*Manipulation check*

A judge blind to condition coded participants responses to the goals tasks. As expected, participants responses were of a "how" nature when instructed to use "how" statements and, in parallel, were of a "why" nature when they were instructed to use "why" statements. Thus, all participants followed instructions for how to perform the initial task.

*Ounces of vinegar drink consumed*

Participants rated the vinegar drink as mildly unpleasant ($M = 3.1$, $SD = 2.0$), and these ratings did not differ by experimental condition, $F < 1$. The main hypothesis was that participants who switched mindsets during the initial task exerted more executive functioning and therefore would show worse self-regulation in the subsequent vinegar-drinking task than would participants who did not switch mindsets. This hypothesis was supported by an analysis of variance that revealed an overall effect of the mindset condition on the amount of the bad-tasting-but-healthy drink consumed, $F(3, 39) = 3.81$, $p < .02$ (Fig. 1). Planned contrasts further supported the hypothesis in showing that participants in both mindset switching conditions drank less than participants in the abstract condition, $t(39) = 3.21$, $p < .01$, or the concrete condition, $t(39) = 2.19$, $p < .04$. There was no difference between the two mindset switching conditions, $t < 1$.

*Urges to stop the task*

In line with the current thesis, there was a difference in reports of how much participants wanted to stop the vinegar drink task as a function of condition, $F(3, 39) = 8.72$, $p < .01$. The means for this measure dovetailed (negatively) with drink intake: $M$ abstract = 4.8, $SD = 2.1$; $M$ concrete = 6.6, $SD = 2.5$; $M$ switching abstract first = 8.8, $SD = 1.2$; $M$ switching concrete first = 8.4, $SD = 2.1$. The same contrast that was conducted on ounces consumed was repeated, this time substituting desire to quit consuming the vinegar drink as the dependent variable. In support of our general thesis, that switching mindsets taxes the self-regulation system, the contrasts between the combined means of the two switching conditions were greater than the abstract only condition, $t(39) = 5.06$, $p < .01$, and greater than the concrete only condition, $t(39) = 2.64$, $p < .02$.

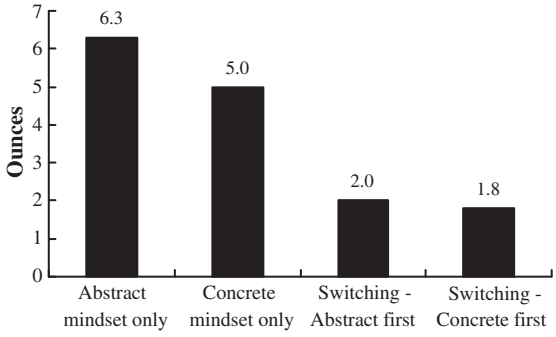


**Fig. 1.** Ounces of vinegar-based drink consumed; Experiment 1.

*Alternate explanations*

We measured several variables to help rule out the possibility that other factors could account for our effects. As expected, reports of positive and negative mood (as measured by the PANAS) did not differ by experimental condition, $F$s < 1. This finding is consistent with previous research on ego depletion, which has found no consistent impact of depletion on mood (Hagger, Wood, Stiff, & Chatzisarantis, 2010). A two-factor confirmatory factor analysis on all the PANAS items (maximum likelihood with varimax rotation) revealed the predicted two factors (positive affect, Cronbach-alpha = .77; negative affect, Cronbach-alpha = .80) accounting for 38.7% of the variance. The correlation of positive affect and negative affect scales with the dependent measure were $r = .00$, *ns*, and $r = -.14$, $p > .35$ respectively.

To ensure that the switching tasks were not more depleting simply because they required more time to complete, the experimenter recorded the length of time that participants spent on the goal-analysis task. As expected, an analysis of this measure (using both actual time and log-transformed time) found no differences across conditions, $F < 1$. Participants also responded to questions regarding their enjoyment of the goal-analysis task, which did not vary as a function of condition, $F < 1.10$.

In summary, switching between thinking about how to pursue a goal and why to pursue a goal reduced intake of a mildly unpleasant vinegar-based drink. This consumption effect was mirrored by reports of wanting to stop drinking, with participants in the mindset switching conditions feeling a stronger urge to stop than participants in the mindset-consistent conditions. These results could not be accounted for by changes in mood nor time spent on the mindset task.

## Experiment 2

The second experiment used regulatory mode theory to test whether switching between decision making mindsets would impair subsequent executive functioning. Regulatory mode theory (Higgins, Kruglanski, & Peirro, 2003) proposes a distinction between two mental functions: *assessment*, which is a comparative function concerned with completely evaluating alternatives before making a decision, and *locomotion*, which is a motive function concerned with moving quickly from state to state in the decision making process. Avnet and Higgins (2003) have shown that an assessment mindset can be activated by a weighted-additive decision strategy (WADD), in which each alternative is evaluated relative to the others (Payne, Bettman, & Johnson, 1993), and a locomotion mindset can be activated by an elimination-by-aspects decision strategy (EBA), in which alternatives are eliminated from consideration in a serial fashion that eventually leaves one acceptable option (Tversky, 1972). Activation of an assimilation versus locomotion mindset produces differences in self-evaluation (Kruglanski et al., 2000), decisiveness (Kruglanski et al., 2000), entertainment preferences (Higgins et al., 2003), and extroversion (Kruglanski et al., 2000). We hypothesized that switching between assimilation and locomotion mindsets would involve costly executive functioning and therefore would deplete self-regulatory resources, which we tested by asking participants to control their facial expressions.

*Method*

*Participants and design*

Fifty-four students (35 women) were randomly assigned to one of three conditions for an initial decision making task that involved

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choosing consumer products. In the assessment mindset condition, participants were instructed to make a choice using a WADD strategy, whereas in the locomotion mindset condition, participants were instructed to use an EBA strategy. In the mindset switching condition, participants alternated between decision strategies. In all conditions, participants made ten choices, which means that those in the switching condition were required to switch mindsets nine times during the decision making task.

*Procedure*

Participants first completed a product choice task, which was the mindset manipulation (Avnet & Higgins, 2003). Choices were made among five options in each of 10 product categories: cell phones, refrigerators, apartments, camcorders, athletic shoes, PDAs, pillows, vacuum cleaners, deodorants, and MP3 players. In the assessment mindset condition, a WADD decision strategy was explained as follows: "Look at Brand A. Compare it to the rest of the brands based on each of the features. Now look at Brand B. Compare it to the rest of the brands based on each of the features. Continue this process until you have looked at all the brands and at all the features. After you are done comparing between brands, decide which brand you prefer most." In the locomotion mindset condition, an EBA decision strategy was explained as follows: "Start with the feature you consider to be the most important and compare each brand's values on that feature. Exclude the brand that has the worst value on this feature. Now you are left with four brands. Go to what you consider to be the second most important feature, and again look at it for all the remaining brands. Exclude the brand that has the worst value on this feature. Follow this procedure until you are left with only one brand." In the mindset switching condition, participants were given instructions for both WADD and EBA decision strategies, which they were told to use in an alternating fashion.

Tasks that consume self-regulatory resources are likely to be perceived as more difficult than similar tasks that do not require as much self-regulation. In order to assess the likely success of the mindset manipulation at creating a more difficult experience when participants switched mindsets compared to when they maintained a consistent mindset, we conducted a pretest of the product choice task with a separate group of 38 undergraduates drawn from the same population. After either making their selections using a WADD strategy, an EBA strategy, or by switching between the two strategies, the participants were asked about the difficulty of the choice task. Consistent with our expectations, the task was rated as more difficult for those switching between mindsets ($M = 3.0$, $SD = 1.7$) than for those maintaining a consistent assessment mindset ($M = 1.8$, $SD = .8$, $t(36) = 2.36$, $p < .03$), or a consistent locomotion mindset ($M = 1.9$, $SD = .8$, $t(36) = 2.50$, $p < .02$).

After the decision making task, participants completed a PANAS questionnaire to assess their current mood (Watson et al., 1988). Next, participants were given an emotion regulation task, which served as the dependent measure of self-control (Vohs, Baumeister, & Ciarocco, 2005). Participants were told that their job was to watch an evocative video and maintain a neutral facial expression, such that "another person should not be able to tell that you are feeling anything." A videocamera, located in plain view, recorded participants' facial expressions while they watched a humorous clip from the movie *Eddie Murphy Raw* (Townsend, Wachs, & Wayans, 1987).

*Results and discussion*

*Facial expressiveness*

Consistent with prior use of this measure (Vohs et al., 2005), a judge blind to condition rated participants' facial expressiveness at four points equally spaced throughout the film clip: at the start and at minutes one, two, and three (the video lasted a little more than 3 min). Facial expressions were rated on a scale from 1 (*not at all expressive*) to 7 (*extremely expressive*), and the four ratings were added to yield an overall expressiveness score (Vohs et al., 2005). As a reliability check, a second judge, also blind to condition, performed the same rating process on 22 faces (41% of the participants); agreement between the two judges was quite high, $k = .93$.

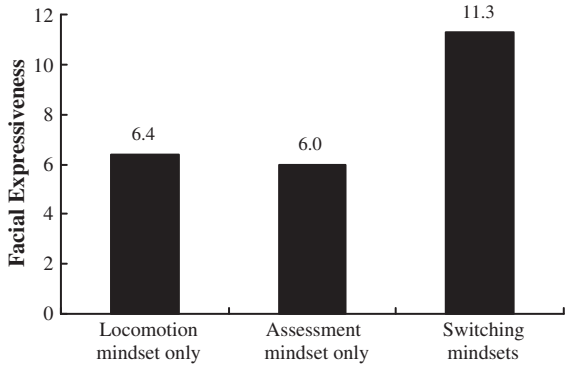


**Fig. 2.** Facial expressiveness while watching a humorous movie; Experiment 2.

The main hypothesis was that, compared to maintaining a consistent mindset, switching decision mindsets would involve the executive functioning system to a greater extent and thus impair later self-control. As shown in Fig. 2, we observed the predicted deleterious effect of switching mindsets. Compared to participants who used a constant decision strategy during the product choice task, participants who switched decision strategies were less able to subsequently neutralize their emotional reactions, $F(2, 51) = 6.05$, $p < .01$. Expressiveness in the switching condition was significantly higher than in both the locomotion, $t(51) = 2.96$, $p < .01$, and assessment conditions, $t(51) = 3.05$, $p < .01$.

*Alternate explanations*

After the mindset manipulation, but before the dependent measure was taken, participants completed the PANAS (Watson et al., 1988) to check if switching mindsets led to a different mood than not switching mindsets. A two-factor confirmatory factor analysis on all the PANAS items (maximum likelihood with varimax rotation) revealed the predicted two factors (positive affect, Cronbach-alpha = .83; negative affect, Cronbach-alpha = .82) accounting for 43.9% of the variance. The correlation of positive affect and negative affect scales with the dependent measure were $r = .03$ and $r = -.07$ respectively, *ns*. Similar to our findings in Experiment 2, analysis of both positive and negative affect subscales revealed that mood was unaffected by experimental condition, $Fs < 1.5$. We also recorded the length of time it took participants to complete the decision task to check whether the tasks required different durations, which theoretically could have played a role in the observed differences in later self-regulation. However, as predicted, there was no significant difference in time spent on the decision task as a function of condition, $F < 1$ (both for actual and log-transformed time).

## Experiment 3

Based on evidence that languages activate associated mindsets, the third experiment tests the current theory in the context of language switching among bilingual people. Theories of linguistic relativity conceptualize language as eliciting an accompanying cognitive orientation. These mindsets have been related to fundamental differences in thought, memory, attention, and perception

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across linguistic cultures (Stapel & Semin, 2007). The self-perceptions of bilinguals change depending on which language they use (Luna, Ringberg, & Peracchio, 2008), as do their implicit associations (Danziger & Ward, 2010). Even preverbal infants from bilingual homes show different decision making patterns than preverbal infants from monolingual homes (Kovacs & Mehler, 2009). Given that bilinguals activate an associated cultural mindset when they use a particular language (Trafimow, Silverman, Fan, & Law, 1997), we expected that switching languages, relative to maintaining one language, would tax the executive functioning system and reduce participants' capacity for later self-regulation, which we tested using persistence on a physical exertion task.

## Method

### Participants and design

Sixty bilingual students from a large university in the Northeastern United States (36 Mandarin–English, 12 Korean–English, and 12 Hindi–English speakers; 47 women) answered 18 open-ended personality questions (e.g., "Please describe yourself socially."). In the two single-language conditions, participants completed questionnaires in English or in the participant's other language. In the switching languages condition, the language in which the questions were asked (and answered) switched every two to four questions (e.g., two questions in Korean, then three in English, then three in Korean, and so on). Thus, all participants answered the same 18 questions, with those in the switching condition required to switch mindsets six times throughout the questionnaire.

### Procedure

Participants first completed a handgrip test, said to be part of a pretest for future experiments. Next they completed the personality questionnaire that served as the mindset manipulation. Following the questionnaire, participants completed a second handgrip test. For both tests, participants' goal was to squeeze a handgrip exerciser for as long as they could. To measure self-control ability, we placed a slip of paper between the two ends of the handgrip and recorded the time at which it fell as the point at which participants stopped exerting self-control on the task. The dependent measure was the difference between the handgrip durations measured pre- and post-manipulation (Muraven et al., 1998). Following the second handgrip test, participants completed the PANAS scale assessing their current mood. Participants also assessed their language fluency by rating the accuracy of the following six statements on a seven-point scale, anchored by 1 = completely disagree/7 = completely agree: "I can (1) speak/(2) read/(3) write as fluently in English as a native English-speaker." "I can (4) speak/(5) read/(6) write in my other language as fluently as a native speaker of that language." The seventh question asked them to rate their relative fluency in English and their other language on a five point scale anchored by 1 = "I am much more fluent in English" and 5 = "I am much more fluent in my other language."

### Results and discussion

#### Manipulation check

Participants' responses were reviewed by a judge who was blind to condition. As expected, when participants were asked to write in English, their responses were written in English. When asked to write in their other fluent language, responses were written in languages other than English. Thus, all participants followed instructions to use English or another language to complete their initial task.

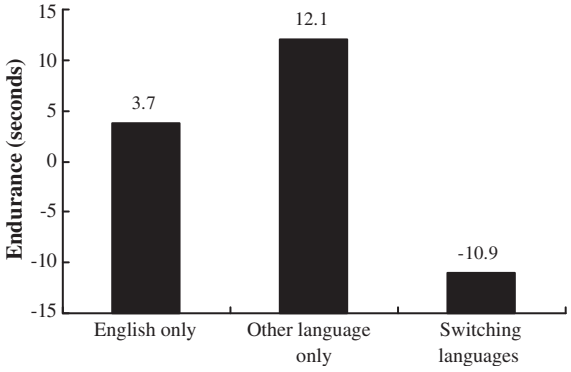


**Fig. 3.** Handgrip endurance; Experiment 3.

#### Handgrip endurance

The hypothesis was that responding to a personality questionnaire that required switching languages, relative to responding using a single language, would draw more on executive resources and thereby impair participants' stamina on the handgrip task. At time 1, participants in the language switching condition held the handgrip for as long, $M = 34.2$ s, $SD = 30.1$, as participants in the English only condition, $M = 28.9$, $SD = 22.2$, or the other-language only condition, $M = 23.0$, $SD = 20.0$, switch condition versus non-switching conditions: $t(58) = 1.26$, $p > .20$. A time difference emerged at time 2, where, consistent with our prediction, participants in the language switching condition performed worse on the handgrip task, $M = 23.2$, $SD = 22.5$, than participants in the English only condition, $M = 32.6$, $SD = 30.2$, or in the other-language only condition, $M = 35.1$, $SD = 28.6$. The difference between the endurance before and after the mindset manipulation task is reported in Fig. 3.

An ANCOVA using the handgrip measure at the end of the study as the dependent variable, the language switching manipulation as a fixed factor, and the handgrip measure in the beginning of the study as a covariate showed a significant effect of language switching, $F(1, 57) = 4.70$, $p < .04$. The covariate was also significant, $F(1, 57) = 13.65$, $p < .001$. Participants in the language switching condition performed marginally worse than participants who completed the questionnaire in English only, $t(57) = 1.67$, $p = .10$; and significantly worse than participants who completed the questionnaire in their other-language only, $t(57) = 2.70$, $p < .01$.

#### Alternate explanations

Analysis revealed no difference in mood across conditions. A two-factor confirmatory factor analysis on all the PANAS items (maximum likelihood with varimax rotation) revealed the predicted two factors (positive affect, Cronbach-alpha = .88; negative affect, Cronbach-alpha = .79) accounting for 40.0% of the variance. The correlation of positive affect and negative affect scales with the dependent measure were $r = .13$ and $r = .15$ respectively. Both were not significant, $ps > .20$.

The self-assessed fluency ratings revealed a high level of fluency in both languages: (1) $M = 5.6$, $SD = 1.6$, (2) $M = 6.6$, $SD = 1.2$, (3) $M = 5.8$, $SD = 1.3$, (4) $M = 6.1$, $SD = 1.2$, (5) $M = 5.8$, $SD = 1.5$, (6) $M = 5.4$, $SD = 1.8$, (7) $M = 2.9$, $SD = 1.5$. None of the seven bilingualism controls was a significant predictor of handgrip performance, $ps > .30$, suggesting that reduced handgrip performance did not result from switching between languages that varied in familiarity and hence ease of activation.

## Experiment 4

Experiment 4 tested our hypothesis regarding the taxing nature of mindset switching in the context of approach and avoidance

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mindsets. The observation that people approach pleasure and avoid pain has been fundamental to understanding human behavior (Freud, 1920). Previous research has found that approach and avoidance tendencies are associated with distinct mindsets (Puca & Schmalt, 2001), and that activating an approach or avoidance motivation has carry-over effects on unrelated tasks (Friedman & Förster, 2000, 2002; Karoly & Newton, 2006). Because approach and avoidance states involve such different perspectives, we hypothesized that switching between approach and avoidance mindsets requires the involvement of executive functioning and therefore would deplete self-regulatory resources, which we measured using persistence on a cognitive task.

The current experiment also included an important comparison condition in order to rule out an alternative explanation for the results of the first three experiments. Recall that participants in those mindset switching conditions were faced with changing sets of instructions during their initial task, the purpose of which was to activate different mindsets. In contrast, participants in the non-switching conditions dealt with only one set of instructions. Hence, it could be argued that impaired self-regulation after mindset switching was due to the changing instructions, which may have required more attention or cognitive processing, rather than the act of switching mindsets. To address this concern, Experiment 4 included a condition in which the instructions changed during the manipulation task but the mindset did not. If any self-regulation impairment is caused by changes in the instructions, we should observe a similar impairment in this condition. However, if impaired self-regulation is the result of switching mindsets, it should not extend to this condition.

### Method

#### Participants and design

One-hundred and eight undergraduate students (61 female) drawn from a paid subject pool were randomly assigned to one of four experimental conditions. Participants played a game in which they were asked to judge the size, length, angle, or some other physical dimension of 32 target shapes relative to a reference shape (e.g., to determine if a target line was longer than a reference line). Mindset was manipulated through the allocation of points for each question by making participants more sensitive to gains or losses. Participants were told they could earn (or lose) points if they were right, wrong, or answered "I don't know." In the approach mindset condition, participants were given a gain-focused point schedule, in the avoidance mindset condition, participants were given a loss-focused point schedule, and in the mindset switching condition, participants alternated between the approach point schedule and the avoidance point schedule. Finally, in the instruction switching (control) condition, participants alternated between two point schedules that differed in the specific point schedule, but kept the same mindset active. Thus, participants in both the mindset switching condition and the instruction switching condition saw point schedules that changed 31 times over the course of the game.

#### Procedure

Participants played the game with one of four point schedules that served as the mindset manipulation. The gain-focused point schedule (approach condition) was designed to reward correct answers, minimize the pain of incorrect answers, and punish indecisiveness. In particular, participants were awarded three points for each correct response, received no penalty for incorrect responses (0 points) but were penalized one point for each answer of "I don't know." The loss-focused point schedule (avoidance condition) awarded only one point for a correct answer, penalized three points for incorrect responses and received no penalty for answers of "I don't know" (0 points).

In the mindset switching condition, the point schedule alternated between questions, starting with the gain-focused point schedule. Finally, in the instruction switching condition, participants alternated between two gain-focused point schedules that differed in magnitude. The point schedule for the first question had a larger magnitude (correct response = 3 points, incorrect response = 0 points, "I don't know" = $-3$ points) than the point schedule for the second question (correct response = 1 point, incorrect response = 0 point, "I don't know" = $-1$ point). The point schedules continued to alternate throughout the game. Thus, the control condition contained alternating instructions but not alternating mindsets.

After playing the game, participants took part in an ostensibly unrelated experiment in which they were asked to solve a number puzzle. The puzzle consisted of 15 numbered tiles arranged in a $4 \times 4$ grid, such that there was one empty space. The object of the game was to arrange the tiles in ascending numerical order by sliding tiles one at a time into the empty space on the grid. Unbeknownst to participants, the order in which the tiles were placed rendered the puzzle unsolvable. The dependent variable was persistence as measured by the time spent trying to solve the puzzle.

### Results and discussion

#### Manipulation checks

If the manipulations worked as intended, participants in the approach and instruction switching conditions, whose tasks involved gain-focused point schedules and therefore were penalized for failing to guess, would be expected to answer "I don't know" less often than participants in the avoidance condition. Results were consistent with this prediction. The rate of selecting "I don't know" was 3.7% in the approach condition and 3.2% in the instruction switching condition, but rose to 13.1% in the avoidance condition, $X^2(1) = 43.4$, $p < .0001$, and $X^2(1) = 53.6$, $p < .0001$, respectively.

Likewise, participants in the avoidance condition, who had a loss-focused point schedule and therefore were penalized for answering incorrectly, would be expected to make fewer mistakes than participants in the approach and instruction switching conditions. Consistent with this prediction, the error rate was higher for participants in the approach condition, 10.1%, and the instruction switching condition, 9.5%, than for participants in the avoidance condition, 4.2%. These differences were significant, $X^2(1) = 20.5$, $p < .0001$, and $X^2(1) = 18.5$, $p < .0001$, respectively.

In the mindset switching condition, one would expect to find evidence of both the gain-focused schedule and the loss-focused schedule in the responses. In fact, this is what we found. Participants in the mindset switching condition, answered "I don't know" at 19.5%, significantly higher than either the approach condition, $X^2(1) = 84.2$, $p < .0001$, or the instruction switching condition, $X^2(1) = 98.9$, $p < .0001$, consistent with an avoidance strategy. However, participants in the mindset switching condition also had error rates that were significantly higher, 9.2%, than participants in the avoidance condition, $X^2(1) = 15.8$, $p < .0001$, consistent with an approach strategy.

These performance data confirm that participants understood the task. Moreover, they adhered to the reward schedules and conformed their behavior accordingly.

#### Persistence on unsolvable puzzle

We predicted that participants in the mindset switching condition would show less persistence than would participants in the other three conditions, who maintained a single mindset throughout the first task. An analysis of variance revealed a significant

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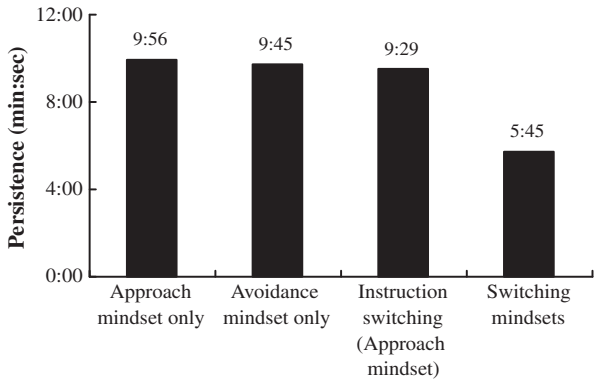


**Fig. 4.** Persistence on an unsolvable puzzle; Experiment 4.

effect of experimental condition, $F(3104) = 3.10$, $p < .03$. As predicted, participants in the mindset switching condition spent significantly less time working on the unsolvable task than did participants in the other three conditions (Fig. 4), $F(1104) = 9.22$, $p < .003$. In fact, time spent working on the puzzle in the mindset switching condition was less than time spent working in the approach, $F(1104) = 6.69$, $p < .01$, avoidance, $F(1104) = 6.45$, $p < .01$, and control conditions, $F(1104) = 5.34$, $p < .02$. There were no differences among participants in the three no-switching conditions, $Fs < 1$.

## Experiment 5

Experiment 5 tested the hypothesis that switching between individualist versus collectivist mindsets (Brewer & Gardner, 1996; Markus & Kitayama, 1991) would tax self-regulatory resources. People with an individualist (sometimes called an independent) mindset focus on those aspects of the self-concept—the egocentric, autonomous, and idiosyncratic—that differentiate them from others. In contrast, people with a collectivist (sometimes called an interdependent) mindset focus on those aspects of the self-concept—the allocentric, collective, and interconnective—that emphasize integration into groups and relationships with others. These two perspectives have been tied to cultural differences, particularly between Eastern cultures, where collectivist self-construals are more common, and Western cultures, where individualist self-construals are the norm (Markus & Kitayama, 1991). Individualist and collectivist mindsets influence judgments and self-descriptions (Brewer & Gardner, 1996), self-evaluation and self-definition (Markus & Kitayama, 1991), and cooperativeness and creativity in group performance (Goncalo & Staw, 2006).

In this experiment, we tested the influence of switching mindsets on self-regulation by measuring the confidence participants have in decisions that they have made. Decision making is a process that consumes executive resources (Vohs et al., 2008), meaning that making a choice while depleted is more difficult than making a choice when not depleted (Wang, Novemsky, Dhar, & Baumeister, 2010). People who have been depleted of their self-regulatory resources are therefore less able than others to engage in effortful and deliberative decision processes (Pocheptsova et al., 2009), but instead make simplified choices and rely heavily on decision heuristics (Fennis, Janssen, & Vohs, 2009). Confidence in one's decisions is a function of the thoroughness of the process one devotes to making the decision (Heath & Gonzalez, 1995; Paese & Sniezek, 1991).

Hence, we predicted that depleting self-regulatory resources reduces decision confidence. We hypothesized that participants who switched mindsets would be less confident in their subsequent decision making than participants who maintained a consistent mindset. The manipulation check data from Experiment 4 is consistent with this prediction. Participants who switched mindsets answered "I don't know" more often (19.5%) than participants in the avoidance mindset condition (13.1%), $X(1) = 14.5$, $p < .0005$. This difference suggests there may be an effect of mindset switching on decision confidence beyond the effect caused by the different point schedules used in Experiment 4. Experiment 5 formally tested whether mindset switching undermines decision confidence.

Experiment 5 also tested a boundary condition of the proposed depletion effect. As mentioned, self-regulatory depletion is conceptually distinct from a general impairment that depresses performance on all tasks. In order to demonstrate that the effect we propose is consistent with a limited-resource account of self-regulation, the current experiment included a short-term memory test that was given after the mindset manipulation but before the administration of the main dependent measure. In a previous test of specificity, Schmeichel et al. (2003) showed that engaging in self-regulation impaired higher-order reasoning ability but did not affect rote, short-term memory. If, as we propose, switching mindsets impairs self-regulation, then we should find an effect on decision confidence (our measure of executive functioning), but not on short-term memory, as the latter is not an act of executive functioning.

Finally, Experiment 5 provided further evidence that the effects we have demonstrated cannot be attributed to differences in task switching or changing instructions across conditions. Unlike the previous four experiments, participants in all three conditions of Experiment 5 switched tasks an equal number of times. Hence, any differences in decision confidence across conditions could not be due to differences in the number of task switches.

### *Method*

#### *Participants and design*

Fifty-six undergraduate students (35 women) were randomly assigned to one of three mindset conditions. Participants in the individualist mindset condition completed writing tasks that focused on the self, whereas participants in the collectivist mindset condition completed writing tasks that focused on relationships with others. In the mindset switching condition, participants alternated between self- and other-oriented writing tasks (Table 1). In total, participants in the switching condition switched mindsets eight times, whereas participants in the two non-switching conditions maintained a consistent mindset throughout the autobiographical writing tasks.

#### *Procedure*

Participants first completed nine autobiographical writing tasks, which constituted the mindset manipulation. Next, participants were given a memory quiz, which served as a test of the proposed boundary condition. Participants were shown a picture containing many different toys and were given a list of eight toys that they had to locate and remember. After 40 s, participants continued to the next page, where the picture was shown again but this time with ten black circles covering various locations, including the eight toys that they were supposed to remember. As a test of short-term memory, participants were asked to match each of the eight toys with the black circle covering its location on the picture. Responses were scored for accuracy, resulting in an outcome ranging from 0 (none correct) to 8 (all correct).

Following the memory test, participants were presented with two options in each of four product categories: vacation spots, digital cameras, cars, and laptops. Each option was described by

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**Table 1**
Autobiographical writing tasks (mindset manipulation); Experiment 5.

| Writing task | Mindset condition | | | Manipulation based on… |
|---|---|---|---|---|
| | Individualist | Collectivist | Switching | |
| 1 Write two statements describing… | …yourself | …groups to which you belong | …yourself | Goncalo and Staw (2006) |
| 2 Write two statements about how you are… | …different from others | …like others | …like others | Goncalo and Staw (2006) |
| 3 Write two sentences starting with… | …"I am" | …"We are" | …"I am" | Kuhn and McPartland (1954) |
| 4 Write two statements about the advantages of… | …standing out | …blending in | …blending in | Goncalo and Staw (2006) |
| 5 Describe a gift you gave… | …yourself | …someone else | …yourself | Mandel (2003) |
| 6 Write two statements describing… | …yourself | …groups to which you belong | …groups to which you belong | Goncalo and Staw (2006) |
| 7 Write two statements about how you are… | …different from others | …like others | …different from others | Goncalo and Staw (2006) |
| 8 Write two sentences starting with… | …"I am" | …"We are" | …"We are" | Kuhn and McPartland (1954) |
| 9 Write two statements about the advantages of… | …standing out | …blending in | …standing out | Goncalo and Staw (2006) |

five attributes, three positive and two negative. For example, in the digital camera category, one camera was described as follows: very powerful zoom, large touch-screen viewer, very easy to use, fragile/easily scratched, and weak flash. The other camera was described as follows: face recognition auto-focus, all-weather/shockproof, wide angle lens, short battery life, and somewhat heavy. Participants were given the option of either choosing one of the options or looking for other options before making a choice. After making their decision, participants were asked how confident they were in their decision on a nine-point scale (1 = not at all confident; 9 = extremely confident).

### *Results and discussion*

#### *Manipulation check*

Participants' responses were reviewed by a judge who was blind to condition. As expected, participants' responses to the autobiographical writing task indicated that they followed instructions in that they gave answers that were appropriate for answering the questions asked. Those in the switching condition answered the questions in an alternating fashion, also as instructed.

#### *Decision confidence*

The main hypothesis was that participants who switched mindsets during the initial writing task would be less confident in their subsequent choices than participants who had maintained a consistent mindset. A repeated measures ANOVA with mindset condition (individualist, collectivist, or switching) as a between subjects factor and product category (vacation spots, digital cameras, cars, and laptops) as a within subjects factor, revealed a significant main effect of the mindset manipulation (Fig. 5), $F(2, 53) = 5.07$, $p < .01$. The effect of product category, $F(3, 159) = 1.37$, and the interaction of product category and mindset condition, $F(6, 159) = 1.13$, were not significant, $ps > .25$, suggesting that this effect was consistent across categories. Planned contrasts revealed significant differences between the mindset switching condition and individualist mindset condition, $t(53) = 2.79$, $p < .01$, as well as between the mindset switching condition and collectivist condition, $t(53) = 2.76$, $p < .01$.

#### *Specificity of self-regulation*

Our hypothesis was that switching mindsets impairs self-regulation—by consuming a resource specific to executive functioning—as opposed to impairing all manner of responses. As such, we expected mindset switching to exert no effect on performance of a memory test (Schmeichel et al., 2003) that took place after the mindset manipulation, but before the decision confidence measure. The results showed that there was no significant influence of mindset condition on number of items remembered, $F(2, 55) = 1.4$, $p > .20$. Scores of those in the individualist condition, $M = 3.7$, $SD = 1.8$, $t(53) = 1.2$, $p > .20$, and collectivist condition, $M = 4.6$, $SD = 1.7$, $t(53) = .32$, $p > .70$, were statistically equivalent to those in the mindset switching condition, $M = 4.4$, $SD = 1.7$. In summary, consistent with the proposed depletion mechanism, switching between independent and interdependent mindsets reduced confidence across a series of decisions, but did not affect short-term memory performance, a task that should not be sensitive to depletion of self-regulatory resources (Schmeichel et al., 2003).

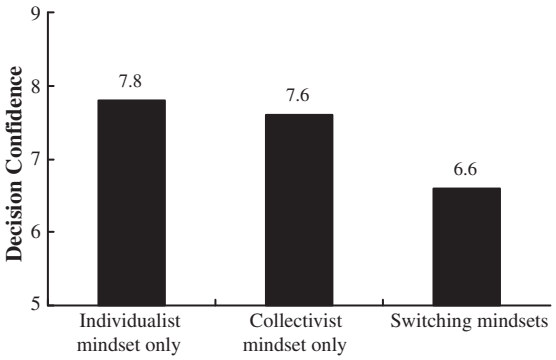


**Fig. 5.** Confidence in choices among consumer products; Experiment 5.

## General discussion

Across five experiments we found support for the hypothesis that switching mindsets is an executive function that consumes self-regulatory resources and therefore renders people relatively unsuccessful in their self-regulatory endeavors. The current studies found converging effects across a wide range of mindset operationalizations. We randomly assigned some participants in these studies to switch mindsets so as to change the way they construed events, pursued goals, communicated, made decisions and thought about the self versus others. Compared to others who performed similar tasks that used only one mindset, participants who switched mindsets were reliably worse at subsequent self-regulation.

The harmful effects of mindset switching were found for a diverse set of activities. What is more, we observed the handicapping effects of mindset switching across the five core domains of executive functioning. One domain of executive functioning involves managing urges. Reducing self-regulatory resources has been

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shown to lead to indulgent rather than restrained choices (Shiv & Fedorikhin, 1999) and impulsive spending (Vohs & Faber, 2007). Experiment 1 in the current paper showed that mindset switching weakened the ability to overcome the urge not to drink a healthy but unpleasant beverage. A second executive functioning domain is the modification of incipient responses, including emotional reactions (Vohs & Baumeister, 2004; Vohs et al., 2005). Experiment 2 showed that mindset switching led to emotional reactions even though participants were attempting to stifle them.

A third domain involves physical stamina. In line with prior research using a traditional self-regulation paradigm (Muraven et al., 1998), we found that switching mindsets produced less successful attempts at gripping a hand exerciser (Experiment 3). A fourth type of executive functioning activity is persistence at difficult tasks. The results of Experiment 4 showed that mindset switching led to relatively poor persistence on an unsolvable task. The fifth domain reducing self-regulatory resources is decision making (Vohs et al., 2008). In Experiment 5, mindset switching was shown to cause a reduction in decision confidence. Hence, together, the experiments reported in this article attest to the breadth and generalizability of the effect.

It is noteworthy that the results we obtained were not due to the mere fact that our manipulations of mindset switching also involved changing instructions: Participants in Experiment 4 who dealt with changing instructions (while maintaining a consistent mindset) during the initial task did not show subsequent self-regulation impairment, whereas participants who alternated mindsets were significantly impaired. Likewise, in Experiment 5 participants in all conditions changed instructions an equal number of times (Table 1) but only those in the mindset switching condition showed changes in decision confidence. Hence, being attentive to changing instructions was not the cause of self-regulatory resource depletion in the mindset switching group. Instead, the dramatic change in perspective that is required for each change in mindset appears to be the causal factor in the present studies.

In sum, this body of evidence supports an executive functioning theory of mindset switching. Although the notion that people possess different mindsets that are functional under different circumstances has been around for over a century (Ach, 1905), little has been known about how people perform such elaborate operations. We propose executive functioning as the underlying mechanism and, in so doing, tie the ability to switch mindsets to the crucial operations of decision making and self-regulation, which also rely on the executive function (Baumeister et al., 1998; Suchy, 2009; Vohs et al., 2008).

The finding that switching mindsets leads to self-regulatory depletion raises questions about the reverse operation: the impact of depleted executive resources on the ability to switch mindsets. The current research suggests that since switching mindsets consumes resources, people who are depleted of executive resources will be less capable of switching mindsets. We expect then that depleted people would continue to use one mindset, even if that mindset is unsuitable to their current activity. In fact, work by Vohs et al. (2005) could be interpreted in this light. In two of their studies, people who were depleted of their executive resources reverted to their predominant style of self-disclosure patterns, which was not the case when their resources were intact. In that case, participants across attachment styles preferred a moderate style of disclosure to a new acquaintance. But when depleted, avoidantly-attached participants refused to self-disclose much whereas anxiously-attached participants wished to disclose highly intimate information (securely-attached participants' self-disclosures were at the socially appropriate middle level under both conditions, which underscores the notion that people must be regulating with respect to a given behavior for resource depletion to affect that behavior). These ill-suited behaviors may be conceptualized as insecurely-attached participants' inability to switch to a mindset suitable for meeting a new acquaintance. The notion that depletion leads to mindset inflexibility could explain why people who are depleted of executive resources exhibit decision biases, illogical thinking, and poor judgment (Schmeichel et al., 2003; Vohs et al., 2008).

### *Limitations*

These findings should be interpreted within the constraints of the research methods that produced them. We propose that the most parsimonious account for our results is that switching mindsets induces self-regulatory depletion. However, it should be noted that this conclusion was necessarily based on proxy measures of the theoretical constructs. These proxy measures included manipulation checks confirming that participants performed the mindset priming tasks as requested, a measure indicating that the task was more difficult in the mindset switching condition than in the consistent mindset conditions (Experiment 2), as well as the main dependent variables in each study, which showed reductions in self-regulatory performance consistent with a depletion account. We also reported no differences in measures that would have been consistent with alternative, non-depletion explanations, including self-reported mood, short-term memory performance, and time spent on the priming task. In each case, these additional measures did not support the alternative explanations. Future research further documenting the depletion effects identified in this research with more direct measures would be of considerable interest.

### *Practical implications*

Our findings suggest that the benefits of switching mindsets to accommodate changing situational demands should be weighed against the drawbacks of mindset switching. The results from five experiments demonstrated that switching mindsets taxes limited self-regulatory resources. Therefore, although activating certain mindsets can reduce decision biases (Kray & Galinsky, 2003; Mandel, 2002) and aid judicious decision making (Rottenstreich & Kivetz, 2006), repeatedly switching mindsets can impair executive functioning and cause self-regulatory failures on subsequent tasks. In terms of optimal decision making, this tradeoff is important to consider: Is shifting to another frame of mind worth the cost?

The findings reported in this article have several practical implications, particularly for those interested in minimizing the negative effects of multitasking and juggling conflicting job demands. Where previous research has demonstrated the pitfalls of trying to simultaneously engage in multiple tasks (Altmann & Gray, 2008), our research shows that even handling multiple tasks sequentially can lead to negative side effects when those tasks require different mindsets. In particular, our research suggests that an employee who cycles between jobs or tasks that require taking different perspectives will subsequently be less able to self-regulate. This could lead to a host of negative organizational consequences, including lower levels of persistence, focus, and patience with co-workers.

Jobs that require employees to use multiple mindsets are very common. Employees at an international firm may be required to conduct business in more than one language during the course of a workday. An accountant may be involved in both planning, which requires a long-term, abstract mindset, and auditing, which necessitates a detail-oriented, concrete mindset. An investment broker may alternate between an approach motivation associated with maximizing the return on investment and an avoidance motivation associated with being able to justify any decision that leads to an underperforming investment. A sales manager may split her time

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between overseeing a district of sales people and cold-calling sales leads herself—tasks that require very different perspectives and approaches (Hill & Birkinshaw, 2006).

Our findings suggest that grouping activities that require a similar perspective or way of thinking may improve employee performance by reducing the number of times an employee has to switch mindsets during the day. For example, a firm could schedule all the meetings conducted in French in the morning and those conducted in English in the afternoon, or an accountant could set aside 1 day for planning and another for auditing. Maintaining a high work load within a given mindset can be depleting in its own right, but this research suggests it may not deplete executive resources as much as work that demands switching mindsets. In short, when an employee must wear multiple hats, she should try to change hats as infrequently as possible.

## Acknowledgments

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