Self-Regulating Enhances Self-Regulation in Subsequent Consumer Decisions Involving Similar Response Conflicts

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ABSTRACT

Ego depletion, the observation that self-regulation reduces subsequent self-regulation, is a remarkably robust phenomenon, and the generalization to the consumer domain appears undisputable. Contrary to most other self-regulatory situations however, consecutive self-regulatory decisions in consumer settings tend to be similar in the control processes that they recruit. Three experiments demonstrate the pivotal role of similarity. When two consecutive self-regulatory situations require similar control processes (e.g. restraining food intake), initial engagement in self-regulation *enhances* subsequent self-regulation. Our data thus challenge the self-regulatory strength model of (consumer) self-regulatory decision making, but are consistent with cognitive control theory.

Imagine a consumer in a retail store deciding on the type of snacks she will purchase for the coming week: a pack of chocolate bars (i.e., a vice product) or a muesli snack (i.e., a virtue product). In the next aisle, she has to decide on the carbohydrate part of the dinner: French fries (i.e., a vice product) or whole rice (i.e., a virtue product). How will the degree of self-regulation during the first choice influence the second decision, and the series of self-regulatory choices in its wake? According to the self-regulatory strength model, which is a prominent model in psychology (Muraven and Baumeister 2000), self-regulation taxes a limited self-regulatory resource that is akin to energy or strength, and thus brings people in a state of resource depletion. This state reduces people's capacity to self-regulate in the period following their previous self-regulatory effort. It reduces people's capacity to engage in activities that are highly valued, as varied as intellectual performance (Baumeister et al. 2002), food intake control (Kahan et al. 2003), and rational decision making (Bruyneel et al. 2006). It has been suggested that the depletion phenomenon permeates all relevant areas of human decision making, including consumer decision making (Baumeister 2002). We question this generalization and provide evidence that in a typical consumption situation in which subsequent self-regulatory choices involve a similar response conflict, self-regulatory *enhancement* rather than depletion will be the rule.

The major contribution of this paper is showing that the depletion effect critically depends on the dissimilarity of the control processes recruited by the response conflicts in two subsequent self-regulatory situations. We demonstrate that depletion effects will occur only when the control processes recruited by the response conflicts are dissimilar in the two consecutive situations. The depletion effect will *reverse* when the control processes recruited by the response conflicts are similar in the two consecutive situations. We consider the latter

context to be closer to many every day consumer contexts than the typical set of dissimilar self-regulatory situations that have been studied in psychology. Beyond providing a novel and consumer relevant boundary condition for the ego depletion phenomenon, these findings provide a better insight in the ego depletion phenomenon, which may have implications beyond consumer theory.

CONCEPTUAL BACKGROUND

Cognitive control theory and ego depletion

In the past decade, dozens of studies have documented on the so-called depletion effect (for a review, Baumeister et al. in press). After having engaged in self-regulation, self-regulatory performance is impaired (Baumeister et al. 1998). The diversity of situations in which the ego depletion effect has been demonstrated suggests that the basic finding should also hold in a consumer context. Indeed, initial evidence points in that direction. Kahan et al. (2003) made restrained eaters participate in an Asch-type conformity task, and found increased food intake during a subsequent taste-rating task as compared to restrained eaters who did not participate in the initial draining task. Bruyneel et al. (2006) observed that after a series of binary product choices in a mock shopping environment, consumers seemed to lack self-regulatory capacity in that they gave in to the temptation of emotionally laden products more easily than consumers who had not self-regulated through active product choosing. Vohs and Faber (2007) found that participants who engaged in various self-regulatory behaviors such as attention control, behavioral control, or thought suppression, subsequently felt stronger urges

to buy and spent more money in unanticipated buying situations than participants who had not self-regulated initially. Bruyneel et al (in press) found that active but not passive mood regulation increased spending on lottery tickets.

There is wide agreement that the self-regulatory strength model (see above, Muraven and Baumeister 2000) is a viable explanation for this ego depletion phenomenon. Neuroscience however offers an alternative model, namely, the cognitive control theory. According to that theory (Botvinick et al. 2001; Miller and Cohen 2001), demanding situations evoke a gradual fine-tuning of the consumer's response set, which increases the fit between the cognitive system and the situational demands. The demanding situations that are typically studied in the domain of cognitive control are strikingly similar to the tasks studied in the domain of self-regulation (e.g., the overcoming of a strong habitual or emotional response; Shallice and Burgess 1993).

To explain how cognitive control theory can account for ego depletion, we now briefly explain cognitive control theory. Cognitive control refers to the cognitive system's ability to perform well at demanding tasks through gradual adjustments in perceptual selection, response biasing, and the on-line maintenance of contextual information. These control processes are triggered by the detection of the simultaneous activation of alternative and thus incompatible responses, which we refer to as a response conflict (Botvinick et al. 2001). The classic Stroop conflict paradigm (Stroop 1935) illustrates the concept of response conflict and the resulting adjustment process. Stroop tasks require participants to name the ink color in which a color word is displayed. More errors occur and response times are greater if there is a mismatch between the word color and the word meaning (e.g., the word 'RED' displayed in green) than if the two are matched (e.g., the word 'RED' displayed in red). Incongruent trials are difficult

because word reading, a strongly automatic but task-inappropriate process, interferes with color naming. When this conflict is detected, the cognitive system recruits control processes that increase sensitivity to stimulus color and/or reduce sensitivity to the word characters, and task execution gradually improves.

The capacity to adjust to demands and buffer against situational changes provides the cognitive control system with a high degree of autonomy. The inevitable cost is a reduced flexibility to solve new response conflicts when control processes that have been recruited to solve a previous response conflict are still activated (Botvinick et al. 2001). We suggest that this inertia of the control processes may be an alternative explanation for the ego depletion effect. An initial self-regulation task recruits control processes, which linger for a while and interfere with the swift recruitment of different control processes that are adaptive to tackle the next demanding dissimilar self-regulation task. Casting the ego depletion effect in cognitive control terms points at an important boundary condition for the effect: the control processes triggered by the response conflicts in the two subsequent self-regulation tasks should be dissimilar for the effect to occur.

The pivotal role of response conflict dissimilarity for the ego depletion effect

We argued that both the self-regulatory strength model and cognitive control theory can account for ego depletion. What would happen if two subsequent response conflicts, and hence the control processes that those response conflicts trigger, are similar? Cognitive control theory suggests that the control processes are still lingering when the next task triggering a response conflict is presented. Because the active control processes are also useful to solve the second

response conflict, self-regulation performance should be enhanced rather than impeded. The self-regulatory strength model predicts self-regulation impediment in this type of situations.

We now turn to the concepts of response conflict similarity and control process similarity. We will use an example to illustrate those crucial concepts. Let's think of a reception at which delicious snacks are offered. Often, people experience a *response conflict* between taking several of those small snacks and taking only one. Taking many would satisfy their desire but would violate a strong social norm spelling out that you can take only one at each serving. Potentially helpful *control processes* in this situation may be to downplay the salience of the taste (e.g. Mischel 1974 who showed that children are more successful in the delay of gratification task if they do not focus on the taste of the marshmallows) or thinking of the anticipated shame upon taking two or more snacks from the plate. Now suppose that in the next phase, the same people are invited to dinner. The dining situation provides a new response conflict between eating ad libitum and eating with measure. Some control processes that were recruited during the reception, such as diverting attention away from the taste, may help them in moderating their food intake over dinner. The response conflicts in the reception and the subsequent dinner situations are similar because they involve a similar conflict between eating ad libitum and restraining food intake. The control processes in the both situations are similar because they involve similar perceptual and response biases (e.g. downplaying the salience of taste). Note that we assume that response conflict similarity and control process similarity are closely related, so we do not differentiate between them in the current paper.

Our conceptualization also implies that response conflict similarity does not equal response similarity or vice versa. For instance, two subsequent choices involving two distant product categories such as snacks (e.g. regular and muesli bars) and proteins (fries and full rice) may

be low in response similarity (e.g., choosing low-fat cookies and full rice) but are high in response conflict similarity (i.e., choosing between tasty and healthy, which may both be helped by reducing the impact of taste on choice). Alternatively, two subsequent choices that involve the same product but that are being made for different reasons may be high in response similarity but low in response conflict similarity. Choosing between chocolate and fruit as an afternoon snack or as a gift to one's significant other may trigger different response conflicts although the response similarity is very high. The former situation may lead to the response conflict between tasty and healthy whereas the latter may trigger the response conflict between moderate price and your wish to signal your love for your significant other.

As we argued in the introduction, many consumer decision settings such as shopping trips, attempts to quit smoking, drug or food consumption regulation, or sticking to one's savings plans, appear to match the structure of the typical depletion situation, as they comprise (at least) two consecutive self-regulation demanding challenges (for some examples, see Dhar, Huber & Kahn 2007; Kahn and Dhar 2006).. However, contrary to the typical depletion situation, the consecutive self-regulatory challenges in many consecutive consumer decision settings trigger similar response conflicts and hence, recruit similar control processes. In cases where response conflicts of subsequent self-regulatory tasks are similar, and hence, recruit similar control processes, cognitive control theory predicts an enhancement of self-regulatory performance at the second task in comparison with a control condition in which no prior self-regulation was required. The self-regulatory strength model, in contrast, predicts a replication of the ego depletion phenomenon in these circumstances: Drawing on the muscle metaphor, having run ten miles does not increase the strength of the muscles involved in the short run.

HYPOTHESES

The self-regulatory strength model and the cognitive control model are empirically indistinguishable in the two phase paradigm typical of the depletion literature, in which subsequent control processes typically are dissimilar. Following the self-regulatory strength model, initial consumption of the scarce self-regulatory resource reduces participants' ability to self-regulate subsequently. Following the cognitive control model, the control processes that have been recruited to adapt to the first self-regulatory task linger and hinder swift adaptation to the new self-regulatory situation. In consumption situations in which consecutive self-regulatory decisions recruit similar control processes however, predictions derived from the two models diverge. The self-regulatory strength model does not assign a special role to similarity of the control processes, and thus predicts impaired self-regulatory capacity in the second phase. The cognitive control model, however, allows us to predict that lingering control processes will facilitate self-regulatory decisions that rely on similar control processes.

The aim of the current studies was to test the predictions derived from the two models against each other. In our studies, we mimicked the two phase paradigm of the depletion literature, and tested the role of the similarity of the response conflicts in the two tasks. That is, we investigated whether response conflict similarity between the two subsequent tasks moderates the effect of initial self-regulation on subsequent self-regulation. The first study tested the role of response conflict similarity by means of a thought suppression task (Wegner 1994) and a response reversal task (Paus et al., 1993), which have both been well established in the depletion literature as relying on the scarce self-regulatory resource (Baumeister et al.

1998, and Gailliot and Baumeister 2007, respectively). After engaging in one of both self-regulatory tasks or in a control task, all participants engaged in a response reversal task.

In the second study, we attempted to replicate the role of response conflict similarity in a consumer setting. We asked participants to restrict their urge to consume sweets in a first phase, which has been shown to be depleting (Baumeister et al, 1998, Study 1), and afterwards invited them to partake in a taste test in which we specifically asked them to eat (similar response conflict) or to solve a word anagram (different response conflict and different responses). In the third and final study, we let participants make a series of binary choices, which has been shown to be depleting (Bruyneel et al., 2006). For one set of binary choices, participants had to choose between a selling offer in which a product was immediately available at a high price (the impatient offer) and a selling offer in which the same product was cheaper but not immediately available (the high self-regulation option; Green & Myerson, 2004). For another set of binary choices participants had to choose between a planned product (the high self-regulation option) and a suddenly appearing tempting alternative (the impulsive option; Rook, 1987). Participants were either assigned to a high response conflict similarity (i.e., similar choice sets in both phases of the study), a low response conflict similarity (i.e., dissimilar choice sets in both phases), or a control condition (i.e., no choice in the first phase).

The self-regulatory strength model predicts that self-regulation in the first phase of these studies (response reversal, thought suppression, restricting food intake, and engaging in choices) will invariably impair self-regulatory performance in the second phase, independently of the response conflict similarity between both self-regulatory tasks. The cognitive control model, in contrast, predicts that self-regulation in the first phase will *improve* self-regulatory performance in the second phase in case participants have deployed similar control processes

to deal with the demands of the first task (i.e. response reversal after engaging in response reversal in Study 1, moderated food intake in the taste test after resisting a food temptation in Study 2, choosing for the delayed larger rather than the immediate smaller reward after having done so repeatedly in Study 3, and resisting the impulse options after having done so repeatedly in Study 3). According to the cognitive control model, self-regulatory impairment will only occur when the recruited control processes differ between the two phases.

STUDY 1

In this study, we explored the moderating role of response conflict similarity between two subsequent self-regulatory tasks on the depletion effect. We applied three levels of response conflict similarity: neutral, low, and high, resulting in three conditions of which the first two matched a straightforward depletion paradigm. In one condition, participants first engaged in a non-depleting, neutral task and then proceeded with a depleting response reversal task (i.e., the Control condition). In one other condition, participants first engaged in a depleting thought suppression task and then engaged in the same response reversal task as participants in the control condition engaged in (i.e., the Low similarity condition). Both the cognitive control and the self-regulatory strength model predict that performance at the response reversal task should be worse in the latter condition than in the former. The third condition is the most informative condition for our research purposes. In that condition, participants engaged in a sequence of two similar, depleting response reversal tasks (i.e., the High similarity condition). The self-regulatory strength model predicts a depletion effect akin to the one in the Low similarity condition. That is, participants get depleted because of the response reversal task that

they engage in during the first phase, which should reduce their capacity to successfully perform on the subsequent response reversal task. The cognitive control model, in contrast, predicts performance to improve in the second response reversal task in comparison with the control condition, as participants in the high similarity condition should fine-tune to the task demands (i.e. the response conflict) of the first response reversal task. Their performance on the second response reversal task should benefit from this fine-tuning.

The response conflict in the thought suppression task is a conflict between thinking about the forbidden thought, which is facilitated by the experimental settings, and not thinking about the forbidden thought, thus complying with the experimental instruction. The control processes recruited by the response conflict that participants experience in the thought suppression task solve this conflict. These control processes are dissimilar to the control processes recruited by the conflict that participants experience in the response reversal task, which is a conflict between providing two equally plausible but competing responses upon presentation of an experimental cue.

Method

Participants. Seventy-five students (30 men, average age 21 years) participated in exchange for course credit.

Procedure. In the first phase of the study, participants engaged in a control task (i.e., Control condition), a thought suppression task (i.e., Low similarity condition, Wegner 1994),

or a response reversal task similar to the response reversal task of the second phase (i.e., High similarity condition). In the second phase, all participants engaged in a response reversal task.

Control task. Participants were asked to watch a five-minute relaxing power-point presentation with landscape pictures.

Thought suppression task. Participants were asked to engage in a thought-listing task for five minutes. They were instructed to write down their thoughts on a sheet of paper and to avoid thinking of a white bear. When thinking of a white bear, participants had to click a button that was centrally displayed on the computer screen before them and immediately change their thoughts and try very hard not to think of a white bear again. Previous studies already established that trying not to think of a white bear for five minutes leads to a state of depletion (e.g., Muraven and Slessareva 2003).

Response reversal task. Participants were asked to match a string of characters to a geometric shape. The string of characters consisted of two letters out of the set A, B, C. These two letters were shown on the first screen. On the second screen, a geometric shape, which was either a circle or a square, was shown. Participants were asked to click the circle when they had seen the letter strings “AB” or “BC” and click the square when they had seen the letter strings “AC” or “BA” on the previous screens. The task consisted of 20 trials of which five trials (i.e., 25% of the trials) required a response reversal. This response reversal implied that participants had to click the non-matching shape whenever a cross was shown in between the two letters (e.g. “AXB”). Latency on the reversal trials minus the average latency on the

regular trials is considered a measure of self-regulation: smaller latency reflects better self-regulation (DeWall et al. 2007).

The matching rule used in the response reversal task came in two versions (i.e. there was also a version relying on character strings consisting of two letters out of the set E, F, G). A similar task requiring participants to consult multiple rules and monitor their decisions carefully has been used successfully as a depletion inducing task before (DeWall et al. 2007; Gailliot and Baumeister 2007; Muraven et al. 2006).

In the second phase of the study, participants in all conditions were asked to engage in a response reversal task. Participants received one of the versions randomly. Participants who received both versions (high similarity condition) never received the same version. Performance at the second response reversal task, as measured by the average latency on the five reversal trials minus the average latency on the other trials, was our dependent variable.

In all conditions, participants' mood was assessed by means of the Positive Affect Negative Affect Schedule (PANAS; Watson, Clark, and Tellegen 1988). This was done to validate that mood states were not different depending on self-regulation condition, thus ruling out a possible alternative account for our findings.

Results and discussion

Because the latency of incorrect responses would be difficult to interpret, only correct responses were used in all the subsequent analyses (Bargh et al. 1992; Fazio 1990; we observed 6.0% incorrect responses in the high similarity condition, 9.0% incorrect responses in the low similarity condition, and 9.6% incorrect responses in the control condition, $F(2,72) =$

3.17, $p < .05$). In order to reduce the influence of outliers, latencies below 300ms and above 3000ms were set at these respective boundaries (Greenwald, McGhee, and Schwartz 1998). We calculated interference by subtracting latencies for the non-conflict trials from the latencies for the response reversal trials.

Interference was significantly affected by the prior task: $F(2,72) = 8.92$, $p < .0004$. Figure 1 shows that, consistent with the typical depletion effect, interference was high in the Low similarity condition ($M = 2.00$, SD = 0.77) compared to the Control condition ($M = 1.58$, SD = 0.73), $t(72)=2.10$, $p < .04$, but also compared to the High similarity condition ($M = 1.17$, SD = 0.57), $t(72)=4.22$, $p < .0001$. In the High similarity condition, interference was even *lower* than in the Control condition $t(72)=2.10$, $p < .04$.

Insert Figure 1 about here

In the High similarity condition, participants engaged in the response reversal task twice ($r = .49$, $p < .02$). Consistent with the between subject analyses, we found that in the High similarity condition ($n = 25$), interference was lower in phase 2 ($M = 1.17$, SD = 0.57, see above) than in phase 1 ($M = 1.54$, $SD = 0.91$; $F(1,24) = 5.39$, $p < .03$).

Mood differences cannot explain the effect as the levels of positive (Control: $M = 26.6$, $SD = 6.7$; Low similarity: $M = 27.3$, $SD = 7.1$; High similarity: $M = 28.8$, $SD = 6.2$; $F(1,72) = 0.7$, $p > .5$) and negative affect (Control: $M = 14.5$, $SD = 4.1$; Low similarity: $M = 16.0$, $SD = 6.8$; High similarity: $M = 13.3$, $SD = 3.2$; $F(1,72) = 1.7$, $p = .18$) did not differ between similarity conditions. Moreover, adjusting for positive and negative affect as covariates did not change

the pattern of results reported above, suggesting that mood does not mediate the effect of similarity on self-control.

The pattern of interference in the High similarity condition is consistent with the predictions of the cognitive control model. It is however at odds with the predictions stemming from the self-regulatory strength model. Although the response reversal task is depleting, which is validated by the finding that interference was higher in the Low similarity condition than in the Control condition, it does not impede self-regulation in a highly similar task. On the contrary, a between-subject and within-subject analysis showed that it enhances self-regulation. In the next studies, we leave aside tasks that have been used in the cognitive control as well as in the ego depletion literatures and focus on consumption behavior.

STUDY 2

In this study, we aimed at replicating the pattern of results for a different set of self-regulatory tasks that have clear links to consumption situations. We further reduced superficial response similarity between the two subsequent tasks, while keeping the hypothesized response conflict similarity high. Unlike in Study 1 where similarity between the phases was manipulated by changing the task in phase 1, similarity was varied by changing the task in phase 2 in this study.

In the first phase, participants were either tempted with attractive chocolates but asked not to eat any (i.e., a demanding task; Baumeister et al 1998, Study 1), or were asked to engage in a non-demanding control task (control condition). In the second phase, half of the participants was asked to engage in a difficult anagram-solving task in which we measured their

persistence in seconds (Baumeister et al. 1998, Study 3). In our design, this is the low similarity condition because the response conflict in solving anagrams differs from the response conflict in the temptation situation. Backed by almost a decade of consistent findings, the self-regulatory strength model unequivocally predicts that persistence on the anagram task will reduce in the group that was previously tempted and had to self-regulate to resist their urge to take a sweet, as compared to the control group. The cognitive control model provides us with the same prediction.

The other half of the participants was asked to engage in a taste test rather than to solve an anagram in the second phase of the study. In our design, this is the high similarity condition because the response conflict in a taste test is similar to that in the temptation situation. Controlling food intake in a taste test of attractive sweets requires self-regulation (Baumeister et al 1998, Study 1; Shiv and Fedorikhin 1999). The self-regulatory strength model predicts that depleted participants (i.e., participants who were not allowed to consume chocolates during the first phase of the study) will have more trouble controlling their food intake than the control group, whereas the cognitive control model predicts that the depleted group will be *better* at self-regulation than the control group during the taste test.

The control processes recruited to solve the response conflict that is evoked in a taste test (i.e. countering the approach tendency towards the food, for instance by the activation of a food intake regulation goal, Fishbach, Friedman, and Kruglanski, 2003, or by ignoring the taste, Mischel 1974) are highly similar to the control processes recruited to solve the response conflict in the temptation situation (i.e. countering the approach tendency to the food, this time by the experimental instruction to not taste the food). In spite of this similarity in control processes, any spill-over from phase 1 to phase 2 cannot be the result of a practice effect

because the required responses to complete the task differ between the two phases. More specifically, in the first phase, we ask participants *not to eat*, whereas in the second task, we ask them *to taste* the food. The control processes recruited by the response conflict that characterizes the anagram task, which comes down to the conflict between quitting and wanting to perform are different from those used to solve the response conflict in both the temptation task and the taste test, which are conflicts between wanting and resisting tasty but unhealthy snacks.

Method

Participants. One hundred and fifty-two female students participated in exchange for a participation fee or for course credit. We used only women because gender has a major impact on food regulation which is not the main concern of the current study (Fishbach et al. 2003).

Design. We crossed the level of temptation (no versus high) with similarity between self-regulatory task 1 and self-regulatory task 2 (high versus low).

Temptation manipulation. In the High temptation situation, participants were given a knowledge task upon entering the laboratory. Participants were told that the manufacturer of the chocolate candy brand 'Quality Street®' was interested in consumer knowledge of the association between candy flavors on the one hand and wrap colors and shapes on the other hand. Participants were asked to associate twelve pictures of candies (of different colors and shapes) with the corresponding flavor of each candy (e.g. 'chocolate with strawberry cream

filling'). In addition, a bowl filled with lots of these 'Quality Street' candies was present next to them. They were told that the candies were placed there because the pictures were not always very clear. They were not allowed to eat any candy *during* the knowledge task, but were told that they were free to eat as many chocolates as they desired *after* the knowledge task. In this way, participants had to self-regulate in order to resist the candies during the knowledge task. Participants in the No temptation situation were asked to match ten colors with ten concepts (e.g. 'white' with 'snow and 'green' with 'grass')[1]. The self-regulatory task in the second phase was either high or low in control process similarity with the self-regulatory task in the first phase.

Similarity manipulation. The high similarity self-regulatory task comprised a taste test of a relatively unhealthy product. In line with prior research, we consider restricting consumption of unhealthy but tempting products in taste tests as an act of self-regulation (Fishbach et al. 2003; Geyskens et al. 2008; Tice, Bratslavsky, and Baumeister 2001). Participants were given two bowls filled with candies, one with regular M&Ms® (400 grams), and the other with 'new' crispy M&Ms (300 grams). They were told that they were participating in a comparative taste test of both types of M&Ms. Participants were allowed to eat as many of the M&Ms as they needed to evaluate the M&Ms on several dimensions (e.g. 'are they crunchy?', 'do they have a strong aftertaste?'). After the taste test, the bowls were removed, and the experimenter weighed how many M&Ms had been consumed (summed across the two bowls). The low similarity self-regulatory task of the second phase consisted of solving an anagram on PC (Baumeister et al. 1998). Participants received eight letters and had to form existing words of at least seven letters. Only five words were possible and a pretest showed that the majority of

the participants found none. Time spent solving the anagram (i.e. persistence) was recorded. Note that to lend credibility to the cover story, the candies were available during the anagram task.

A pretest in the same population (n = 46) showed that the temptation manipulation did not affect positive (No temptation; M = 29.7, SD = 6.2; High temptation; M = 29.0, SD = 6.8, F<1), nor negative affect (No temptation; M = 12.9, SD = 3.9; High temptation; M = 13.2, SD = 4.1, F<1). We preferred measuring affect in a different sample to preclude participants from consuming the candies of the first phase during the completion of the affect measure.

Results and discussion

Because the distributions of time spent and quantity consumed were skewed to the right, both variables were log-transformed. Both dependent measures were standardized. For the sake of clarity, the quantity consumed was reversed such that higher values mean better self-regulation for both self-regulatory tasks. Figure 2 shows the interaction between Similarity and Temptation: $F(1,149) = 10.07$, $p < .002$. The main effects were not significant (Fs < 0.1). In the Low similarity condition (anagram solving in the second phase), tempted participants spent less time solving anagrams than participants who were not tempted beforehand, $F(1,149) = 4.98$, $p < .03$ (High temptation: M = 140s, SD = 136, No temptation: M = 189s, SD = 140). In the High similarity condition (taste test in the second phase), tempted participants performed better at the taste test. Actually they consumed less than participants who were not tempted beforehand, $F(1,149) = 5.10$, $p < .03$ (High temptation: M = 9.28g, SD = 5.9; No temptation: M = 13.12g, SD = 7.84) . One may argue that lower consumption in the taste test may be due to

allocation of consumption between the two types of candy. This would imply a negative correlation (in the second phase) between consumption of the candies of the first phase and candies of the taste test. The correlation was 0.03 (n = 35, NS), which suggests that lower consumption was not due to the consumption of the other candy.

Insert Figure 2 about here

Study 2 replicates the previous finding that initial self-regulation enhances self-regulation at a second task provided that the second task is similar to the first one with respect to the control processes recruited by the response conflict. Once again, these findings provide support for the cognitive control model while being at odds with the self-regulatory strength model.

STUDY 3

The major objective of this study was to replicate the pivotal role of response conflict similarity in the effect of prior self-regulation on subsequent self-regulation, using a fully crossed experimental design. We asked participants to make a series of binary product choices. We relied on recent findings by Bruyneel et al. (2006) that making product choices that do not involve affect-cognition trade-offs increases the impact of affective product features in later product choices, and thus reduces self-regulation in dissimilar sequences. We used self-regulatory tasks of two different types, as an independent and as a dependent measure. Combined with the control condition in which no prior self-regulatory task was involved, this

yielded a three (high similarity, low similarity, and control) by two design (self-regulation type 1 and self-regulation type 2). Compared to the control condition we expected self-regulation enhancement at the second task when the prior self-regulatory task triggered similar response conflicts and self-regulatory impediment when the prior self-regulatory task triggered dissimilar response conflicts.

We further reduced superficial response similarity between the two subsequent tasks while keeping the control processes needed to solve the response conflict in the two phases similar. In addition, we used self-regulatory tasks unrelated to performance.

For the present study, we selected two types of binary product choices that have undisputed roots in self-regulation literature and have clear links to consumer decision making. The first type of choice was the delay of gratification situation (Green and Myerson 2004). We let participants choose between two offers for one particular product: In the first offer, the product was immediately available but the price was relatively high. In the second offer, the same product was cheaper but not immediately available. The second type of choice was the impulsive buying situation (Rook 1987). We again let participants choose, but this time they had to choose between a product that they had planned to buy before their shopping trip, and an attractive product that they unexpectedly encountered during the shopping trip. We used scenarios similar to the ones used by Dholakia et al. (2005).

We let participants first go through a series of twelve choices of either of the two types, or through a series of twelve questions in the control condition. Subsequently, we gave them two pre-tested choices of either the first or the second type in the dependent measures phase. We restricted ourselves to two choices because Dholakia et al. (2005) found sequence effects after only two choices. According to the self-regulatory strength model, self-regulation in phase 2

should be weaker in comparison with the control condition when participants had just made a series of choices, irrespective of the nature of the choices. According to the cognitive control model, self-regulation in phase 2 should be enhanced after a series of similar choices but be impaired after a series of dissimilar choices, both in comparison with the control condition.

The control processes recruited to solve the response conflicts characterizing the two types of self-regulatory choices are dissimilar. In the delay of gratification situation, self-regulation is achieved by activating the importance of the value of the reward and/or downplaying the devaluation due to the delay. In the impulsive buying situation self-regulation is achieved by over-activating the goal related to the initial purchase plan and/or deactivating the hedonic value of the alternative.

Method

Participants. One hundred twenty-four participants (82 women, 65%) received a fee for participating in this experiment. Six participants who did not read at least one of the choice scenarios (reading time less than two seconds, 5%) were omitted from further analyses.

Stimuli. We created two sets of 14 binary choices, of which 12 were used in the manipulation phase and two in the measurement phase. Each choice consisted of a tempting option and a high self-regulation option. Each set corresponded to one type of self-regulatory conflict. One set presented a conflict between a planned purchase and a suddenly appearing temptation that was not planned. Following Rook (1987), we call a lack of self-regulation in these binary product choices 'impulsive'. We refer to this set as the impulsive choice set. A second set presented a conflict between an immediate but more expensive selling offer and a

cheaper but delayed selling offer of the same product. Following Frederick, Loewenstein, and O'Donoghue (2002) we call a lack of self-regulation in these binary product choices 'impatient'. We refer to this set as the impatient choice set. The two binary choices (both impulsive and impatient) that served as dependent variables were selected in a pretest. These four choice options of the dependent variable phase are presented in Table 1. They are representative of the other options in the respective choice sets that served as the independent variable set (stimuli available upon request). As three of the four selected scenarios had to do with food, we included gender as a control variable in the analyses.

Insert Table 1 about here

Design. Type of self-regulatory task (Impatient versus Impulsive) was crossed with similarity (High, Low, and Control).

Similarity manipulation. Two thirds of the participants (the experimental conditions) were first presented with a set of 12 binary product choices of either the impulsive or the impatient type and then received a set of two binary product choices of either the impulsive or the impatient type. In the High similarity condition, both sets were choices of the same type. In the Low similarity condition, the two sets were of different types. One third of the participants (the Control condition), received a neutral filler task taking the same amount of time as the choices in phase 1 in the high and low similarity experimental conditions[5]. Control participants had to

make two binary product choices of either the impulsive or the impatient type after having engaged in the filler task.

Measures. Self-regulation was defined as the number of times (0-2) participants selected the high self-regulation option in the second phase. As the number of times a participant chooses the high self-regulation option is a count variable, we log-transformed this variable.

Results and discussion

We conducted a three (Similarity) by two (type of self-regulatory conflict in phase 2) ANOVA on self-regulation, controlling for gender. The ANOVA revealed a significant main effect of Similarity: $F(2, 115) = 5.94$, $p < .003$. As predicted, in the High similarity condition, participants chose the high self-regulation option more often ($M = 0.83$, SD = 0.3) than in the Low similarity condition ($M = 0.58$, SD = 0.4, $F(1, 115) = 7.86$, $p < .006$) and than in the Control condition ($M = 0.68$, SD = 0.4, $F(1, 115) = 4.20$, $p < .05$). In the Low similarity condition, self-regulation was marginally weaker than in the Control condition ($F(1, 115) = 2.09$, $p < .08$, one-tailed), replicating the depletion effect of choice making (Bruyneel et al. 2006).

Further, a significant main effect of Type of self-regulatory conflict, $F(1, 115) = 22.04$, $p < .0001$, showed that the impatient choices led to better self-regulation ($M = 0.84$, SD = 0.3) than the impulsive choices ($M = 0.56$, SD = 0.4). This finding however reflects stimuli differences that are not important for the present research purposes. More importantly, the interaction between Type of self-regulatory conflict and Similarity was not significant: $F($1,

115) = 0.9, $p > .40$, suggesting that the effect of similarity is task-independent (see Figure 3). The effect of gender was not significant ($F < 1$).

Insert Figure 3 about here

This study replicates the self-regulation enhancing effect of prior exertion of self-regulation in situations characterized by a response conflict recruiting similar control processes. After having pondered twelve times over whether or not to delay product acquisition in exchange for a cheaper price, participants were more likely to delay gratification but less likely to resist the temptation of an impulsive buy. In contrast, after having pondered twelve times over whether or not to resist the temptation of an impulsive buy, participants were more likely to resist the temptation of an impulsive buy but were less likely to delay gratification. The self-regulatory strength model predicted that all acts of choice-making would lead to weakened self-regulation, whereas the cognitive control model predicted weakened self-regulation only when the control processes recruited to solve the response conflict differed between phases but predicted improved self-regulation when the control processes recruited to solve the response conflict remained constant in the second phase. The pattern of data is thus at odds with the predictions of the self-regulatory strength model but supports the predictions of the cognitive control model.

It is important to note that even though the actual responses in all choice situations appear very similar at a basic level (i.e., selecting one choice option over another choice option), we

believe that they are in fact very different in their details, as no single choice option is the same (see Table 1 and footnote 3). Therefore, we are fairly confident that response practice effects cannot explain potential self-regulation enhancement effects in this study.

GENERAL DISCUSSION

This paper tested the robustness of the ego depletion effect in typical consumption settings, in which subsequent self-regulatory decisions are often similar. We compared two possible theoretical interpretations of the ego depletion effect (Baumeister et al. in press). The first interpretation, which is derived from self-regulatory strength model (Muraven and Baumeister 2000), states that ego depletion reflects a reduction in self-regulatory strength that is needed in the process of overriding one's behavior, thoughts, or emotions. The second interpretation, which is derived from cognitive control theory (Botvinick et al. 2001; Miller and Cohen 2001), states that ego depletion reflects an individual's temporal adaptation to highly demanding situations. Although indistinguishable in situations where two *dissimilar* self-regulatory conflicts follow each other (i.e., both models predict a reduction in self-regulation after initial self-regulation in that case), the two models yield sharply diverging predictions when applied to situations in which two *similar* self-regulatory conflicts follow each other, which is typical of many consumption self-regulatory situations. The self-regulatory strength model predicts that self-regulating is depleting, and hence negatively affects self-regulatory ability in any subsequent situation, irrespective of the similarity between both types of self-regulatory demand. The cognitive control theory, in contrast, predicts that response conflicts lead people to temporally adapt to self-regulatory situations by recruiting appropriate control processes,

which should enhance their ability to deal with subsequent response conflicts that require similar control processes to be solved successfully.

Our data provide strong support for the cognitive control model. In Study 1, we found that a depleting response reversal task enhanced self-regulation on a similar task in the second phase. In Study 2, we showed that inhibiting food intake, although depleting, subsequently improved self-regulation in the domain of food intake control. In Study 3, we observed that choice making, although depleting, facilitated subsequent self-regulation when the control processes required to solve the response conflict were similar in both phases. These findings imply that many consumer decision settings such as shopping trips, attempts to quit smoking, or eating sweets, to name just a few, not necessarily lead to self-regulatory breakdown in later phases. If consecutive or continued self-regulatory challenges in consecutive consumer decision settings trigger similar response conflicts and hence, recruit similar control processes, self-regulation may even be enhanced.

Theoretical implications

The first implication of our findings is that the ego depletion effect is moderated by the similarity of the response conflict and hence the control processes recruited by the response conflicts in two subsequent self-regulation demanding situations. The ego depletion effect occurs only when the control processes needed to solve the response conflicts characterizing two consecutive self-regulatory phases are sufficiently different.

Similarity of control processes required to solve response conflicts does more than suppressing the depletion effect, however. Our findings also suggest that similarity even *reverses* the depletion effect. Self-regulating in a situation that involves a certain response conflict recruiting certain control processes (e.g. intertemporal choices in an online setting; trade-offs between quality and price in a retail situation) appears to facilitate self-regulation in a subsequent situation that involves a response conflict recruiting similar control processes. We found that adapting to a response reversal task facilitates performance in a subsequent response reversal task (Study 1), that inhibiting food intake in a first phase enhances food intake control in a subsequent taste test (Study 2), and that pondering over choices presenting a conflict of a certain nature enhances self-regulation in subsequent choice situations presenting a similar conflict (Study 3). The implication of these findings is that exerting effort is not a sufficient condition for the ego depletion effect (in the sense of reduced self-regulation after previous self-regulation) to occur. Participants in the high similarity conditions of our studies had self-regulated in the first phase but performed better in the second phase than participants who had not self-regulated in the first phase. These findings cannot be accounted for by a muscle metaphor which states that self-regulating temporally exhausts self-regulatory capacity in the same way as in which using a muscle temporally exhausts its capacity to exert power. Muscles get exhausted in using, whether or not they are used in similar or different tasks. The muscle metaphor implies that depletion of the scarce resource that the self-regulatory strength model refers to should not depend on the similarity of the control processes needed to solve subsequent conflict situations. However, our data strongly suggest that it does.

Our data also have implications for the societal scope of ego depletion effects. Baumeister and Heatherton (1996) documented the societal costs of self-regulatory breakdown. The

depletion effect was put forward as the culprit behind much of people's misbehaviors as it provides an explanation for why people's capacity to self-regulate is dramatically limited. The fact that depletion effects set in after a mere five minutes of thought suppression (Muraven and Slessareva 2003) only boosted the perceived maliciousness of the ego depletion effect. However, our data suggest a very different possibility: the ego depletion effect may not point at an all too rapid drain of scarce self-regulatory resources, thereby impeding people from behaving in an appropriate way. Rather, it may be a side-effect of an adaptive process that helps people to deal with highly demanding situations.

Future research opportunities

Consumer decision situations often involve a series of decisions that can be characterized as highly demanding but bear sufficient similarity in the response conflicts that they elicit (e.g., high involvement choices, Wertenbroch, Dhar, and Zeelenberg 2002). We observe that initial choices like that may not necessarily lead to poor (as in 'less self-regulated') decision-making. In fact, initial self-regulation fosters further self-regulation even in taxing decisions, provided that the decisions in question are sufficiently similar with respect to the response conflict that they elicit. These findings map onto existing literature demonstrating the impact of initial mental control strategies on subsequent decisions in a series of similar self-regulation trade-offs (Dhar et al. 2007; Mischel 1974; Polivy and Herman 1985).

There has however been research demonstrating that initial self-regulation in a sequence of similar consumption opportunities does not always enhance self-regulation. In fact, mere awareness of a future opportunity to self-regulate may even stifle self-regulation upfront

because consumers might plan to postpone their effort until the next opportunity (Khan, Huber, and Dhar 2007). But even when initial success on a focal goal occurs (e.g. successful resistance to a dessert conform a food restriction goal) engagement in conflicting goals (e.g. indulgence in tasty food) may get enhanced subsequently, exactly *because* progress along one goal temporarily liberates consumers from investing in the focal goal (Fishbach and Dhar 2005). Likewise, initial commitment to virtuous acts has been found to subsequently license the choice of more self-indulgent options, as the virtuous act boosts a positive self-concept and negative self-attributions associated with the purchase of relative luxuries are no longer impactful (Khan and Dhar 2006). The counterpart of these effects is the increased willingness to self-regulate after initially having engaged in impulsive choices, an effect known as the sequential mitigation effect (Dholakia, Gopinath, and Bagozzi 2005). We call upon future research investigating the circumstances under which consumers adhere to their initial mental control strategies, and the ones under which they switch to different strategies when engaged in sequential decision-making. Likely moderators are the success at adapting to a particular response conflict and the degree to which subsequent response conflicts are truly similar, which we both discuss next.

An interesting research question pertains to the moderating role of success at adapting to a particular response conflict. Whenever a response is successful, reinforcement signals strengthen the association between the situation and the successful control processes. Successful control processes may eventually gradually become automatic. When this happens, conflict and hence the need for control diminishes (Botvinick et al. 2001; Miller and Cohen 2001). Future research may search for moderating factors that clarify the distinction between tasks that impede complete adaptation (e.g. dieting) and tasks that allow for complete

adaptation (e.g. working with a pc). The answer to this question has implications for the scope of the ego depletion phenomenon. It allows us to predict that depletion effects (in the sense of impaired self-regulation at unrelated subsequent tasks) may occur only when consumers are still adapting to a response conflict but not after they have fully adapted. Specifically, engaging in a demanding task for five minutes may be more 'depleting' (in the sense that it impedes subsequent self-regulation at unrelated tasks) than engaging in the same task for half an hour (that is, when adaptation to the task demand has completed).

In the present paper, we used a working definition of response conflict similarity and control processes similarity that may require further fine-tuning. The working definition relied on the assumption that the control processes recruited by a certain response conflict are defined, cognitively, with respect to the goal pursuit needed to produce the desired response. This working definition sufficed for evaluating similarity in response conflicts and control processes between tasks, but the issue remains at exactly which level of abstraction a response conflict and its recruited control processes should be defined. Thus, future work is relevant when it comes to predicting whether certain self-regulatory sequences that appear similar at first sight will truly enhance or rather still impede subsequent self-regulation. It is for instance not clear yet whether a supermarket choice between fruit and cake recruits control strategies similar to the ones involved in a choice between soda and water. Should choosing between fruit and cake recruit control processes that can be defined abstractly as reducing the impact of taste, then we should predict self-regulation enhancement in a subsequent choice between soda and water, presuming that the control processes involved in the latter choice can also be defined abstractly as reducing the impact of taste. Should the initial response conflict however recruit control processes that are defined less abstractly as reducing the impact of the attractive

texture of cake, then there should be self-regulation impairment in a subsequent choice between soda and water, as reducing the impact of the attractive texture of the cake is irrelevant in the latter case.

Cognitive control theory is cast in neurological terms and links the mental states to the operation of units in the brain. Specifically, cognitive control processes occur in the prefrontal cortex, and conflict monitoring and detection occurs in the Anterior Cingulate Cortex (Botvinick et al 2001). As our empirical approach is psychological in nature in that it links situational factors to behavioral variation without measuring the brain processes involved, we rely on the mental states involved in the process rather than on the neurological substrate and its operations. This methodological limitation provides an opportunity for future neuroscientific research.

Finally, we would like to draw attention to the fact that cognitive control theory typically models conflicts between informational inputs (as we did in study 1). But, as we showed, self-regulatory conflicts that are reminiscent of typical heart-mind conflicts (studies 2 and 3, cf. Shiv and Fedorikhin 1999) also followed the predictions derived from cognitive control theory. One of the contributions of this paper is showing that control processes recruited by these typical self-regulatory conflicts can also be identified in terms of elementary activation and deactivation patterns. Our findings suggest that any task that has been shown to be depleting should be identifiable in terms of the control processes it recruits. Ingesting distasteful medication, for instance, may recruit control processes that deactivate motoric disgust reactions to bitterness and/or activate the wish to get well. Observed patterns of self-regulation enhancement and depletion for any pair of subsequent self-regulatory tasks may help to define the relevant conflict and control processes involved. These patterns may eventually also help to

identify the level at which the conflict should be implemented in cognitive control models, and in this way inform neuroscience.

REFERENCES

Bargh, John A., Shelly Chaiken, Rajen Govender, and Felicia Pratto (1992), "The generality of the automatic attitude activation effect," *Journal of Personality and Social Psychology,* 62 (June), 893-912.

Baumeister, Roy F. (2002), "Yielding to temptation: Self-control failure, impulsive buying, and consumer behavior," *Journal of Consumer Research,* 28 (March) 670-76.

Baumeister, Roy F., Ellen Bratslavsky, Mark Muraven, and Dianne M. Tice, (1998), "Ego depletion: Is the active self a limited resource?," *Journal of Personality and Social Psychology,* 74 (May), 1252-65.

Baumeister, Roy F., C. Nathan DeWall, Natalie J. Ciarocco, and Jean M. Twenge (2005), "Social exclusion impairs self-regulation," *Journal of Personality and Social Psychology,* 88 (April), 589-604.

Baumeister, Roy F., Matthew T. Gailliot, and Dianne M. Tice, (2008), "Free willpower: limited resource theory of volition, choice, and self-regulation," in *The psychology of action, Volume 2: Mechanisms of human action*, ed. Ezequiel Morsella, John A. Bargh, and Peter Gollwitzer, NY: Oxford.

Baumeister, Roy F., and Todd F. Heatherton (1996), "Self-regulation failure: An overview," *Psychological Inquiry,* 7 (1), 1-15.

Baumeister, Roy F., Jean M. Twenge, and Christopher K. Nuss (2002), "Effects of social exclusion on cognitive processes: Anticipated aloneness reduces intelligent thought," *Journal of Personality and Social Psychology*, 83 (October), 817-27.

Botvinick, Matthew M., Todd S. Braver, Deanna M. Barch, Cameron S. Carter, and Jonathan D. Cohen (2001), "Conflict monitoring and cognitive control," *Psychological Review,* 108 (3), 624-52.

Bruyneel, Sabrina D., Siegfried Dewitte, Kathleen D. Vohs, and Luk Warlop (2006), "Repeated choosing increases susceptibility to affective product features," *International Journal of Research in Marketing,* 23 (2), 215-25.

Bruyneel, Sabrina D., Siegfried Dewitte, Philip-Hans Franses, and Marnik Dekimpe (in press), "I felt low and now my purse feels light. Depleting mood regulation increases spending on lottery". *Journal of Behavioral Decision Making.*

Carmon, Ziv, Klaus Wertenbroch, and Marcel Zeelenberg (2003), „Option attachment: when deliberating makes choosing feel like loosing," *Journal of Consumer research,* 30 (June)¸15-29.

DeWall, Nathan C., Roy F. Baumeister, Tyler F. Stillman, and Matthew T. Gailliot (2007), "Violence restrained: Effects of self-regulation and its depletion on aggression," *Journal of Experimental Social Psychology,* 43 (1), 62-76.

Dhar, Ravi, Joel Huber, and Uzma Kahn (2007), "The shopping momentum effect," *Journal of Marketing Research,* 44 (3), 370-78.

Dholakia, Utpal M., Mahesh Gopinath, and Richard P. Bagozzi (2005), "The role of desires in sequential impulsive choices," *Organizational Behavior and Human Decision Processes,* 98 (2), 179-94.

Fazio, Russell H. (1990), "A practical guide to the use of response latencies in social psychological research," in *Review of personality and social psychology,* Vol 11, ed. C. Hendrick and M. S. Clark, Newbury Park, CA: Sage, 74-97.

Fishbach, Ayelet, and Ravi Dhar (2005),"Goals as Excuses or Guides: The Liberating Effect of Perceived Goal Progress on Choice," *Journal of Consumer Research,* 32 (December), 370-77.

Fishbach, Ayelet, Rohn S. Friedman, and Arie W. Kruglanski, (2003), "Leading Us Not Unto Temptation: Momentary Allurements Elicit Overriding Goal Activation," *Journal of Personality and Social Psychology*, 84 (February), 296-309.

Frederick, Shane, George Loewenstein, and Ted O'Donoghue (2002), "Time Discounting and Time Preference: A Critical Review," *Review of Economic Literature,* 40 (2), 351-401

Gailliot, Matthew T., and Roy F. Baumeister (2007), "Self-regulation and sexual restraint: Dispositionally and temporarily poor self-regulatory abilities contribute to failures at restraining sexual behavior," *Personality and Social Psychology Bulletin,* 33 (2), 281-94.

Geyskens, Kelly, Siegfried Dewitte, Mario Pandelaere, & Luk Warlop (2008), "Tempt me just a little bit more: The effect of prior food temptation actionability on goal activation and consumption," *Journal of Consumer Research,* 35 (December), 600-10.

Green, Leonard, and Joel Myerson (2004), "A discounting framework for choice with delayed and probabilistic rewards," *Psychological Bulletin,* 130 (5), 769–92.

Greenwald, Anthony G., Debbie E. McGhee, and Jordan L.K. Schwartz (1998), "Measuring individual differences in implicit cognition: The implicit association test," *Journal of Personality and Social Psychology,* 74 (June), 1464-80.

Kahan, Dana, Janet Polivy, and Peter C. Herman (2003), "Conformity and dietary disinhibition: A test of the ego-strength model of self-regulation," *International Journal of Eating Disorders, 33* (2), 165-71.

Khan, Uzma, and Ravi Dhar (2006), "Licensing effect in consumer choice," *Journal of Marketing Research,* 43 (2), 259-66.

Khan, Uzma, Joel Huber, and Ravi Dhar (2007), "The shopping momentum effect," *Journal of Marketing Research,* 44 (3), 370-8.

Miller, Earl K., and Jonathan D. Cohen (2001), "An integrative theory of prefrontal cortex function," *Annual Review of Neuroscience,* 24, 167-202.

Mischel, Walter (1974), "Processes in delay of gratification," In L. Berkowitz (Ed.), *Advances in Experimental Social Psychology, Volume 7* (pp. 249-292), New York: Academic Press.

Muraven, Mark, and Roy F. Baumeister, (2000), "Self-regulation and depletion of limited resources: Does self-control resemble a muscle?," *Psychological Bulletin,* 126 (2), 247-59.

Muraven, Mark, Dikla Shmueli, and Edward Burkley (2006), "Conserving self-control strength. *Journal of Personality and Social Psychology,"* 91 *(*September), 524-37.

Muraven, Mark, and Elisaveta Slessareva (2003), "Mechanisms of Self-Control Failure: Motivation and Limited Resources," *Personality and Social Psychology Bulletin*, 29(7), 894 -906.

Muraven, Mark, Diane M. Tice, and Roy F. Baumeister (1998), "Self-control as a limited resource: Regulatory depletion patterns," *Journal of Personality and Social Psychology, 74 (*March), 774-89.

Norman, Donald A., and Tim Shallice (1986), "Attention to action. Willed and automatic control of behavior," In R. J. Davidson, G. E. Schwartz, and D. Shapiro (Ed.), *Consciousness and self-regulation, Volume 4* (pp. 1-18), New York: Plenum Press.

Paus, Tomas, Michael Petrides, Alan C. Evans, and Ernst Meyer (1993), "Role of the human anterior cingulate cortex in the control of oculomotor, manual, and speech responses: a positron emission tomography study," *Journal of Neurophysiology* 70(2), 453-69.

Polivy, Janet, and Herman C. Peter (1985), "Dieting and bingeing: A causal analysis," *American Psychologist,* 40 (2), 193-201.

Rook, Dennis W. (1987), "The buying impulse," *Journal of Consumer Research,* 14 (September), 189–99.

Shallice, Tim, and Paul W. Burgess (1993), "Supervisory control of action and thought selection," In A. Baddeley and L. Weiskrantz (Ed.), Attention: Selection, awareness, and control (pp. 171-187), Oxford: Clarendon Press.

Shiv, Baba, and Alexander Fedorikhin (1999), "Heart and mind in conflict: The interplay of affect and cognition in consumer decision making," *Journal of Consumer Research,* 26 (December), 278-92.

Stroop, John R. (1935), "Studies of interference in serial verbal reactions," *Journal of Experimental Psychology,* 18 (December), 643-62.

Tice, Dianne M., Ellen Bratslavsky, and Roy F. Baumeister (2001), "Emotional distress regulation takes precedence over impulse control: If you feel bad, do it!," *Journal of Personality and Social Psychology,* 80 (January), 53-67.

Vohs, Kathleen D., and Ronald J. Faber (2007), "Spent resources: Self-regulatory resource

availability affects impulse buying," *Journal of Consumer Research,* 33 (March), 537-48.

Wallace, Henry M., and Roy F. Baumeister (2002), "The effects of success versus failure feedback on further self-control," *Self and Identity*, 1 (1), 35-41.

Watson, David, Lee A. Clark, and Auke Tellegen (1988), "Development and validation of brief measures of positive and negative affect: The PANAS scales," *Journal of Personality and Social Psychology, 54* (June), 1063-70.

Wegner, Daniel M. (1994), "Ironic processes of the mental control," *Psychological Review,* 101(1), 34-52.

Wertenbroch, Klaus (1998), "Consumption self-control by rationing purchase quantities of virtue and vice," *Marketing Science,* 17(4), 317-37.

Wilkowski, Benjamin M., and Michael D. Robinson (2007), "Keeping one's cool: Trait anger, hostile thoughts, and the recruitment of limited capacity control," *Personality and Social Psychology Bulletin,* 33 (9), 1201-13.

TABLE 1

Binary Product Choices of The Impulsive And The Impatient Type, Used In The Second Phase Of The Experiment (In Parentheses The Percentage Of Participants Choosing The High Self-Regulation Option).

Self-regulation type	Example
Impulsive 1	You are dining with friends. It's time for dessert. You decide to choose a fruit salad with seasonal fruit. The waiter comes to take your orders. He suggests the home-made specialty: ice cream with chantilly made of fresh milk. Do you keep to your first plan or do you choose the ice with cream? (71%)
Impulsive 2	You are at a restaurant and you order chicken with rice. The waiter tells you that the restaurant has run out of rice. He suggests either potatoes or French fries. The people at the table next to you are eating fries. What do you choose? (16%)
Impatient 1	You feel like having ice cream. The ice vendor just passes by and the ice that you want costs $1.60. But you were planning to go to the grocery store later that day anyway, and you know that the same ice costs 60 cents over there. Which of the two options do you choose? (52%)
Impatient 2	You are looking for drinking glasses. You finally find the perfect set of glasses. The seller tells you that a sale is coming up and that there are many of these sets left. If you wait another three weeks, you can get an 80% discount. What do you choose? (89%)

FIGURE 1

INTERFERENCE EFFECT ON A RESPONSE REVERSAL TASK AS A FUNCTION OF THE SIMILARITY OF THE CONTROL PROCESSES RECRUITED BY THE RESPONSE CONFLICTS IN PHASE 1 AND PHASE 2 (STUDY 1).

FIGURE 2

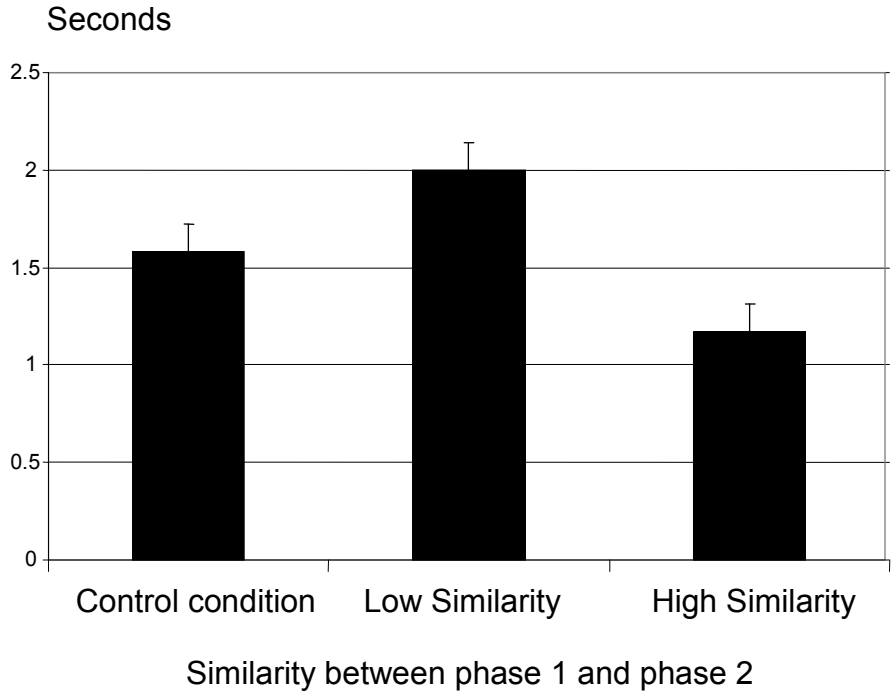
SELF-REGULATION (STANDARDIZED) AS A FUNCTION OF THE SIMILARITY BETWEEN TASK REQUIREMENTS OF THE SECOND TASK (HIGH FOR THE TASTE TEST AND LOW FOR THE ANAGRAM) AND TASK REQUIREMENTS OF THE PRECEDING TASK (LEVEL OF FOOD TEMPTATION) (STUDY 2).

FIGURE 3

SELF-REGULATION (RANGING FROM 0 TO 2) AS A FUNCTION OF THE SIMILARITY BETWEEN TYPE OF SELF-REGULATORY TASK OF PHASE 1 AND PHASE 2, SPLIT FOR THE TWO TYPES OF SELF-REGULATORY TASKS (STUDY 3).

FIGURE 1

INTERFERENCE EFFECT ON A RESPONSE REVERSAL TASK AS A FUNCTION OF THE SIMILARITY OF THE CONTROL PROCESSES RECRUITED BY THE RESPONSE CONFLICTS IN PHASE 1 AND PHASE 2 (STUDY 1)



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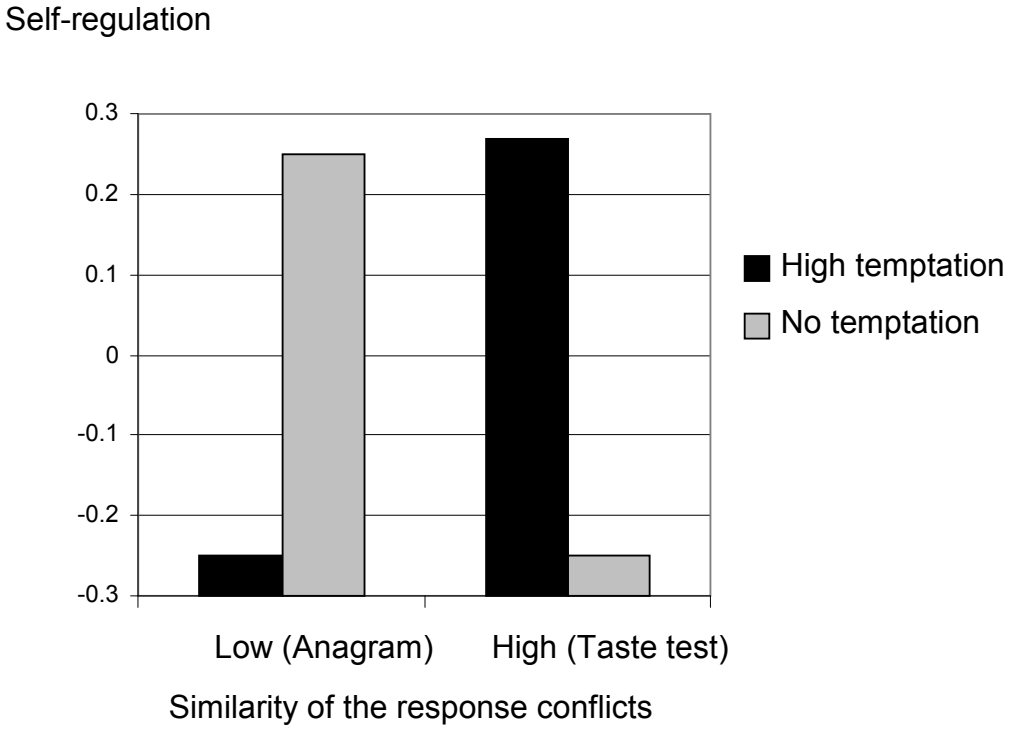
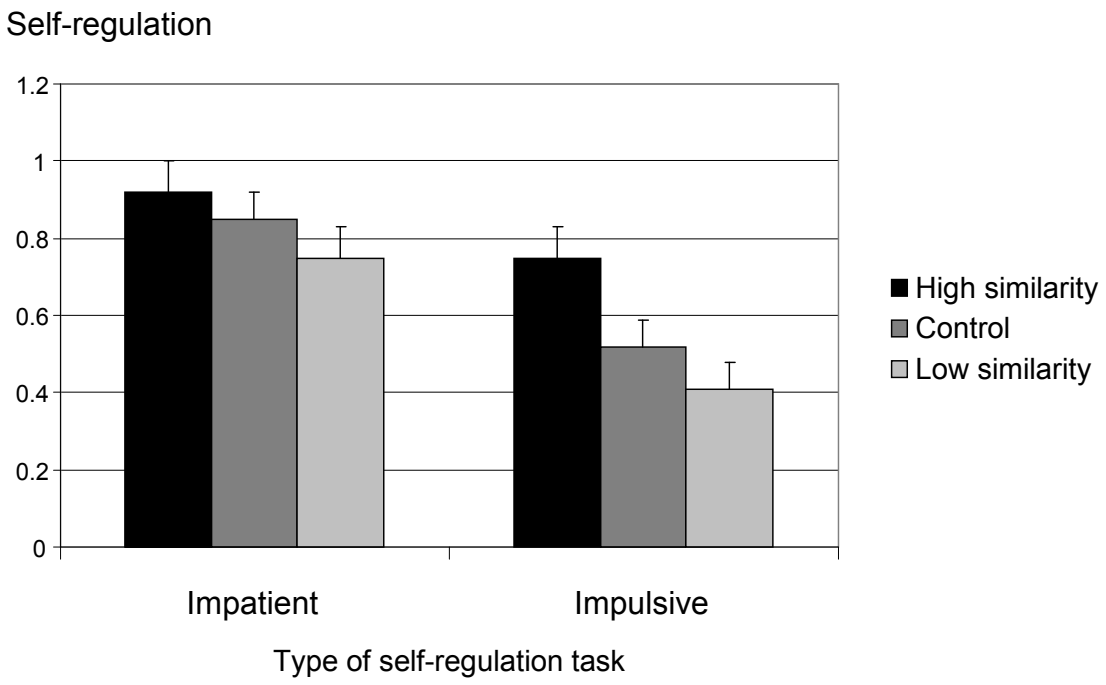


FIGURE 3

SELF-REGULATION (RANGING FROM 0 TO 2) AS A FUNCTION OF THE SIMILARITY BETWEEN TYPE OF SELF-REGULATORY TASK OF PHASE 1 AND PHASE 2, SPLIT FOR THE TWO TYPES OF SELF-REGULATORY TASKS (STUDY 3).



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