

**From willpower breakdown to the breakdown of the willpower model. The symmetry of self-control and impulsive behavior**

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Abstract

Most contemporary self-control theories share two core assumptions. They assume that indulgence is the default option in self-control decision situations, and that successful self-control requires top down interference, either in the form of willpower (direct top down interference) or in the form of desire management (indirect top down interference). This generalized willpower model aligns with human intuition and many data. Some data, however, are difficult to reconcile with the basic assumptions of the general willpower model. This paper sketches how a more general model that can also incorporate the dissonant findings should look like.

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Intertemporal Consumer Choice (JEL); Motivation and Emotion (PSYCINFO);

## **1. Introduction**

Twenty years ago, Hoch and Loewenstein (1991) conceptualized the outcome of self-control decisions as the joint result of two underlying forces: willpower and desire. In the years to follow, self-control gained unprecedented attention in the social sciences as it became clear how many pressing societal issues, ranging from indebtedness, preventable health problems, study and job underperformance, crime and violence, and more recently, obesity were affected by (a lack of) self-control (Baumeister and Heatherton 1996). Inspired by compelling phenomenological cues, researchers have conceptualized self-control often as the successful result of a top down interference in the (often undesirable) natural flow of behavior. Theories based on this general assumption dominate self-control literature. A one-sided focus on top down interference may obscure the possibility of horizontally emerging self-control. This possibility will be the focus of the present paper.

Self-control situations can have two outcomes. The decision maker either fails and chooses the vicious option, or she is successful and chooses the virtuous option. The dominant family of theories assumes that the first outcome is the default (e.g. Metcalfe and Mischel 1999) whereas the second option is believed to reveal successful top down interference. I argue, based on empirical research, that the first assumption is probably wrong. This leads to the question what successful self-control actually reveals and if successful self-control can actually emerge without top-down interference.

The paper is organized as follows. In the second section, I discuss the asymmetric nature of the contemporary self-control theories and summarize the underlying assumptions in a general willpower model. In the third section, I review empirical evidence that is difficult to reconcile with a general willpower model. I proceed in the fourth section with sketching the general outline of a more encompassing alternative model and conclude in the fifth section with a discussion of how this general model accommodates the anomalies and how it may create future research opportunities.

## **2. The animal and the mind: a general willpower model of self-control**

Before identifying the top-down nature of leading self-control theories, it is essential to agree on the terminology and the phenomenon we are talking about. *Temptations or vices* reflect objects with high immediate benefits and delayed costs (e.g. an unnecessary pair of luxury shoes). *Virtues* reflect objects with the opposite incentive structure (e.g. a reasonably priced and attractive pair of shoes that you need). In the definition of self-control I will use the word consuming but this should be understood in its broadest sense. *Self-control decisions* can reflect three types of decisions: (1) those between consuming vicious or virtues products, (2) those between consuming vices versus nothing, and (3) those between consuming virtues versus nothing. *Self-control failure, indulgence, or impulsivity* occurs when people consume the vice in situations 1 and 2 or nothing in situation 3. *Self-control (success)* occurs when people consume the virtue in situations 1 and 3, or consume nothing in situation 2. *Self-regulation* refers to a broader category of behaviors in which two or more responses conflict for behavioral control. The two need not necessarily be relative vices or virtues (see Fujita, 2011, for a more elaborate discussion of the difference).

It is important to note at this point, that this paper focuses on decision situations where the decision maker is aware of at least two options, and hence, of the opportunity to take a decision. Situations where the decision opportunity is only theoretical, such as when a consumer drinks water in environments where sugared soda is available without thinking about it, are beyond the scope of the paper. In the discussion I come back on the question how unconscious goal pursuit (Bargh & Chartrand 1999) relates to the analysis of this paper. The focus on conscious decision making situations also implies that decision situations can only be identified idiosyncratically. Although the choice between sugared sodas and water may provide a self-control conflict for a substantial part of the population, it does not for many others, for at least two reasons (Hoffman, Friese, and Strack, 2009). For some

consumers, sugared sodas will not provide a temptation because they do not like sodas better than water. Other consumers do not have the goal of cutting sugar intake in the first place and for them, too, the situation is not a self-control situation. The reader should always bear in mind this important nuance when reading an example.

Leading psychological theories on self-control appear to have a profound top-down orientation. Hoch and Loewenstein (1991) distinguished two broad types of strategies that people use to handle self-control decision situations. The first type of strategy involves willpower. Willpower reflects the top down interference into lower order processes that govern behavior. As an example, take the consumer who upon exposure to a new and attractive smart phone, naturally tends to approach it and buy it. Willpower can interfere with this natural tendency and prevent the purchase. The desire for the smart phone is unaffected but the consumer overrides this desire and decides not to buy. The willpower aspect of self-control is at center stage in contemporary psychological theories. An alternative type of strategies that consumers can use to handle self-control conflict according to Hoch and Loewenstein (1991) is desire management. Upon exposure to the smartphone the consumer may strategically downplay her attitude towards this smartphone or towards smartphones in general, up to a point that the preferred option would be *not* to buy (Myrseth, Fishbach, and Trope, 2009). In that scenario, the consumer will also not buy the smartphone.

Although the two types of self-control strategies, that is, direct top down interference versus desire management, appear different on the surface, they both fit with the general willpower model of self-control. This virtual model relies on two essential assumptions. The first assumption is that impulsive behavior is the default option. This naturally leads to the second assumption that without external control, top down interference is required to override impulsive behavior. In the next subsections, I will discuss the role of these assumptions about the asymmetric structure in the two families of self-control theories.

## **2.1. Self-control models with the focus on willpower**

Several seminal theories on self-regulation paved the way for the theoretical conceptualization of will power. The control theory of self-regulation (Carver and Scheier 1982) modeled self-regulation as the dynamic interplay of a standard, a monitoring function gauging the current state, a comparison function measuring the discrepancy between the current state of affairs and the standard, and an output function, aimed at reducing the possible discrepancy. The model claims the existence of a feedback loop, implying that the detection of a discrepancy between the standard and the current state triggers behavior aimed at reducing the discrepancy. These feedback loops are hierarchically organized, with the standard of a certain level connecting to the output of a higher order loop (e.g. one's principles, a goal), implying that the lower level alone cannot efficiently steer behavior and that standards of behavior come from a higher level. Self-control decisions occur when an opportunity arises that would increase the discrepancy between the standard and the (anticipated) state of affairs (e.g. spending one's tight budget on a luxury item). In such a situation of conflict, attention to the standard or the action description that fits with the threatened control loop (Vallacher and Wegner 1987) is believed to boost the top-down influence and enhance self-control.

Social Cognitive Theory of self-regulation is a related theoretical framework (Bandura 1991). Bandura stated that "if human behavior were regulated solely by external outcomes, people would behave like weathervanes" (p. 249), which puts this theory clearly in line with the first essential assumption that impulsive behavior is people's default option. The theory claims three sub-functions of self-regulation which jointly produce successful self-regulation: a monitoring function, a comparison function, and a reactive function. The reactive function is of most interest to us here. The theory stresses the role of anticipated satisfaction or dissatisfaction connected to the options as an important motivator to choose the "right" option.

Metcalfe and Mischel's hot/cool system theory (1999) is more explicit about the processes involved in the top down control of behavior. They posit a mental network of cognitive nodes that have the capacity to jointly suppress the natural behavioral flow that is governed by hot (i.e. affective) nodes, which represent well-learned S-R connections. According to these authors, without cognitive control, people would wander from one impulsive behavior to another, reacting to whatever stimulus has the strongest pull on behavior at a certain moment. The authors explicitly mention that impulsive behavior is the default and that top down interference is needed to steer behavior away from situational control.

Counteractive self-control (Trope and Fishbach 2000) models self-control behavior as resulting from goal activation and elaborates further on the asymmetric nature of self-control. Upon activation, relevant goals (e.g. save €10.000 to invest in my house) suppress the influence of impulses (e.g. buy these new shoes). One hallmark of counteractive self-control theory is the double reaction that temptations trigger. On the one hand, they trigger an approach tendency which, if not curbed, leads to indulgence (please recognize again the first assumption in this finding). The same stimulus also leads to the activation of the goal that is threatened by the presence of the temptation. Exposure to the new attractive shoes activates not only the motive to buy the shoes but at the same time activates one's saving goal. Fishbach, Friedman and Kruglanski (2003) showed that exposure to temptations (real as well as pictured) indeed activated a counteractive goal, which helps the decision maker to control herself. Another typical feature of counteractive self-control theories is its hierarchical organization. Goals are defined in a more abstract way than temptations (Zhang, Huang, and Broniarczyk, 2010). This theory is therefore intimately related to Carver and Scheier's control theory, Vallacher and Wegner's (1987) action identification theory, or to their more recent descendant Construal Level Theory (Trope and Liberman 2003).

These theories all suggest, explicitly or implicitly, that more abstract representations of one's goals facilitate self-control as these conceptualizations highlight the long term consequences and the essential

features. Consistent with this general model, Canova, Rattazzi and Webley (2005) demonstrated the hierarchical nature of saving motives. They showed that saving motives can be ordered from very concrete (e.g. “saving for a purchase”) to very abstract (e.g. “saving for self-esteem”) with the abstract motives motivating the more concrete motives. Fujita, Trope, Liberman, and Levin-Sagi (2006) found that adopting a higher construal level (i.e. thinking of the abstract features of a situation) enhances self-control.

The self-regulatory strength model (Muraven and Baumeister, 2000) is probably the model that is best aligned with the intuitive notion of how willpower works (Mukhopadhyay and Yeung, 2011). The model claims that there is a limited mental resource that has the capacity to alter the self’s behavior, including its cognitions and emotions. This mental resource or ‘ego’ is compared to a muscle and is believed to actively interfere with the natural flow of behavior, so as to align this behavior with personal and social standards. The flagship of this theory is the ego-depletion phenomenon, which denotes the well-known finding that exerting self-control reduces self-control performance in subsequent self-control situations. A host of empirical data attests to the robustness of this effect (Hagger, Wood, Stiff, & Chatzisarantis, 2010). The phenomenon has been shown to work in the economic context as well. Depleted people take more rewarding financial risks, rely more on affective product features, and are willing to pay more for hedonic products than non-depleted people (resp. Bruyneel, Dewitte, Franses, & Dekimpe, 2009; Bruyneel, Dewitte, Vohs, & Warlop, 2006; Vohs and Faber, 2007). Consistent with the theory is the finding that people can train their resource (e.g. Oaten and Cheng, 2007). The theory explicitly assumes that impulsive behavior is the default and that willpower interferes with the natural flow of behavior.

The theories reviewed hitherto can be considered as dual system theories (Hofmann, Friese, and Strack, 2009, Strack and Deutsch, 2004) where the smart higher order system (the rider) attempts to control the strong low level impulses (the horse). In comparison with these massive dual system

theories Higgins' (1997, 2000) regulatory fit theory of self-regulation appears more nuanced. People with a focus on gain (promotion oriented people) value temptations very high because they focus on the gain aspect of the temptation (e.g. the pleasure it brings), and hence need a lot of top down interference to keep control (Sengupta and Zhou, 2007). In contrast, people with a focus on loss (prevention oriented people) value temptation much lower to start with, because they focus on the loss aspect of temptations (e.g. the excessive cost), and hence don't need much top down interference to keep control in the face of temptations. Avoiding temptation fits their regulatory strategy, and this regulatory fit gives them enough additional motivation to avoid the possible pull of the temptation.

When regulation requires additional activation, however, the picture appears to be reversed. Prevention oriented people value achievements relatively less because of their focus on loss avoidance. In contrast, promotion oriented people value achievement goals more (especially when they are near completion, Förster, Higgins, and Idson, 1998) and hence experience regulatory fit when the success calls for more effort. In these circumstances, they need less top down interference compared to prevention focused people to self-regulate (Freitas, Liberman, and Higgins, 2002; Hong and Lee, 2008; Spiegel, Grant-Pillow, and Higgins, 2000). The nuance of regulatory fit theory resides in the fact that the fit concept removes some self-control conflicts from our scope (e.g. temptations for prevention oriented people or persistence for promotion oriented people) but this does not put the theory outside of the general will power model, as the situations of low fit require strong top down interference to curb the default behavior.

Theories that are historically rooted in behaviorism have a different feel and cannot be identified as dual system theories. Nevertheless, they also reflect the interference of one system in the S-R behavioral flow. Ainslie (1975) puts the concept of rules central in his theory. Rules are verbally expressed behavioral regularities that may exert an influence on behavior in such a way that the automatic deployment of S-R links is prevented. Rules (e.g. "I don't buy new shoes unless my old pair is



worn”) are closer to behavior than goals (“I want to save 10.000 euro”) but they can obviously be linked to each other in a way that resembles hierarchical motive structure (Canova et al. 2005). Rules can be considered as means to reach goals.

Rachlin (1995) builds on the human capacity to go beyond direct situational influences on the perception of behavioral patterns. Buying shoes once will not harm your goal very much but buying shoes every month may. Seeing the pattern helps the consumer to save. Read, Loewenstein and Rabin (1999) called this cognitive reframing bracketing and found that seeing choices in a series rather than in isolation, enhances the long term focus and hence self-control. In Ainslie’s and Rachlin’s accounts, the interference is not necessarily top down but comes from another system. For Ainslie (1975) the formulation of rules and for Rachlin (1995) the perception of patterns in one’s own behavior have the capacity to curb the natural S-R driven flow of behavior.

Although the theories from social and cognitive psychology on the one hand and behaviorism on the other hand differ in many important ways, they share the notion that successful self-control relies on the interference of a more sophisticated system into a more simple system that underlies ‘default’ behavior. Ample evidence attests to the fact that complex cognition is indeed involved in successful self-control. When under cognitive load, decision makers choose the vice food to the virtue food (Shiv and Fedorikhin, 1999; Ward and Mann, 2000) and choose the smaller but immediately available financial reward against the larger delayed reward (Hinson, Jameson, and Whitney, 2003). Norman and Shallice (1986) proposed a supervisory attentional system that is able to change the system’s behavior by selectively affecting the system’s input and its information processing. They located this function in the frontal lobes of the brain. Input modulation brings us to the complement of brute and somewhat mysterious willpower force: desire management.

## **2.2. Desire management and self-control**

Desire management can also help decision makers to steer clear from unwanted temptations. Although Hoch and Loewenstein (1991) proposed several subtypes of this family of strategies, mainstream theories do not tend to put their major emphasis on desire management. Indeed, a recent overview called into question the strong conceptual tie between self-control and willpower (Fujita 2011). Nevertheless, some theories do have something to say about desire management, and several empirical reports speak to the issue of desire management, which I review next.

Implementation intentions theory's main focus is on future behavior regulation (Gollwitzer 1999). Implementation intentions specify where, when, and what the person should do to enact the goal intention and reach her goal ("if X occurs then I will do Y"). Implementation intentions may have the function of a reminder but may also motivate people to behave in a desired way. In the latter sense, forming implementation intentions can be considered as a desire management strategy as it can be used to ward off temptations. The X specified in the behavioral plan may be the occurrence of a temptation and the Y may then be the action that helps the person to warding off indulgence (Rook 1987). The technique has accordingly been successfully stimulated in domains where self-control decisions are frequent such as food intake control (Adriaanse, Vinkers, De Ridder, Hox, and De Wit, 2011) and saving programs (Loibl, Grinstein-Weiss, Zhan, and Bird, 2010). This strategy manages desire because the specified behavioral plan competes for attention and hence reduces desire. A crucial feature of this strategy is that people have to plan in advance. Again, the natural flow of behavior seems to be to indulge and the previously constructed plan may prevent indulgence, which echoes again the assumptions delineated above.

Inspired by economic theory, Loewenstein (1996) considers not the impulsive but the self-control behavior as the default behavior, as self-control is the rational option. However, situational cues may result in the activation of visceral factors (such as hunger, sexual drive, or the desire to be very attractive), which may take over behavioral control. In such circumstances decision makers do not

follow their own preferences but follow the dictate of their visceral state (e.g. buy the expensive shoes). According to Loewenstein's (1996), successful self-control requires desire management, which can for instance be achieved by increasing the distance to the tempting object. Although he conceptualizes self-control behavior as the default behavior, this characterization dramatically shifts in the presence of strong temptations. So in the end, the assumption that indulgence is the default option *in the face of temptation* also appears in his theory. The theory is less explicit about online top down interference. His theory focuses on preventing preference shifts.

Mental accounting is another well-established process that enhances self-control through desire management. People's budget is divided into smaller amounts that are dedicated to certain expenses (Thaler, 1985). For instance, some of the discretionary income may go to saving, to doctor expenses, and to entertainment. Mental accounting helps consumers to live up to their budget. Soman and Cheema (2006) showed that people apply their mental budgets, and do so in a flexible way.

What can a person finding herself in front of temptation still do, lacking preventive plans or mental accounts, besides relying on sheer willpower? Hoch and Loewenstein (1991) proposed distraction and avoidance in general as strategies aimed at reducing the power of temptation. Distraction reflects the often self-initiated strategy of paying attention to something else than the temptation or its tempting nature (e.g. its taste). Mischel and Ebbesen (1970) demonstrated the power of attention in children's self-control. In this paradigm, children face the conflict between consuming an immediately available small reward and waiting for a larger reward. Children who used distraction from the reward, whether spontaneously or induced, were much more likely to succeed in delaying gratification than those who did not.

The distraction strategy does not immediately reduce the desire but it takes away the intensity, and hence its motivational force, because it helps people focus on something else. A related strategy is counteractive construal (Zhang, Huang, and Broniarczyk, 2010) in which people construe a certain

temptation differently as a way to strategically affect their own behavior. Zhang et al. (2010) showed that when tempted, people perceived the food to have more calories than when not tempted, thereby using motivated perceptual distortion (Balcetis and Dunning, 2006). This temporal overestimation of calories indeed reduced food intake. Myrseth et al. (2009) demonstrated that when put in a choice situation with a vice and a virtue, people indicate to like the temptation less than when not tempted, apparently as a strategy to reduce the likelihood that they choose the temptation. After the decision, the evaluation distortion immediately disappears. This phenomenon can arguably be considered as the strongest evidence of desire management.

All these demonstrations echo the top down nature of self-control. The assumption that indulgence is the default behavior appears to be undisputed. The salience of top down interference during decision making varies from study to study. The assumption is clearly present in strategic pre-decisional evaluation reduction (Myrseth et al., 2009) and in active attention management (Mischel and Ebbesen 1970) but it is less visible in strategies where people prevent themselves from indulging in the future, by, for instance, buying smaller portions (Wertebroch, 1998). But also in this case, the goal to consume moderate portions is conceptualized as a rational top down influence. It actually prevents self-control decision situations to occur by restricting the options of the future self (in terms of Hoch and Loewenstein, 1991, this is called precommitment).

### **2.3 Summary of a general willpower model of self-control**

What does a general willpower model (GWM) of self-control look like? I do explicitly not put this theory forward as a theory for the future but as a very general common denominator of existing theories. For a more elaborated version of this theory, I refer to Fujita (2011). My main aim is rather to question the general applicability of GWM. GWM claims that situational cues drive human behavior by default. Desirable opportunities and aversive stimuli attract our attention as time goes by and trigger

approach or avoidance behavior. These behaviors are not always in our own best interest, certainly not in the long run. If governed by this system only, we would become obese in our food rich environments, die prematurely from unhealthy life styles, and not be able to engage in stable economic, social, and intimate relationships. Adult humans would behave like animals or two-year old children. Willpower helps us to lead an acceptable life (Baumeister and Heatherton, 1996). Sometimes we need direct top-down interference to make sure that we act in our own best interest. At other times we manage our desires in order to align ourselves in the social world and securing an acceptable life. In the next section, I want to show that some of the implications of the GWM are not tenable.

### **3. From willpower breakdown to the breakdown of the willpower model**

Kivetz and Keinan (2006; Keinan and Kivetz, 2008) documented a phenomenon called hyperopia, which reflects the tendency to systematically forgo opportunities to indulge and regret this choice afterwards. A substantial part of humanity apparently “fails to indulge” systematically and regrets the many opportunities they have missed in their lives. Haws and Poynor (2008) developed a scale to measure hyperopic tendency, based on the conceptualization of Kivetz and Keinan (2006). The items of their scale highlight that hyperopia assumes an active self-control decision situation, in which consumers are aware of the tempting option but typically don’t choose it. For instance “it is hard for me to make myself indulge” refers to the failure to choose the temptation if the opportunity arises. This implies that (1) the temptation is at least to some extent attractive to them and (2) that their selection of the virtue is at least not fully automatized. People who do not like luxury or ignore it due to automatic goal activation, will not be counted as hyperopics, although they may appear very controlled. They even fall outside the scope of the present analysis.

Kivetz and Keinan (2006) stated that this type of consumers need to exert self-control to indulge. Innocent as this peculiar problem may seem, it turns out to be a true challenge for GWM. For

hyperopics, self-control (not buying the expensive shoes in our example) seems to be the default option and they need to exert effort to deviate from that path (e.g., buying the shoes for their wedding). Again, notice that they prefer the expensive shoes sufficiently as to be aware of the fact that they miss something if they don't buy them.

Applying the GWM to hyperopia implies that the default behavior is selecting the virtue and that hyperopics need top down interference to select the vice. The trouble with this account is that it is not clear what their real preference is. Do they want to save, or do they secretly want to spend anyway? What, in other words, is their real default behavior? Given the findings, we have to assume that their dominant preference is saving. But why would they exert effort to abandon their own saving goal at all? Is there a cool cognition or a goal motivating them to select the short term option? For GWM to work in this case, we need to create an additional layer (a secondary preference) that explains why they would want to indulge, which threatens to lead us in an endless regression because we then need an arbitrator who decides which of the goals is going to take control. Common willpower techniques such as bracketing and high level construal are also difficult to translate in this context. Stressing the future consequences will probably not enhance indulgence, for instance. So I claim that hyperopia, with its reversed self-control problem, rather than being just another strategy to cope with temptations, puts the GWM in trouble.

A very relevant stream of research that has not been connected to self-control theories to my knowledge is the pre-decisional distortion paradigm (Russo, Medvec, and Meloy, 1996). In this paradigm, people have to sample information before they make a decision which can be a binary choice (Russo et al., 1996) or a go/no-go-decision (Bond, Carlson, Meloy, Russo, and Edwards, 2007). Across a diversity of situations, the findings show that people distort the incoming information according to the preference that emerges during pre-decisional information sampling phase. This pattern is consistent with eye-tracking patterns in the pre-decisional phase in a binary choice paradigm, showing that the

option that will be finally chosen gets gradually more and longer saccades (Shimojo, Simion, Shimojo, and Scheier, 2003). Crucial in these findings is the symmetry of pre-decisional distortion: it can go either way. If there is a clear winner, the default behavior would be to selecting the winner, and for this selection no distortion is needed. But if the options are tied in attractiveness and differ in terms of their long and short term consequences, distortion is needed to the same extent for selecting the vice as for selecting the virtue. Although a thorough test of the applicability of this model to traditional self-control decisions still has to be conducted (to the best of my knowledge) the available data show symmetry. The inherent symmetry of this paradigm (as much distortion for vices as for virtues) challenges the inherent asymmetric nature of GWM.

A next observation that poses a challenge for GWM is the finding that pre-exposure to temptation in a non-consummatory context reduces the valuation of that temptation (Geyskens, Dewitte, Pandelaere, & Warlop, 2008) in subsequent self-control situation involving the same or similar temptations. A typical observation goes as follows. In a first phase, participants are exposed either to a bowl of attractive candies, to pictures of that candy, or to none of both. The task required them to link wrapper color to the taste, implying, tacitly, that they could not eat the candy during the matching task. Eating the candies during the task would make the task pointless. Compared to the two control conditions, participants exposed to the real candy ate less and subsequently displayed reduced liking of the candy by means of explicit and implicit measures. Crucially, the study also showed that the effect was unrelated to the activation of a restriction goal. The conditions with real and photographed candy did indeed activate a restriction goal but this goal did not explain the behavioral and liking data, replicating the literature (Fishbach et al., 2003).

In this pre-exposure situation there seems to be nothing more than a temporary incompatibility between two behaviors, eating and the knowledge task implying non-eating, none of which is explicitly dictated top-down or can classify as a goal. Waiting to eat can at best be classified as a temporary task

goal but not as a diet goal. When the knowledge task is over, the task goal becomes obsolete. Given the attractiveness of the food and the fact that the vast majority of the participants do not eat during the knowledge task, suggest that they succeed in solving this behavioral conflict. The available data suggest that the individual solves this behavioral conflict by reducing the liking of the candy (Geyskens et al., 2008; Grubliauskiene, Dewitte, Warlop, 2011). Some other recent work appears consistent with this findings, under the assumption that the decision to refrain from eating is akin to a no-go instruction Veling (2008) showed participants a series of attractive stimuli and linked some target stimuli repeatedly to a no-go cue. Veling found that the attractiveness towards the target stimuli reduced as a result. Houben and Jansen (2011) replicated this finding in the food domain. Combined, these findings suggests that self-control does not necessarily require intentional top down interference but may also emerge from a behavioral conflict. The link between the conflicts may go through changing preferences.

Although none of the three pieces of evidence is conclusive, any of the three pose a serious challenge to GWM. What should be amended to the GWM for it to become able to accommodate these deviating findings? I claim that an alternative approach can be built on cognitive control theory, which I introduce next. In elaborating it, I will add testable predictions to illustrate how this model can go beyond existing theory.

#### **4. Cognitive control theory can accommodate symmetry**

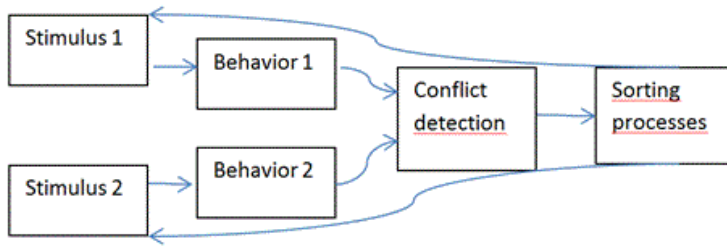
Cognitive control refers to the ability of the cognitive system to perform well at specific tasks through adjustments in perceptual selection, response biasing, and the on-line maintenance of contextual information. Cognitive control theory (e.g., Botvinick, Braver, Barch, Carter, & Cohen, 2001; Miller & Cohen, 2001) assumes a system that monitors for response conflicts. When a response conflict is detected, this monitoring system recruits cognitive control processes that are meant to resolve the



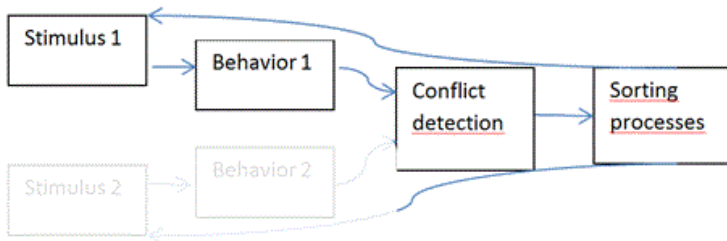
behavioral conflict. The detection of a behavioral conflict indicates that current levels of control are insufficient to meet task demands, and thus signals a demand for greater control.

Conflict may for instance appear in a store where two pair of shoes compete for a potential buyer's attention and selection. Cognitive control processes are recruited when this conflict is detected. Not only currently available information will be sampled but information from memory may also be invoked. The collected and retrieved evidence will gradually favor one of the options. Mukhopadhyay, Sengupta, and Ramanathan (2008) demonstrated symmetric effects of recalled temptations on the current decision. They found that a decision in a self-control decision situation (resisting or succumbing) was determined by what behavior they recalled from the previous self-control decision episode. Interestingly, this happened both when the previous decision was impulsive or self-controlled, which suggests a symmetric effect of the recalled decision on current decisions in a self-control context. Conflict may also arise at the moment that the a consumer needs to pay the very attractive (but very expensive) smartphone she just saw. The amount of money that the consumer needs to pay sends a stop signal (or an interruption cue, Rook, 1987). Observers are compelled to believe that a saving goal must be involved in the behavior but the model I put forward suggests that the intrinsic pain of paying that is activated upon the need to pay a big amount of money, can go a long way in explaining horizontally emerging self-control (Rick, Cryder, and Loewenstein, 2008).

*A Initial situation*



*B Resolving the conflict (in favor of behavior 1)*



*C Conflict solved*



**Figure 1. The gradual resolution of behavioral conflict by means of input distortion**

I propose that the cognitive control model can shed a new light on self-control decision making. Figure 1 illustrates the core process. Initially, two behaviors compete for being emitted. The conflict is detected, which triggers processes aimed at sorting the two options apart (panel A). Subsequently, the sorting process kicks in and gradually distorts the input that motivates the behaviors (Panel B, in this example the input motivating behavior 2 is suppressed). Finally, this “preference editing” process mitigates the conflict and in its wake the sorting process. The system emits behavior 1 without conflict (Panel C). The

feature that sets this model crucially apart from its predecessors is its symmetry. In case of behavioral conflict, the decision maker needs sorting processes to move forward, irrespective of whether the decision tends towards the virtue or towards the vice. This is actually the first testable prediction that can be derived from the model: Engaging in indulgence (e.g. choosing the vice) will lead to depletion effects in much the same way as engaging in self-regulation has been shown to do (Proposition 1).

Based on the application of the cognitive control model to self-control dilemmas, Dewitte, Bruyneel, and Geyskens (2009) proposed that engaging in self-control should enhance successful self-control when the subsequent self-control decision situation requires similar control processes to solve the second conflict. For instance, if consumers refrain from buying luxurious shoes in the first shop, they should become more successful in the next situation where they have to refrain from buying luxurious products. The underlying rationale is that the first situation creates a behavioral conflict (buying the luxurious product versus not buying it). The control processes that are recruited to solve this problem (e.g. downplaying the role of design in shoe preference), may also be useful some minutes later when the consumer is buying a coffee machine and has to choose between a sober and a designer model.

In three studies Dewitte et al. (2009) indeed found evidence for the claim that engaging in self-control may indeed enhance rather than impair subsequent self-control. For instance, they found that being confronted with a series of dilemmas that were either of a delay-of-gratification nature (Mischel and Ebbesen, 1970) or set a planned against an impulsive option (Rook, 1987) enhances subsequent self-control in dilemmas of the same nature but reduces self-control in the dilemmas of the (subtly) different nature. These findings replicate the ego depletion effect when the subsequent conflicts are different but cannot be explained by the self-regulatory strength model. The same self-control enhancement effect has been found for the consumption of hedonic food (Dewitte et al. 2009; Geyskens et al, 2008). Converse and Deshon (2009) reported similar findings. They showed that compared to no

prior self-control challenges, two prior self-control challenges improved self-control performance. Such findings are not only difficult to reconcile with the self-regulatory strength model (Muraven and Baumeister 2000) but with GWM in general, as these findings are symmetric in nature.

## **5. Discussion**

Self-control theories are cast in terms of top-down control, probably reflecting lay theories on the issue, which all imply a central agent interfering with more affective, lower level, and spontaneous processes (Mukhopadhyay and Yeung 2011). The nature of this interaction is inherently asymmetric as with a (strong) animal and its (smart) boss. The boss can control the animal but the animal cannot control the boss. The boss needs the animal because the animal is the engine of the system. In the complex area of self-control, even when wrong, lay theories may have a dramatic impact on actual self-control. Kim (2006) showed that people interpret their failure to exert self-control as a reflection of a lack of willpower ability, which reinforces indulgence in subsequent self-control decision situations. The layman's belief in the asymmetric top-down nature of self-control may actually produce some of the observed asymmetric effects. This should not take our attention away from horizontally emerging self-control and the anomalies that hint at the problems with GWM.

The model proposed is only a first sketch to solve the explanatory problems that GWM face. The first issue is that the model itself is actually conceptualized as a top down interference model. Conflict detection is believed to recruit control processes, which then exert their influence in a top down fashion (Miller and Cohen, 2001). However, the model is inherently symmetric. The control processes need not necessarily support a superordinate goal, they may as well support the selection of the temptation. The process behind cognitive control theory may very well be top down, the actual control direction does not necessarily come from higher order goals. I believe that the cognitive control model can accommodate the three anomalies that challenge the GWM, which I will discuss one by one.

It can accommodate the hyperopia anomaly that I identified as a problem for GWP. Hyperopics may experience a conflict between their plan to save and their desire (be it cognitive or affective) to indulge from time to time, in exactly the same way as myopics may experience a conflict between their desire to spend and their intention (again, be it cognitive or affective) to save from time to time. Whenever a conflict occurs, the decision maker will engage in information sampling and in the end, one of the options will be selected. The resolution of the conflict requires pre-decisional distortion in the direction of the initial bias, which will be reinforced unless the opposite pull will be extremely large (for instance because of social pressure pushing someone to save or to spend). The theory allows to predict that conflict will reinforce whatever tendency people have up to a point that the conflict is no longer experienced. Spenders will happily spend and savers will happily save without experiencing a conflict in much the same circumstances (proposition 2). They actually may trigger conflict in each other by observing each other's opposite behaviors. Future research may want to document the consolidating nature of conflicts and the disrupting nature of opposite behavioral patterns.

Cognitive control can also accommodate the symmetric pre-decisional distortion process (Russo et al. 1996) that consumers use to make decisions. The decision problem actually illustrates very nicely how symmetric the control processes are. From the moment that one of the options becomes more attractive, control processes will bias the incoming information to lead to a decision. The intensity of the conflict is inversely related to the attractiveness gradient between the two. If the two options differ strongly, the decision is easy and not much distortion will be needed. When the options are close ties, a long information sampling period will be required and the decision will take long. One interesting implication is that making the virtuous option as attractive as the vice may be more efficient in the long run than briefly making the virtue extremely attractive (e.g. by adding extrinsic rewards). In the first situation, the virtue and the vice will be in conflict and this will lead to durable divergence in attitude.

When external contingencies add value to the virtue, the virtue may be temporarily preferred but the attitude towards the virtue itself may remain relatively negative. (proposition 3).

The cognitive control approach is also good in explaining the temptation pre-exposure effect (Geyskens et al., 2008). The conflict in the first phase between the desire to consume and the need to not consume (to be able to accomplish one's task) triggers preference editing and may lead to longer term changes in attitudes. It would be interesting to test the longevity of these effects and the underlying nature of the distortion. Following Balci and Dunning (2006) for instance, one may expect that the perception of both options may be distorted (both the vice and the virtue may change in value). Further, the distortion may be asymmetric within the set of options. Specifically, it is the most ambiguous option that will experience the most important distortion, and this may as well be the vice or the virtue (Proposition 4)

I also need to come back on the specifications of the scope of the present review at this point. I excluded non-conscious goal pursuit from the theoretical analysis but it is important to consider the possible impact of cognitive control theory and non-conscious goal pursuit. The question is how the emergence of automatic goal pursuit relates to the cognitive control model. Miller and Cohen (2001) argue that cognitive control is recruited as a result of the required demand. If there is no conflict to start with (for instance for someone who prefers an apple to chocolate), there is no recruitment of cognitive control, and the theory is irrelevant. If there is a behavioral conflict to start with (I want the chocolate but should take the apple), control processes will solve the conflict. If a conflict is repeated and the solution tends to be the same because of a subtle cue in the situation pushing the decision maker in one direction, the solution will tend to emerge faster and faster, up to a point that the conflict is prevented. From that moment on, cognitive control theory has become irrelevant.

I would like to discuss two final implications of the model. The first one is related to the initial identification of a self-control situation as such (Myrseth and Fishbach 2009). I agree that failure to

identify a certain situation as a self-control decision situation may be a very important factor behind undesirable behavior. In the cognitive control model, identification is no longer the starting point of the self-control causal chain but (also) the end point. When the conflict is solved, in whatever direction, there is no self-control conflict anymore. A final implication of the model is that self-control, as defined behaviorally, and effort, are not closely linked. Many people succeed in self-control without any effort (for instance smokers who quit successfully) whereas others have to exert effort to indulge (for instance non-drinkers who think of drinking a glass of Champaign to celebrate). We don't know how the perceived effort and the actual effort interact. Do people feel more effort if they are expected to feel effort (assimilation) or do they actually notice that they don't have to put in effort because their actual experience contrasts with expectations.

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