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Research Dialogue

Free will in consumer behavior: Self-control, ego depletion, and choice

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Abstract

Consumer behavior offers a useful window on human nature, through which many distinctively human patterns of cognition and behavior can be observed. Consumer behavior should therefore be of central interest to a broad range of psychologists. These patterns include much of what is commonly understood as free will. Our approach to understanding free will sidesteps metaphysical and theological debates. Belief in free will is pervasive in human social life and contributes to its benefits. Evolution endowed humans with a new form of action control, which is what people understand by free will. Its complexity and flexibility are suited to the distinctively human forms of social life in culture, with its abstract rules, expanded time span, diverse interdependent roles, and other sources of opportunities and constraints. Self-control, planful action, and rational choice are vital forms of free will in this sense. The capacity for self-control and intelligent decision making involves a common, limited resource that uses the body's basic energy supply. When this resource is depleted, self-control fails and decision making is impaired.

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How could one prove that people have free will? One approach would be to show that an action is not shaped by any external cause or prior event. In essence, this would be a random action. But random actions are not valued or popular in human social life. What is valued—and what can furnish a very different idea of free will—includes self-control, following rules, and making intelligent, rational decisions (and carrying them out). If something resembling free will had actually evolved in human psychology to meet the new demands of and to facilitate the new kinds of human social life, including cultural systems and economic marketplaces, then it would have more likely involved capacities for self-control, following rules, and smart choices than for acting randomly.

Consumer psychology presents an excellent context for analyzing and studying this conceptualization of human free will. Rational choice is an important part of being a consumer (Bettman, Luce, & Payne, 1998), such as in figuring out how to get the most for one's money or how to avoid selecting an inferior product (Huber, Payne, & Puto, 1982). Self-control is also important, insofar as one must resist temptations and discipline oneself to purchase essential items and to conserve funds rather than buying whatever strikes one's fancy or making

oneself feel better (Hoch & Loewenstein, 1991; O'Guinn & Faber, 1989). Furthermore, consumers function in a marketplace that depends on everyone following rules, instead of, say, stealing from sellers or defrauding buyers.

The purpose of this article is to relate our research program and findings about choice and self-control to the broader issue of free will in a consumer psychology context. The findings suggest that self-control and rational choice both involve processes that consume a limited psychological resource. When that resource has been depleted, such processes are impaired (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Schmeichel, Vohs, & Baumeister, 2003; Vohs & Heatherton, 2000).

Consumer psychology and human nature

Consumer psychology should be regarded as an important and a revealing sphere of behavior that is centrally useful for understanding human nature. Our impression is that it has not yet gained this level of respect, but this may be an accidental product of the way psychology developed, with its strong roots in clinical observation and animal learning, neither of which offered a good basis for appreciating the insights that consumer psychology generates.

Fortunately, the psychological landscape is changing, and this may offer a context for an enhanced respect for the insights

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to be gleaned from studying consumer behavior. Interest in judgment and decision making has risen in psychology, and psychology and economics have begun to exchange ideas.

One of us has sought to construct a coherent understanding of human nature based on laboratory findings from social psychology and related disciplines. His central conclusion was that the human psyche was shaped by evolution particularly for participation in culture, and so the capabilities needed to create, to sustain, and to function in cultural systems are distinctively human traits—in other words, the capacity for culture is what makes us human (Baumeister, 2005). On that basis, consumer psychology should be central to psychology.

Consumer psychology involves many of the defining attributes of cultural activity. Consumers participate in a large and complex social system (which is also what culture is!). The consumer marketplace is based partly on information, such as the value of products and money, but not all information is fully available to everyone. Participating in this system requires making sacrifices, such as by following rules and by not cheating transaction partners, and in the long run the system makes most participants substantially better off, even if they must make short-term sacrifices to follow the rules (e.g., Fehr & Gächter, 2002; Smith, 1776).

Consumer behavior also involves what is typically called theory of mind, which is to say people's awareness of belonging to a community of individuals with similar mental and emotional processes and their associated capacity to use this shared mentality to communicate, to negotiate, to coordinate, and to generally interact with others in ways that are based on mutual understanding (e.g., Baron-Cohen, Tager-Flusberg, & Cohen, 2000). Although theory of mind is not completely absent in other species, it is quite rare and limited in them, and so it too counts among the traits that help define what makes people human. A sophisticated theory of mind is necessary in order for consumers to participate effectively in the marketplace, such as in negotiating with others and in anticipating to what extent these others are likely to obey the rules as opposed to seeking unfair advantage (Vohs, Baumeister, & Chin, 2007).

Another important ability for human consumers is quantification, which is an understudied style of reasoning that is based on measuring and comparing amounts, typically with numbers. Quantification is central to most deals, including even the most primitive barterings (e.g., how many fish are worth a lamb chop or heap of corn?). Consumer behavior has focused on quantification far more than other subdisciplines in showing, for instance, that consumers attempt to strike a balance between hedonic and utilitarian products (Kivetz & Simonson, 2002; Wertenbroch, 1998; Wertenbroch & Dhar, 2000) and even in just making judgments about how much one would be willing to pay for a given product.

Consumers operate in a marketplace that is defined by distinct individual roles and, in the modern world at least, is heavily regulated by the collective system and its agents (e.g., product safety laws, the Securities and Exchange Commission, mall security personnel). In that sense, consumer social behavior

moves beyond the basic two-party form of interaction to the three-way interaction favored by culture, in which the exchange between the two people is overseen by third parties representing the culture itself. Only cultural animals such as human beings routinely engage in three-way interactions in which one of the parties (e.g., policeman, judge, referee) is acting not for self but to enforce the culture's rules.

Consumer interactions are mutually beneficial yet they use an exchange rather than a communal basis, unlike most of mutually beneficial relationships in the animal kingdom (which tend to be communal). In other words, and as Baumeister (2005) emphasized, the capacity for social exchange greatly transformed and expanded the potential for adaptive human behavior, and consumer behavior is among the most important manifestations of this.

Last, and most relevant to the present article, consumer behavior embodies the seeming paradox noted by Adam Smith (1776/2004) and central to the success of cultures everywhere: The system flourishes and produces benefits for all, although each individual is free and is assumed to pursue his or her self-interest. This is where free will is relevant. Consumers can calculate their enlightened self-interest and act accordingly, and as they do so (and, likewise, suppliers adjust to further their own self-interest by selling what consumers want), the system makes more and better goods available to more people.

The complexity of action control in a seemingly ordinary shopping trip reveals a level of action control—free will, if the expression is not too grandiose—that is quite remarkable in comparison to the behavior patterns of white rats that so preoccupied psychologists for much of the twentieth century. There may be a shopping list, which is a written compilation of items to purchase that is based on checking current inventory of possessions against anticipated needs and wants (thus guiding behavior by cognitions that coordinate across time and space). Advertisements may have been consulted to find bargains, and in the store one may calculate what offers the best value for the money. The amount of money to be spent itself involves some complex calculations and rules of thumb (e.g., impulse purchases up to a particular cost are acceptable; Johnson & Meyer, 1984). Information may be acquired along the way (peanut butter is on aisle 4). Multiple steps may be integrated based on various contingencies (visit the shoe store before the grocery store, lest the ice cream melt in the car during the shoe purchase). Accumulated knowledge of cultural conventions may be used (e.g., in the restaurant, one may expect all tap water to be free whereas bottled water will be charged; there is no additional charge for the second glass of cola but there is a full additional charge for the second glass of wine).

In short, we think that consumer psychology can reveal much about the defining human traits and the behavior patterns, and indeed it highlights many of the most important ones that were missed by the animal learning and the clinical psychology approaches that constituted psychology's roots. We now narrow our focus to the distinctively human forms of action control, which is linked to the popular notion of free will.

Free will: theory

Many philosophers now regard free will (or freedom of action) as compatible with a belief in full determinism (e.g., Dennett, 2004; see also Kane, 1996, 2005). Yet many scientists and psychologists do not find the beliefs compatible and assume that either a person is free to act in any manner or else the person's behavior is an inevitable consequence of various causes (see compilation by Baer, Kaufman, & Baumeister, *in press*). In particular, many believe that empirical psychology is only plausible if all behavior is fully caused, which makes belief in free will irreconcilable with any attempt to study psychology scientifically. Our approach seeks to avoid these metaphysical and epistemological pitfalls.

Instead, we begin by recognizing that the belief in free will is an important aspect of human social life. We are much less interested in the quest for the extreme case of total freedom (i.e., behavior independent of all external causes and prior events) than in differences along the continuum. People experience some of their actions as freer than others, and they make similar distinctions while perceiving the actions of others. For instance, behavior performed reluctantly at gunpoint is less free than behavior selected on a whim or following one's own carefully made plan. Likewise, crimes of passion caused by unexpected and strong impulses are seen as less free than premeditated crimes (Ancel, 1958). Such distinctions are important to systems of law and interpersonal relationships. Our interest is this: What is the difference in inner process that yields those differences between relatively unfree and relatively freer acts?

As we said in the opening paragraphs, the philosophical and the scientific debates about free will have, in our view, gone awry by searching for extreme cases of total freedom in the form of random acts. An interest in fully random action has shaped the way researchers have approached the free will question. Most notably, Libet (1985, 2001) conducted a series of experiments in which participants were told to make a random finger movement. They were also asked to remember precisely when they had decided to make the finger movement. Brain recordings taken before, during, and after the random finger action showed a spike in neural activity approximately a quarter of a second before participants reported the intention to make the movement. These experiments have been widely discussed among scientists studying the science of free will, particularly among those who invoke them to disparage the role of conscious processing (which in this case seems to have occurred after the brain was perhaps already actively producing the finger movement). It emphasizes random behavior as the optimal test case for studying conscious free will.

Free will, when defined strictly by random action, is difficult to explain from an evolutionary perspective because there is no apparent reason that humans would have evolved a capacity for acting randomly. Early humans who needed to find food amid scarcity competed with rivals in the status hierarchy or sought a desirable mate would not likely find random behavior to be an effective strategy for pursuing these goals. Instead, their goals would better be served by careful, rational consideration of

options and by exercise of self-control to bring about the chosen solution within the rules about what is permissible. Our proposed conceptualization of free will as consisting of self-control, following rules, and making enlightened decisions is more plausible (as compared to free will as random behavior) from an evolutionary perspective insofar as these qualities would have clearly benefited early humans in dealing with such problems. In short, if one assumes that free will is the result of evolutionary processes to facilitate life in human cultural society, then random action seems a far less promising conceptualization than self-control and rational choice.

Likewise, the capacities to make rational decisions and to exercise self-control have proven useful both to modern humans and to humanity in general. As Simonson (2005) contended, freedom and conscious will are much more evident in complex decision making that requires cost–benefit analyses and similar reasoning than in the impulsive acts and the spontaneous reactions that are commonly studied and that are indeed readily influenced by nonconscious responses (see also Donald, 2002). Extending his argument, we suggest that conscious decision and free will are more useful for logical decision making than for random or meaningless action. Clearly, our notion of free will brings it much closer to consumer psychology as well. It is hard to see how consumers would benefit from developing a capacity to make random, meaningless choices, but they would benefit hugely from being able to make relatively free choices that pursue enlightened self-interest. Furthermore, consumers may often be swayed or guided by nonconscious processes, indeed sometimes being swept along by marketers, advertisements, unhealthy cravings, and the like into making nonoptimal purchasing decisions, but if they can use conscious processes to regulate their behavior according to their plans and goals, they will fare much better in the long run.

The core of our theory of free will is that evolution endowed the human psyche with a relatively new and different process for controlling its behavior and regulating its responses, and this is what laypersons refer to when they speak of free action. It is perhaps not entirely unique in nature—evolution does not easily make something out of nothing—but it is nonetheless qualitatively different from most of action control systems found in other animals.

Why? The broad-brush evolutionary argument emphasizes the requirements and the opportunities of culture (e.g., Baumeister, 2005). Being cultural is a step beyond being social. Much earlier in evolution, becoming social enabled some animals to survive and to reproduce better than by remaining solitary, and so animals began to work together to derive the benefits of sociality. Being social required a substantial increase in psychological processes, however, because animals had to want to be together and had to have capabilities for recognizing what others were doing (and joining in), for resolving disputes, and for dealing with all the other problems and opportunities of social life. Becoming cultural animals was a big step further in the same direction: offering more benefits but also requiring more powerful inner capabilities, such as to make use of meaning and information (which permeate culture). Thus, culture is understood as a better way of being social.

A computer that wants to access the Internet has to have more varied and extensive capabilities than a computer whose only job is to help balance the checkbook. In the same way, the cultural mind requires more capabilities than the merely social mind. Culture depends on having language competencies (because language is the most effective tool for using information). It benefits from theory of mind and from selves that can serve multiple roles in changing systems. An improved ability to understand justice, reciprocity, and social exchange was likewise central. The human ability to see beyond the current moment and to respond to distal stimuli, which we have called transcendence (Baumeister, Heatherton, & Tice, 1994), and its associated ability to form associations among events over time, called the “extended now” (Vohs & Schmeichel, 2003), freed humans from having to behave in a stimulus-response fashion. Consequently, people can orient their behavior in the present to achieve delayed outcomes (e.g., Mischel, 1974).

Recent work by Godoy et al. (in press) studied Bolivian Amazonians, a group of tribal people who are isolated from contact with groups other than their own. Individuals were offered choices between immediate amounts and delayed but greater amounts of money and food. Those individuals who were better able to hold out for the delayed gratifications on the experimental tasks, thus doing what proved best in the long run, turned out to succeed better in actual long-term economic outcomes, including increasing their financial outcomes over 5 years. The implication is that the ability to exercise self-control and to pursue delayed instead of immediate gratification is highly adaptive even among people first making the transition to civilized life.

Free will can be understood as one of these abilities that humans developed to be able to create, to function in, and to benefit from culture. As an evolutionarily new and advanced form of social life, culture presented novel demands and opportunities. The payoff of cultural life is hard to dispute: Humans have survived and reproduced very effectively, indeed more successfully than any of their biological ancestors (who mostly remain confined to tropical areas). Humans have even managed to develop the knowledge that has enabled them to double or to triple their average life expectancy, a feat unmatched by any other known creature on earth. In the 20th century alone, life expectancy rose 40% in the United States, improving the median longevity from 47 to age 77 (Mann, 2005). To operate in such a culture, however, requires a highly sophisticated form of action control. Decisions need to be made, rules need to be followed, plans need to be worked out and followed, and so forth. It is in this sense that we speak of the evolution of free will.

The economic dimension of culture particularly requires the development of sophisticated psychological mechanisms for action control. Economic systems, such as marketplaces, tend to be large and complex, and in fact they operate more efficiently (in the economic sense) as they become larger and more complex—hence the progressive globalization of economic life. Communities can decide to allocate resources such as water, electricity, or gasoline based on flat rates or total amount

of use. Rules (such as how much to tip a server at a restaurant) need to be developed and learned. Currency and its exchange rate must be established to enable other kinds of exchanges to take place. Buyers and sellers heed centralized agencies that will guarantee product safety (such as the Food and Drug Administration). Laws restrict false advertising and the Surgeon General requires warnings of product risk. Participation in these complicated systems requires a sophisticated ability to measure and assign value, to follow rules, and to assess the likelihood that others will also follow the rules.

Consumer behavior provides one of the best forums to study the operation of this kind of free will, partly because rational choice might be more common in this arena than in many other domains (e.g., Bettman et al., 1998; Simonson, Carmon, Dhar, Drolet, & Nowlis, 2001). The importance of rational and analytic approaches to consumer choice has been recognized for years. Economists John von Neumann and Oskar Morgenstern's (1944/1947) *Theory of Games and Economic Behavior* transformed theories of rational decision making. In their approach, decision makers are capable and willing to assign a stable expected value to every alternative course of action to calculate expected utility. It is assumed that decision makers possess the potential to compute which option will maximize expected value.

Sophisticated action control does not guide all behavior. Rational choice theory (as it was originally conceived) does not model decisions perfectly. Psychologists and behavioral economists have long recognized that the assumptions of normative models of choice are frequently violated (see Kahneman & Tversky, 1979, 1984; Tversky, 1969; Tversky & Kahneman, 1981). Psychologists have come to distinguish between two processing systems. These generally correspond to what most people think of as intuition and reason. Two-system models of processing have been described in different ways and given different names, but most are referred to as dual-process theories (Chaiken & Trope, 1999). Kahneman and Frederick (2002) and Stanovich and West (2000) have referred to the two modes of processing as *System 1* and *System 2*. Decisions relying on System 1 processes correspond to intuition. They are quick and efficient and often rely on nonconscious processes including affective feelings. They occur spontaneously and require low processing skill or energy expenditure. Decisions relying on System 2 processes, on the other hand, correspond to what most people think of as intellectual reasoning. They are slow, rule-based, controlled, skillful, and effortful, and they involve analytical reasoning and rational choice. Our conception of free will is closely linked to System 2 processing and indeed may be the link between cognition and action. As Searle (2001) has pointed out, the capacity for rational analysis is useless unless one has at least enough free will to alter one's course of action on the basis of that analysis.

Evidence suggests that most behavior is effortless and automatic and relies on System 1 processing, whereas System 2 overrides occur occasionally at best (Bargh, 1997; Bargh & Chartrand, 1999; Kahneman, 2003). In addition, some evidence has suggested that many consumers primarily rely on automatic System 1 processes (Bargh, 2002; Dijksterhuis, Smith, van

Baaren, & Wigboldus, 2005). Nonetheless, even if System 2 overrides only account for a small portion of all behavior, this behavior could potentially have the greatest impact on life, happiness, and other positive outcomes (e.g., Baumeister & Sommer, 1997; see also Steel, 2007; Stutzer & Frey, 2006). These less frequent but crucial occurrences of controlled, intelligent behavior can be viewed as the human ability to execute free will.

Thinking of free will in terms of self-control also has clear relevance for understanding consumer behavior. Consumers on diets must restrain their caloric intake and hence overcome incipient impulses to buy tempting chocolate candies while at the grocery store. Many purchase decisions involve some element of refraining from a short-term indulgence in an effort to keep to the monthly budget. The importance of impulsivity in studying consumer choice has long been recognized by consumer researchers. Rook (1987) asserted that impulsive spending occurs in conditions in which spontaneous desires to have a product emerge. But of course many purchasing impulses need to be resisted, which entails the need for self-control (Hoch & Loewenstein, 1991; Vohs & Faber, 2007).

Belief in free will

We have proposed that free will is woven into the fabric of everyday social life and therefore well worthy of study as a social belief—even for those scientists who dogmatically refuse to believe in the possibility that free will could be real in any sense. As a social reality, the belief in freedom may shape the way people act and interact.

Belief in free will can be manipulated with methods developed by Vohs and Schooler (2008). These researchers had some participants read an essay by a well-known scientist (Francis Crick, a Nobel laureate) rejecting and indeed mocking the notion of free will. Others read a neutral essay. Another manipulation involved a procedure in which participants read aloud a series of statements emphasizing either freedom of action or lack of freedom and determinism. In those studies, participants who had been induced to disbelieve in free will were later more willing than controls to cheat on a test. In one case, cheating also enabled them, in effect, to steal money from the researchers who had offered a cash incentive to reward correct answers on a self-graded test.

Likewise, manipulations of belief in free will have been shown by Baumeister, Masicampo, and DeWall (2006) to affect other social behaviors. Participants who had been led to disbelieve in free will were significantly more aggressive and less helpful toward others.

We are not suggesting that these studies be taken as proof of the existence of free will. Nevertheless, taken together, these findings indicate that the belief in free will is socially beneficial. Undermining that belief led to an increase in antisocial actions (cheating and aggression) and to a reduction in socially desirable behavior (helping).

Also, in these studies, manipulations aimed at promoting belief in free will typically yielded results identical to neutral controls, which suggests that encouraging people to believe in

free will simply reaffirms their ordinary state. That is, people normally believe in free will, and getting them to disbelieve in it is the departure from normal. This pattern indicates that belief in free will is woven into the fabric of everyday social life and the assumptions according to which people perceive and interact with each other.

What constitutes free will in everyday belief? Research by Stillman, Sparks, and Baumeister (in preparation) has relied on having people read scenarios and furnish ratings of how free the stimulus person's actions were. Preliminary findings suggest that people associate higher freedom with acting against one's selfish impulses, with conscious deliberation, and with resisting external pressure. Thus, self-control, conscious reasoning, and internal decision will constitute important foundations of the popular conception of free will. To be sure, people also think of random action as highly free. In any case, there is some evidence that actions vary as to how free they are perceived to be and that the relatively advanced System 2 processes (including self-control and rational, deliberate choice) are seen as contributing to free action.

Ego depletion and self-control failure

The present approach to free will was rooted in studies of self-control and self-regulation. (We use the terms interchangeably, although we acknowledge that some researchers consider self-control to be only the conscious subset of self-regulation processes.) Based on a review of the literature, Baumeister, Heatherton, and Tice (1994) and Baumeister (2002) proposed that self-control seems to operate like a muscle or strength (a connotation implicit in the traditional folk term *willpower*). The implication was that, like a muscle, self-control would have a limited capacity, and when this had been expended, the capacity for self-control would be temporarily impaired. We have used the term *ego depletion* to refer to this state of reduced self-regulatory powers stemming from prior exertion.

Laboratory studies designed to investigate ego depletion soon found that, sure enough, brief acts of self-control were enough to produce changes in subsequent, seemingly unrelated behaviors—suggesting that the first acts had depleted some resource needed for optimal functioning. Muraven, Tice, and Baumeister (1998) found that initial exertions of self-control in one sphere led to poorer performance on subsequent tests of self-control in other spheres. For example, after people tried to control their emotional responses to a film, their physical stamina was reduced. In another study, trying to suppress an experimentally activated thought of a white bear caused people to be subsequently less successful at resisting laughing while watching a funny film. Baumeister et al. (1998) showed that resisting the temptation to eat chocolates and cookies caused people subsequently to give up faster on difficult problems. The implication of all these findings was that the first task used up some resource that was then no longer available to enable people to perform well on the second task.

Many subsequent studies in various laboratories have replicated and extended those findings. To conserve space, we shall summarize the main conclusions and then emphasize

findings most relevant to consumer behavior. The pattern of ego depletion is not due to mood effects or to a feeling of having already done enough for the experiment (see Baumeister, Gailliot, DeWall, & Oaten, 2006). It is not caused by a sense of having failed at the first task and therefore being poor at self-control or low in self-efficacy (Wallace & Baumeister, 2002). Effects occur long before the resource is fully exhausted and seem instead to reflect efforts to conserve what is left of a resource that has been diminished (Muraven, Shmueli, & Burkley, 2006), just as a tired athlete begins to conserve remaining strength long before it is fully exhausted. People therefore can still self-regulate when they are in a depleted state, and various short-term antidotes to depletion have been documented, including cash incentives (Muraven & Slessareva, 2003), implementation intentions (Webb & Sheeran, 2003), thinking about one's close relationships (Stillman, Tice, & Baumeister, unpublished findings), positive affect such as humor (Tice, Baumeister, Shmueli, & Muraven, 2007), and thinking about one's life values (Schmeichel & Vohs, 2007). Nonetheless, these short-term antidotes carry a cost. Self-regulating despite being already depleted will take more away from the resource, leaving the person that much more depleted afterward, which can be reflected in that much poorer performance subsequently (Muraven et al., 2006).

Ego depletion affects consumers. Researchers showed that people shifted toward less edifying and more self-indulgent fare when depleted (Novemsky, Wang, Dhar, & Baumeister, 2007). In one study, this took the form of shifting toward candy instead of healthful granola bar snacks. In others, it involved selecting relatively trashy films instead of highbrow fare such as intellectual or artistic movies. These shifts were found even when people were selecting a film to see in the future rather than the present (e.g., choosing a film on Wednesday to watch on the weekend). Thus, they do not reflect accommodating to current states but rather a seemingly genuine shift in preferences.

Actual consumption is affected too. Vohs and Heatherton (2000) showed that dieters ate more food when depleted than they would otherwise. Nondieters were relatively unaffected by ego depletion. The distinction is important because it suggests that ego depletion does not simply increase appetites or pleasure seeking. Rather, it undermines the defenses and the virtuous intentions that would otherwise guide behavior. Nondieters are not trying to control what they eat, and so ego depletion does not affect their eating. In contrast, dieters normally use willpower to restrain what they eat, and ego depletion weakens and thus ultimately thwarts these restraints.

Only some people seek to control and to restrain their eating, but most people seek to restrain their spending. Vohs and Faber (2007) showed that ego depletion causes an increase in impulsive spending. In one of their studies, depleted students reported being willing to pay more for a set of consumer goods than nondepleted control participants. In another, students were given a \$10 stake as payment for experiment participation, and then they were presented with an opportunity to make actual impulse purchases ostensibly as part of a marketing campaign by the campus bookstore. Depleted participants spent significantly more of their money on these goods than nondepleted

ones—indeed, averaging over ten times as much spent. This study represents a true impulse-purchasing situation, insofar as participants had not anticipated having the opportunity to shop, were not seeking these items, and indeed presumably had little or no need for them.

A recent experiment demonstrated that being depleted of self-regulatory resources is akin to being in System 1 (Hamilton, Hong, & Chernev, 2007). The main focus of the experiment was to show that a particular option would be preferred when people are in intuitive System 1 mode rather than in deliberative System 2 mode. Participants were primed to use one system or the other by having them perform one of three tasks. To promote System 1 processing, participants saw a visual image that contained two interpretations (e.g., the Necker cube, Rubin's Face-Vase figure) and were asked to describe which image they had seen first. To promote System 2 processing, participants performed mental arithmetic problems—but only five of them, thus enough to activate the system but not deplete it. To induce a state of ego depletion, a third condition of participants performed the same type of mental arithmetic problems—except they had to do more items, which Hamilton et al. (2007) believed would deplete participants' System 2 processing abilities and consequently push them into System 1 mode. Participants in the depletion condition showed choice patterns that were indistinguishable from the System 1 primed group, whereas both were different from the System 2 primed group. Hence, processing information using primarily System 1 is highly similar to being in a state of self-regulatory resource depletion. This fits our central argument that more resources are needed for the more advanced, rational, System 2 sort of processing.

Choice too is depleting

Self-regulation is an important aspect of the self's executive function, but it is not the only one (see Baumeister, 1998). The early findings that self-control depended on a limited resource brought up the question of whether other activities of the self's executive function would operate in the same way and perhaps draw on the same resource as self-control.

Two early studies by Baumeister et al. (1998) provided some initial signs that the willpower resource was used for more than self-control. One study used a cognitive dissonance paradigm and found that participants who made the choice to give a counterattitudinal speech subsequently showed impaired self-control akin to what was caused by prior, depleting acts of self-control. The other suggested that people became more passive when depleted, as indicated by greater reliance on the passive or the default option in guiding behavior. Taken together, these suggested that effortful choice and active initiative draw on the same resource as acts of self-control. Indeed, it was these findings that led to the preference for the term "ego depletion" over "regulatory depletion" because the resource appeared to be useful for multiple activities.

The conclusion that choice is depleting was questioned by Moller, Deci, and Ryan (2006). They showed that making a choice that fits one's own preferences was not depleting. This finding may seem to contradict what Baumeister et al. (1998)

found because their study had included a condition in which people chose to give a proattitudinal speech, which by definition was consistent with their inner beliefs. However, it is plausible that the students simply did not want to give a speech of any sort, pro- or counterattitudinal, and so in both cases making the choice required willpower.

Further studies by [Vohs et al. \(2007\)](#) shed more light on the question of whether choice is depleting. They found that making multiple choices is depleting, even when one is free to choose what one wants. (One or two easy choices may however not require much willpower, as [Moller et al., 2006](#), showed.) These appear to have been the sort of choices that [Moller et al. \(2006\)](#) approved as genuine, unconstrained choices, but they were still depleting. People chose consumer products or psychology course options. Afterward, they showed poorer self-control on a variety of measures, including holding one's hand in ice water, drinking a healthful but bad-tasting beverage, and persisting on difficult problems and puzzles. In control conditions, participants thought about and rated the same options but did not choose. In short, after people make a series of choices, their self-control is impaired.

What is it about choice that depletes the inner resource? [Vohs et al. \(2007\)](#) included a study in which participants executed preordained choices, deliberated among options without choosing, or both deliberated and chose. The last condition produced the strongest evidence of depletion, which indicates that choosing is depleting above and beyond the process of deliberating. Deliberating produced some depletion (i.e., more than executing preordained choices). Thus, depletion comes from thinking about and comparing the options and from making a specific choice.

Choosing can be aversive, and this makes it more depleting. [Vohs et al. \(2007\)](#) had participants perform a bridal registry task (i.e., making a large number of selections for wedding presents to receive) for either a relatively brief or a long time (i.e., 4 vs. 12 min). Some participants enjoyed the task, whereas others found it aversive. Liking for the task moderated depletion when the task was short but not when it was long. Thus, again consistent with what [Moller et al. \(2006\)](#) found, a brief and enjoyable decision task is not depleting or is much less depleting than a brief but aversive one. When many decisions have to be made, however, the result is substantial ego depletion, regardless of whether one liked the task or detested it.

The structure of options can also influence how easy a choice is and, as a result, how depleting it is. [Novemsky et al. \(2007\)](#) had participants make choices that traded off price and quality, which is of course a standard pattern that many consumers encounter. In one condition, the trade-off was fairly linear, so that each increase in price yielded a roughly proportional increase in quality. In another condition, however, the trade-offs were not linear, and one of the choices yielded the best value in the sense that it offered much higher quality for only a slight increase in price. The latter choices were less depleting. Thus, again, it seems the amount of psychological work determines the level of depletion. Finding the optimal answer to make an easy choice is not very depleting. Finding a way to resolve a

difficult trade-off with no clearly best answer is considerably more depleting.

Choosing although depleted

Thus far, we have suggested that free will is best understood as an evolutionary adaptation that uses the body's energy to enable human beings to behave in more self-controlled and rationally intelligent ways. We have noted that the capacity for this kind of action depends on a limited energy supply and that behavior patterns change when people are depleted. In particular, depletion caused by either prior self-control or making effortful choices leads to poorer self-control subsequently. If this theory is correct, however, then ego depletion would also produce changes in the way people choose—and hence in what they choose.

The rational pursuit of enlightened self-interest requires intelligent thinking. Ego depletion makes people think less intelligently, as shown by [Schmeichel, Vohs, and Baumeister \(2003\)](#). In their studies, depletion led to significant reductions in IQ test performance and other mental tests. Notably, depletion mainly impaired performance on tasks that required executive control for following rules to transform information from what was given into something else, such as by logical reasoning and by inference or extrapolation. Automatic tasks, such as rote memory, were not significantly affected by ego depletion. This pattern fits well with the dual-process approach and the assumption that System 1 processes are not depleting whereas System 2 ones are ([Rottenstreich, Sood, & Brenner, 2007](#); also [Hamilton, Hong, & Chernev, 2007](#)).

The link between depletion and controlled or System 2 processing fits our understanding of free will as a distinctively human trait. Automatic information processing via associations is found in most animals, whereas the ability to perform logical reasoning operations to transform information is distinctively human—and much more centrally important in human cultural life than in the sorts of social interactions found among other animals. Thus, the pattern fits the idea that free will evolved in part to enable humans to guide their behavior on the basis of logical, intelligent decisions.

How ego depletion would alter decision making was the focus of a series of studies by [Pocheptsova, Amir, Dhar, and Baumeister \(2007\)](#). They found that depleted persons succumbed to various flawed decision strategies, all of which conserve effort by taking short cuts instead of reasoning out the problem. Each of these deserves comment.

First, depletion made people less likely to compromise. Compromises are a relatively strenuous form of decision making because they require integrating and trading off competing dimensions of value ([Simonson, 1989](#)). When participants were in a normal (nondepleted) state, most of them preferred to compromise, but depleted persons tended to focus on one dimension and to take the extreme on it (e.g., just pick the cheapest). The implication is that depleted consumers will be less likely to use their capacity for reasoning and all the information they have in making decisions. Depleted consumers may just settle on the best or the cheapest, whereas others will

seek compromise and will trade-off competing dimensions to find the optimal solution.

Second, depleted decision makers were more likely than others to fall for the asymmetric dominance effect. This pattern was first identified by Huber et al. (1982) and constitutes an irrational but easy way of making a difficult decision. In brief, participants confront a choice between two options that are quite different and good in very different ways, making the selection difficult. Some participants also have a third option that is similar to one of the others but inferior to it in all respects. Logically, the third or “decoy” option should be dismissed quickly, leaving the person to choose between the other two just as if the decoy had not been present. However, people tend to choose the option that was better than the decoy. One way of understanding this pattern is that there is a simple decision (to eliminate the decoy as inferior to the similar option) and a difficult one (between the remaining two), and people tend to let the simple decision also dictate the difficult one. Depletion significantly intensified this tendency (see also Masicampo & Baumeister, 2007).

The third pattern studied by Pocheptsova et al. (2007) involved the simple avoidance of deciding to purchase anything. Unlike in most laboratory studies of decision making, most actual consumer decisions include the possibility of doing nothing (specifically, not making a purchase). Pocheptsova et al. offered participants a selection among several possible consumer goods to purchase but also the option of doing nothing. (In another study, the choice was between making a somewhat promising investment versus just leaving the money sitting in one's checking account.) When this do-nothing option was included, ego depleted participants were more likely than others to select the do-nothing option. By extension, when depleted consumers go to the store, they may often balk at making the decision to purchase anything.

Consumer research has also suggested that depleted choosers have a stronger preference than nondepleted choosers for the affective qualities of a product. Shiv and Fedorikhin (1999) gave participants a choice between one product that was associated with inferior cognitions but produced a more positive affective response (chocolate cake) and another product that was associated with superior cognitions but produced an inferior affective response (fruit salad). In these studies, some participants were placed under cognitive load and required to memorize seven digit numbers while choosing. The participants with access to fewer self-regulatory resources were more likely to choose the chocolate cake than participants who had a full supply of self-regulatory resources. Bruyneel, Dewitte, Vohs, and Warlop (2006) sent participants on a mock shopping trip. Some participants had to make a series of product choices. Others were given a shopping list and were told to place preselected products in their bag. Then they all faced the same choice between cake and fruit salad. The participants whose resources had been depleted by making many choices favored the cake, as compared to those who merely followed the list.

The idea that free will involves a different kind of choice process is also supported by data on memory. Schmeichel, Gailliot, and Baumeister (2005) documented a “self-choice” effect, by which people remember choices they have made

better than control items and better than items chosen for them by others. However, when research participants made their choices during the depleted state, the self-choice effect vanished. The implication is that effortful choosing normally leaves a strong memory trace, but when people are depleted, they choose by a different and easier process, which leaves less of a memory trace.

What gets depleted?

The initial studies of ego depletion invoked an energy metaphor (akin to willpower) to describe the findings. In the 1990s, when these first studies were done, psychologists had grown unaccustomed to analyzing phenomena in terms of energy, and indeed the prevalence of cognitive information-processing models rendered all other approaches seemingly quaint and obsolete. Early discussions of regulatory strength and energy were therefore offered in an apologetic and a tentative manner (e.g., Muraven et al., 1998).

In the interim, theorizing about energy has become more plausible and acceptable to psychologists due, in large part, to the rising influence of biological perspectives. Life itself is an energy process, and the brain requires energy to carry out its activities—which presumably include the bulk of inner psychological processes. Hence, it gradually became fair to ask whether the ostensible energy behind ego depletion effects corresponded to any of the real energy sources that brain and body use.

The principal source of fuel for brain (and other) processes is glucose. This is a chemical carried in the bloodstream. The body takes in energy from food and converts it to glucose, which is then either stored as fat or consumed for mental and physical activity.

Sure enough, it appears that the consumption of blood glucose is an important aspect of ego depletion. A review article by Gailliot and Baumeister (2007) found multiple links between blood glucose problems and poor self-control. A series of studies by Gailliot et al. (2007) showed, first, that blood glucose readings dropped significantly from before to after exerting self-control on standard laboratory tasks. No change in blood glucose was found with other tasks that did not require self-control. Second, the low levels of glucose after depletion correlated with the relatively poor levels of self-control performance on the next task: Thus, the lower the glucose level after the first task, the more depleted the person appears to be in terms of subsequent behavior. Third, administering a glucose snack after a depleting task counteracted the effects of depletion, most likely because it restored the blood glucose to its original levels.

The manipulations of glucose ingestion by Gailliot et al. (2007) involved giving participants a glass of lemonade, sweetened with either sugar (which provides a quick and strong dose of glucose) or Splenda (a dietary sugar substitute that tastes about the same but provides no glucose). Tired consumers during a long day of shopping may pause to get a drink to refresh themselves, but the restoration of their powers of rational decision making and self-control may depend on whether they consume a diet drink or a regular one.

Some work suggests that replenishing glucose can facilitate reasoning too. Various indications were reviewed by Gailliot and Baumeister (2007), such as the finding that schoolchildren who skip breakfast perform worse on tests but will do better after a snack. An experiment by Masicampo and Baumeister (2007) replicated the finding that ego depletion intensifies the asymmetric dominance bias in decision making, but a glass of lemonade with sugar is sufficient to eliminate that effect.

Conclusion: free will theory revisited

Our contention is that consumer research is an ideal forum for addressing some basic philosophical questions about the human condition—including the nature of free will. We agree with skeptics who doubt the reality of free will, insofar as free will is conceptualized as a generator of random behavior. The random behavior theory of free will is implausible from an evolutionary perspective and is not supported empirically (except that it does fit some people's stereotypes about what free will would look like).

In contrast, our understanding of free will entails rational choice, self-control, and following rules. All of these are highly adaptive forms of action control. They are also rather scarce in nonhuman nature but vital prerequisites for living in culture. Not coincidentally, they are central issues in consumer behavior. By connecting their research on consumer behavior to free will, consumer psychologists may contribute unique and novel insights to an interdisciplinary debate that has gone on for centuries.

Nature endowed humans with a remarkably sophisticated form of action control through which humans are able to make intelligent choices, to formulate and carry out specific plans, and to override wishes and impulses in favor of doing what they have decided will bring the best results in the long run. It is perhaps a matter of taste whether to call this capacity free will or to use some label with less baggage. We think, however, that this capacity corresponds both to many aspects on popular, lay conceptions of free will and to the most plausible scenario for what would likely have evolved to facilitate human participation in culture. As Adam Smith wrote more than two centuries ago, the miracle of the marketplace is that individuals can rationally calculate and pursue their own (enlightened) self-interest and, in the process, simultaneously contribute to the general good. In our terms, by exercising free will, consumers can facilitate a marketplace that makes life better. If this is not a useful and promising way to understand free will, then we do not know what is.

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References

Ancel, M. (1958). Le Crime Passionnel: État Actuel de la Question. *L'Hygiène Mentale*, 47, 153–168.

- Baer, J., Kaufman, J. C., & Baumeister, R. F. (Eds.) (in press). *Are we free? Psychology and free will*. New York: Oxford University Press.
- Bargh, J. A. (1997). The automaticity of everyday life. In R. S. Wyer Jr. (Ed.), *The automaticity of everyday life: advances in social cognition*, vol. 10. (pp. 1–61). Mahwah, NJ: Erlbaum.
- Bargh, J. A. (2002). Losing consciousness: Automatic influences on consumer judgment, behavior, and motivation. *Journal of Consumer Research*, 29, 280–285.
- Bargh, J. A., & Chartrand, T. L. (1999). The unbearable automaticity of being. *American Psychologist*, 54, 462–479.
- Baron-Cohen, S., Tager-Flusberg, H., & Cohen, D. J. (2000). *Understanding other minds: Perspectives from developmental cognitive neuroscience*. Oxford: Oxford University Press.
- Baumeister, R. F. (1998). The self. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *Handbook of social psychology* (pp. 680–740). New York: McGraw-Hill.
- Baumeister, R. F. (2002). Yielding to temptation: Self-control failure, impulsive purchasing and consumer behavior. *Journal of Consumer Research*, 28, 670–676.
- Baumeister, R. F. (2005). *The cultural animal: Human nature, meaning, and social life*. New York: Oxford University Press.
- Baumeister, R. F., Bratslavsky, E., Muraven, M., & Tice, D. M. (1998). Ego depletion: Is the active self a limited resource? *Journal of Personality and Social Psychology*, 74, 1152–1265.
- Baumeister, R. F., Gailliot, M. T., DeWall, C. N., & Oaten, M. (2006). Self-regulation and personality: How interventions increase regulatory success, and how depletion moderates the effects of traits on behavior. *Journal of Personality*, 74, 1773–1802.
- Baumeister, R. F., Heatherton, T. F., & Tice, D. M. (1994). *Losing control: How and why people fail at self-regulation*. San Diego, CA: Academic Press.
- Baumeister, R. F., Masicampo, E. J., & DeWall, C. N. (2006). Prosocial benefits of feeling free: Manipulating disbelief in free will increases aggression and reduces helpfulness. Manuscript submitted for publication.
- Baumeister, R. F., & Sommer, K. L. (1997). Consciousness, free choice, and automaticity. In R. S. Wyer (Ed.), *Advances in Social Cognition*, vol. 10. (pp. 75–81). Mahwah, NJ: Erlbaum.
- Bettman, J. R., Luce, M. F., & Payne, J. W. (1998). Constructive consumer choice processes. *Journal of Consumer Research*, 25, 187–217.
- Bruyneel, S., Dewitte, S., Vohs, K., & Warlop, L. (2006). Repeated choosing increases susceptibility to affective product features. *International Journal of Research in Marketing*, 23, 215–225.
- Chaiken, S., & Trope, Y. (1999). *Dual-process theories in social psychology*. New York: Guilford Press.
- Dennett, D. C. (2004). *Freedom evolves*. New York: Penguin Books.
- Dijksterhuis, A., Smith, P. K., van Baaren, R. B., & Wigboldus, D. H. J. (2005). The unconscious consumer: Effects of environment on consumer behavior. *Journal of Consumer Psychology*, 15, 193–202.
- Donald, M. (2002). *A mind so rare: The evolution of human consciousness*. New York: Norton.
- Fehr, E., & Gächter, S. (2002). Altruistic punishment in humans. *Nature*, 415, 137–140.
- Gailliot, M. T., & Baumeister, R. F. (2007). The physiology of willpower: Linking blood glucose to self-control. *Personality and Social Psychology Review*, 11, 303–327.
- Gailliot, M. T., Baumeister, R. F., DeWall, C. N., Maner, J. K., Plant, E. A., Tice, D. M., et al. (2007). Self-control relies on glucose as a limited energy source: Willpower is more than a metaphor. *Journal of Personality and Social Psychology*, 92, 325–336.
- Godoy, R., Reyes-Garcia, V., Huanca, T., Leonard, W. R., McDade, T., Tanner, S., & Seyfried, C. (in press). On the measure of income and the economic unimportance of social capital: Evidence from a native Amazonian society of farmers and foragers. *Journal of Anthropological Research*.
- Hamilton, R., Hong, J., & Chernev, A. (2007). Perceptual focus effects in choice. *Journal of Consumer Research*, 34, 187–199.
- Hoch, S. J., & Loewenstein, G. F. (1991). Time-inconsistent preferences and consumer self-control. *Journal of Consumer Research*, 17, 492–507.

- Huber, J., Payne, J. W., & Puto, C. (1982). Adding asymmetrically dominated alternatives: Violations of regularity and the similarity hypothesis. *Journal of Consumer Research*, 9, 90–98.
- Johnson, E. J., & Meyer, R. J. (1984). Compensatory choice models of noncompensatory processes: The effect of varying context. *Journal of Consumer Research*, 11, 528–541.
- Kahneman, D. (2003). A perspective on judgment and choice. *American Psychologist*, 58, 697–720.
- Kahneman, D., & Frederick, S. (2002). Representativeness revisited: Attribute substitution in intuitive judgment. In T. Gilovich, D. Griffin, & D. Kahneman (Eds.), *Heuristics & biases: The psychology of intuitive judgment* (pp. 49–81). New York: Cambridge University Press.
- Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decisions under risk. *Econometrica*, 47, 263–291.
- Kahneman, D., & Tversky, A. (1984). Choices, values, and frames. *American Psychologist*, 39, 341–350.
- Kane, R. (1996). *The significance of free will*. New York: Oxford University Press.
- Kane, R. (2005). *A contemporary introduction to free will*. New York: Oxford University Press.
- Kivetz, R., & Simonson, I. (2002). Self-control for the righteous: Toward a theory of pre-commitment to indulgence. *Journal of Consumer Research*, 29, 199–217.
- Libet, B. (1985). Unconscious cerebral initiative and the role of conscious will in voluntary action. *Behavioral & Brain Sciences*, 8, 529–566.
- Libet, B. (2001). Consciousness, free action and the brain. *Journal of Consciousness Studies*, 8, 59–65.
- Mann, C. C. (2005). Provocative study says obesity may reduce U.S. life expectancy. *Science*, 307, 1716–1717.
- Masicampo, E. J., & Baumeister, R. F. (2007). Toward a physiology of bounded rationality: Lemonade, willpower, and bias in decision making. Unpublished manuscript, Florida State University.
- Mischel, W. (1974). Processes in delay of gratification. In L. Berkowitz (Ed.), *Advances in experimental social psychology*, vol. 7. (pp. 249–292). San Diego, CA: Academic Press.
- Moller, A. C., Deci, E. L., & Ryan, R. M. (2006). Choice and ego-depletion: The moderating role of autonomy. *Personality and Social Psychology Bulletin*, 32, 1024–1036.
- Muraven, M., Shmueli, D., & Burkley, E. (2006). Conserving self-control strength. *Journal of Personality and Social Psychology*, 91, 524–537.
- Muraven, M., & Slessareva, E. (2003). Mechanism of self-control failure: Motivation and limited resources. *Personality and Social Psychology Bulletin*, 29, 894–906.
- Muraven, M., Tice, D. M., & Baumeister, R. F. (1998). Self-control as a limited resource: Regulatory depletion patterns. *Journal of Personality and Social Psychology*, 74, 774–789.
- Novemsky, N., Wang, J., Dhar, R., & Baumeister, R. F. (2007). The interaction of ego-depletion and choice. Manuscript submitted for publication.
- O'Guinn, T. C., & Faber, R. J. (1989). Compulsive buying: A phenomenological exploration. *Journal of Consumer Research*, 16, 147–157.
- Pocheptsova, A., Amir, O., Dhar, R., & Baumeister, R. F. (2007). Deciding without resources: Psychological depletion and choice in context. Manuscript submitted for publication.
- Rook, D. W. (1987). The buying impulse. *Journal of Consumer Research*, 14, 189–199.
- Rottenstreich, Y., Sood, S., & Brenner, L. (2007). Feeling and thinking. *Journal of Consumer Research*, 33, 461–469.
- Schmeichel, B. J., Gailliot, M. T., & Baumeister, R. F. (2005). Memory and the self's executive resources: Ego depletion undermines the self-choice effect. Manuscript submitted for publication.
- Schmeichel, B. J., & Vohs, K. D. (2007). *Self-affirmation and self-control strength: Affirming core values counteracts ego depletion*. College Station, TX: Texas A&M University Unpublished manuscript.
- Schmeichel, B. J., Vohs, K. D., & Baumeister, R. F. (2003). Intellectual performance and ego depletion: Role of the self in logical reasoning and other information processing. *Journal of Personality and Social Psychology*, 85, 33–46.
- Searle, J. R. (2001). *Rationality in action*. Cambridge, MA: MIT Press.
- Shiv, B., & Fedorikhin, A. (1999). Heart and mind in conflict: The interplay of affect and cognition in consumer decision making. *Journal of Consumer Research*, 26, 278–292.
- Simonson, I. (1989). Choice based on reasons: The case of attraction and compromise effects. *Journal of Consumer Research*, 16, 158–174.
- Simonson, I. (2005). In defense of consciousness: The role of conscious and unconscious inputs in consumer choice. *Journal of Consumer Psychology*, 5, 211–218.
- Simonson, I., Carmon, Z., Dhar, R., Drolet, A., & Nowlis, S. (2001). Consumer research: In search of identity. *Annual Review of Psychology*, 52, 249–275.
- Smith, A. (1776/2004). In C. J. Bullock (Ed.), *An inquiry into the nature and causes of the wealth of nations (Harvard classics, part 10)* Whitefish, MT: Kessinger Publishing.
- Stanovich, K. E., & West, R. F. (2000). Individual differences in reasoning: Implications for the rationality debate? *Behavioral and Brain Sciences*, 23, 645–726.
- Steel, P. (2007). The nature of procrastination: A meta-analytic and theoretical review of quintessential self-regulatory failure. *Psychological Bulletin*, 133, 65–94.
- Stillman, T. F., Sparks, E., & Baumeister, R. F., (in preparation). Perceiving free will. Florida State University.
- Stutzer, A., & Frey, B. S. (2006). What happiness research can tell us about self-control problems and utility misprediction. Working Paper No. 267, Institute for Empirical Research in Economics, University of Zurich.
- Tice, D. M., Baumeister, R. F., Shmueli, D., & Muraven, M. (2007). Restoring the self: Positive affect helps improve self-regulation following ego depletion. *Journal of Experimental Social Psychology*, 43, 379–384.
- Tversky, A. (1969). Intransitivity of preferences. *Psychological Review*, 76, 31–48.
- Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science*, 211, 453–458.
- Vohs, K. D., Baumeister, R. F., & Chin, J. (2007). Feeling duped: Emotional, motivational, and cognitive aspects of being exploited by others. *Review of General Psychology*, 11, 127–141.
- Vohs, K. D., Baumeister, R. F., Twenge, J. M., Nelson, N. M., Rawn, C. D., Schmeichel, B. J., et al. (2007). Making choices impairs subsequent self-control: A limited resource account of decision making, self-regulation, and active initiative. Manuscript submitted for publication.
- Vohs, K. D., & Faber, R. J. (2007). Spent resources: Self-regulatory resource availability affects impulse buying. *Journal of Consumer Research*, 33, 537–547.
- Vohs, K. D., & Heatherton, T. F. (2000). Self-regulatory failure: A resource-depletion approach. *Psychological Science*, 11, 249–254.
- Vohs, K. D., & Schmeichel, B. J. (2003). Self-regulation and the extended now: Controlling the self alters the subjective experience of time. *Journal of Personality and Social Psychology*, 85, 217–230.
- Vohs, K. D., & Schooler, J. W. (2008). The value of believing in free will: Encouraging a belief in determinism increases cheating. *Psychological Science*, 19, 49–54.
- Von Neumann, J., & Morgenstern, O. (1944/1947). *Theory of games and economic behavior*. Princeton, NJ: Princeton University Press.
- Wallace, H. W., & Baumeister, R. F. (2002). The effects of success versus failure feedback on further self-control. *Self and Identity*, 1, 35–42.
- Webb, T. L., & Sheeran, P. (2003). Can implementation intentions help to overcome ego-depletion? *Journal of Experimental Social Psychology*, 39, 279–286.
- Werthenbroch, K. (1998). Consumption self-control by rationing purchase quantities of virtue and vice. *Marketing Science*, 17, 317–337.
- Werthenbroch, K., & Dhar, R. (2000). Consumer choice between hedonic and utilitarian Goods. *Journal of Marketing Research*, 37, 60–71.