The Dynamics of Impulsive Behavior:

Construct versus Goal Activation Effects on Memory, Evaluations and Choice

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We gratefully acknowledge the detailed feedback from members of the dissertation committee: John Bargh, co-chair of the committee, Tom Meyvis, Vicki Morwitz, Sankar Sen and Patti Williams. We also thank Nidhi Agrawal, Meg Campbell, Chris Janiszewski and Bob Wyer Jr. for their comments on earlier drafts. We are indebted to Suchi Chandran for her assistance at various stages of this project, and to Manoj Thomas for his assistance in data collection. Special thanks are due to Kalpana Suresh, the first author’s wife, for painstakingly helping with data entry.
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ABSTRACT

Marketers and academic scholars have long been interested in understanding what drives impulsive behavior. One key issue that has not yet been examined in extant literature is the dynamics of the mental processes that drive impulsive behavior. We provide evidence of two distinct paths to impulsive behavior – one driven by temporary construct activation and the other by chronic hedonic goals. Across four studies reported in this paper, we demonstrate that impulsive people possess heightened accessibility to hedonic behaviors (Study 1) and to chronic hedonic goals (Study 2). Non-impulsive people on the other hand may only have temporary accessibility to hedonic behaviors that do not manifest in the possession of hedonic goals. We then show that these different sources of accessibility manifest very differently in how people evaluate hedonic products over time (Study 3). Finally, we show that these two processes interact with a specific primed concept in driving actual behavior over time (Study 4). These findings impact the theoretical underpinnings of impulsive behavior and suggest that impulsive behavior may be multiply determined in process terms, not just in terms of affecting whether or not an individual will act impulsively in a given situation but also how impulsively the individual will behave.
Most people believe that they are capable of controlling their impulses and desires. Yet, every now and then, the sweater in the window that shrieks out “buy me!” (Rook, 1987) or the feeling “it was like I was on automatic” (O’Guinn & Faber, 1989) challenges these beliefs. For instance, one definition of the buying impulse has been derived from the Greek word *akrasia*, or “weakness of will” (Wood 1998). Wood defines akratic impulses as unplanned purchases, undertaken with little or no deliberation, accompanied by affective mood states that furthermore are not compelled, and that, finally, are against a buyer’s better judgment. Impulses have also been defined as “desires” that compete with an individual’s “willpower” (Hoch and Loewenstein 1991).

The most widely cited definition of impulse buying is attributed to Rook (1987), who characterized such actions as those where “a consumer experiences a sudden, often powerful and persistent urge to buy something immediately.” This urge materializes as a buying stimulus that is spontaneous, kinetic, psychologically arousing, immediate and “primary” (Rook 1987). This definition actually encompasses two psychological phenomena – a sudden felt urge and an immediate action. Further, it defines impulsive behavior as a strong and immediate affective reaction. In other words, spontaneous affect drives behavior; e.g., seeing ice cream in the supermarket freezer evokes an immediate visceral and affective reaction in the form of an urge that then causes the person to pick it up and add it to her shopping cart. Recent studies conducted by Shiv and Fedorikhin (1999) also support this notion.

In this paper, we argue that impulsive behavior in a dynamic setting is a joint outcome of construct activation, spontaneous affect and chronic hedonic goals. We show that chronic hedonic goals, once activated, continue to operate on people in such a way that spontaneous desires for products positively related to the goal increase over time while desires for products
negatively related to the goal decrease over time. This then manifests in increased strength of the impulse and a concomitant increase in behavior. On the other hand, we also show another route to impulsive behavior that is based on temporary construct activation among those without chronic hedonic goals. This group of people might experience immediate desires for hedonic products upon being primed with hedonic concepts and might indeed act on these desires. However, this effect is ephemeral and decays pretty rapidly.

As a first step, we establish that there are differences in the natural cognitive structure of hedonic behaviors among impulsive and non-impulsive people. However, priming leads to similar levels of organization of behaviors in memory for non-impulsives as well, providing evidence for a cognitive system in operation (Study 1). We then provide evidence of differences in the cognition-motivation link among impulsives and non-impulsives by showing unique goal-driven effects for impulsives that do not obtain for non-impulsives. Specifically, we show that impulsives persist with even more positive evaluations of hedonic products despite being forced to think of prudence, whereas non-impulsives evaluate these products lower after thinking of prudence in a cognitively consistent way (Study 2). In Study 3, we provide evidence of both routes by which people might experience desires for hedonic objects – one that engages the motivational system (impulsives) and the other that engages the cognitive system (non-impulsives). We show that chronic hedonic goals help in creating progressively increasing liking or desire for hedonic products directly related to the goal while the construct activation route leads to a temporary increase in liking that then decays to baseline levels over time. Finally, we link this increased liking to actual behavior by showing that priming impulsive people with hedonic-related concepts leads to greater intensity of hedonic behavior over time even while the percent of such people acting impulsively remains about the same. On the other hand, we show
that non-impulsive people may act impulsively immediately after being primed. However, the incidence of such behavior in this group goes down significantly after a delay (Study 4).

We elaborate on the theoretical implications of our findings and suggest that there is more to impulsive behavior than spontaneous affect or absence of planning. We integrate our findings under the rubric of a connectionist model of behavior (Smith 1996) that suggests that perception, affect and motivation are all intertwined and jointly influence behavior. We also provide a dynamic view of behavior rather than a static snapshot, arguing that time plays an important role in determining how behavior might unfold.

From a practical standpoint, our findings show that impulsive behavior can be influenced in subtle ways by priming specific hedonic concepts. Further, such behavior may increase in its intensity over time resulting in greater quantities being purchased or consumed. Understanding the structure of hedonic goals and the various linkages that exist to these goals could be a very profitable avenue for market researchers. At the level of public policy, our findings could shed some light on how binge-eating may be triggered. The most prevalent explanation is that binge-eating is a form of affect regulation where people overeat to manage distress or negative affect. Our results provide some support for the idea that pleasure-seeking goals may also gather momentum over time such that they drive excess consumption.

Next, we begin the derivation of our conceptual model, followed by the studies that were conducted to test the hypotheses that we propose.

**IMPULSIVENESS AND CHRONIC HEDONIC GOALS**

It is well known that the pursuit of hedonic gratification is a strong motive among some people. Freudian theory on the pleasure principle has long recognized the need for some
individuals to seek pleasure and avoid pain. Barratt and Patton (1983) found a strong correlation between the tendency of sensation seeking and impulsivity. Impulsive people scored high on scale items that measured a desire to seek thrills and adventure, novel experiences and release in uninhibited social activities, all of which are means of achieving gratification. Gray (1987) distinguished people along two orthogonal dimensions measuring the tendency to seek pleasure and the tendency to take costs of one’s actions into account and concluded that impulsive people tended to be overactive on the first dimension or under-active on the second.

There are two ways such tendencies can be associated with chronic hedonic goals. First, trait impulsivity may manifest in a stronger set of associations in memory for behaviors related to such goals. Several studies have argued that goals are represented mentally in the just the same fashion as other knowledge structures such as perceptual or conceptual categories (see, for example, Gollwitzer and Moskowitz 1996; Kruglanski 1996). Hamilton, Katz and Leirer (1980) found that people who had a goal to form an impression of a target had better free recall of the target’s behaviors as opposed to participants who were instructed to memorize the behaviors. In other words, goals are cognitively associated with relevant mental paths, just as semantic categories are. Thus, both impulsive and non-impulsive people are expected to recall more hedonic behaviors when they are primed with a hedonic goal as opposed to a condition when they are not primed. However, we also expect that impulsive people in general will recall more hedonic behaviors compared to non-impulsive people regardless of the priming condition, reflecting the chronicity of their goals. Thus:

**H1a:** Impulsive people will recall more hedonic behaviors compared to non-impulsive people.
**H1b:** People primed with a hedonic construct/goal will recall more hedonic behaviors compared to those who are not primed.

Another facet of this increased recall for hedonic behaviors is the way such behaviors are organized in memory. Hamilton et al. (1980) found that people with an impression formation goal were also much more likely to organize the target’s behaviors in related clusters. Similar findings were reported by Chartrand and Bargh (1996). Semantic priming is just as likely to result in clustering of behaviors related to the concept being primed (Trafimow, Triandis and Goto, 1991). We therefore expect that those with hedonic goals will show a better clustering of hedonic behaviors as opposed to those that do not have such goals. However, priming is expected to create similar patterns of organization for those without chronic goals. Hence:

**H2:** Impulsive people will show a greater clustering of hedonic behaviors regardless of being primed or not compared to non-impulsive people who will show such clustering only upon being primed with a hedonic goal.

A second manifestation of trait impulsivity in terms of its link to hedonic goals lies in the way people respond to hedonic products in the face of a countervailing influence. Theories on ironic processes (Wegner 1994) suggest that people may be unable to suppress thoughts or influences even while actively trying to do so. Thus, when participants were instructed not to think of white bears, they reported a greater intrusion of thoughts related to white bears. Goal theories similarly suggest that forcing people to respond in a manner counter to their current goals will lead to overcompensation. A classic study by Zeigarnik (1939) showed that people subsequently tended to recall more goal-relevant cues when interrupted in their pursuit of a goal. Moskowitz et al. (1999) similarly showed that forcing people with chronic egalitarian goals to
respond stereotypically to a set of situations caused them to evaluate stereotyped targets more positively, because their egalitarian goals were disrupted by the manipulation.

If, as we hypothesize, impulsivity is associated with chronic hedonic goals, we should see a similar effect among impulsive people. Specifically, forcing impulsive people to give prudent responses to a set of tempting situations should cause them to overcompensate on a subsequent product evaluation task. While a standard cognitive explanation consistent with a construct activation story would suggest that evaluations of the hedonic products would be prime-consistent and thus lower after the prudence manipulation, we hypothesize that impulsive people will actually evaluate the hedonic products higher after the manipulation. This would indicate the operation of a chronic hedonic goal. Thus:

**H3:** Impulsive people will evaluate hedonic products more positively after a prudent response while non-impulsive people will evaluate hedonic products less positively after such a response.

We conducted Studies 1 and 2 to test these hypotheses. We describe these below.

**STUDY 1: ACCESSIBILITY OF HEDONIC BEHAVIORS**

Our objective in this study was to establish that individual differences in chronicity of hedonic goals, as represented by impulsiveness, determine how accessible behaviors related to the goal are in memory. We also wished to show that the sources of chronic and temporary accessibility operate similarly and jointly in influencing free recall and clustering. Thus, we tested hypotheses 1 and 2 in this study.
**Method**

*Design*. In order to assess the extent of free recall and clustering, we used a procedure followed by Chartrand and Bargh (1996). Our design was a 2 (prime: hedonic vs. none) x 2 (impulsivity: impulsive vs. non-impulsive) between-subjects factorial. We manipulated the temporarily primed hedonic goal/construct by asking respondents to evaluate and choose from among three brands of cereals rated on either hedonic or neutral attributes. Our hypothesis was that evaluating different brands of cereals on attributes relating to taste and calories (described in terms of the sugar content and presence of nuts and dried fruit) would activate hedonic knowledge structures (Metcalfe and Mischel 1999) while evaluating cereals on attributes relating to neutral attributes such as crispiness or texture would not do so. A pretest of the two conditions run among 45 students confirmed our hypothesis. Respondents in the primed condition reported a greater use of their emotional side ($X_{\text{prime}} = 4.92$, $X_{\text{neutral}} = 3.08$, $F(1,41) = 12.7$, $p < .01$) and a greater need for something sweet ($X_{\text{prime}} = 5.14$, $X_{\text{neutral}} = 3.71$, $F(1,41) = 7.15$, $p < .05$) compared to those in the neutral condition. Respondents also reported a lower use of their rational side when primed ($X_{\text{prime}} = 4.5$, $X_{\text{neutral}} = 5.53$, $F(1,41) = 4.49$, $p < .05$).

*Procedure*. Fifty-nine undergraduate students from a large northeastern university participated in this study for partial course credit. Participants were randomly assigned to one of two task conditions. All participants were first informed that they were to participate in a decision-making study on cereals. They were told to imagine themselves in a grocery superstore, trying to decide which brand of cereal to buy. Participants were then presented with a brand-attribute matrix with what were purportedly *Consumer Reports*’ ratings of three different brands (A, B and C) on four different attributes, counterbalanced. Participants in the hedonic prime condition were presented data relating to taste, sodium content, calories and cost per ounce, and
in the neutral condition were presented data relating to texture, sodium content, crispiness and cost per ounce. Participants were asked to indicate which brand of cereal they would buy, the difficulty and emotionality of the task, the importance of the individual attributes and their current mood state.

Following this priming manipulation, participants were shown a list of sixteen behaviors (see Appendix A for the list of behaviors). Embedded among these sixteen behaviors were 4 consummatory or hedonic behaviors: “tasting mom’s homemade cookies,” “eating chocolate ice-cream,” “buying a candy bar” and “eating a piece of cheesecake.” Participants were simply told to focus on the behaviors because we would be subsequently asking a few questions about these behaviors. In order to prevent recency effects, participants were then shown a set of three completely unrelated issues (e.g., sweatshops and Nike) and were asked to come up with two arguments for the issue and two against the issue. Participants then performed a surprise recall task of the 16 behaviors. The critical measures were the number of consummatory behaviors recalled and the extent of their clustering (i.e., the extent to which a behavior of a given type is followed by another behavior of the same type).

We then elicited participants’ self-reports of impulsivity using Puri’s (1996) Consumer Impulsiveness Scale (CIS). The CIS has two sub-scales, hedonic and prudent, that are orthogonal to each other. The hedonic scale consists of five items while the prudent scale consists of seven items. Participants are classified as impulsive if their scores fall below the median on the hedonic scale and above the median on the prudent scale. They are deemed prudent if their scores fall above the median on the hedonic scale and below the median on the prudent scale. The rest are classified as moderates. For the purpose of this study, we classified all those who were not impulsive (moderates and prudents) as non-impulsive.
After providing other background measures, participants were debriefed and dismissed.

Results

*Impulsivity Categorization.* Based on our classification scheme of participants as impulsive versus non-impulsive, thirty-one participants were deemed to be impulsive and twenty-eight were classified as non-impulsive.

*Free Recall.* We measured the total number of hedonic behaviors recalled in the free recall task. An ANOVA was conducted with impulsivity and prime as independent variables and total hedonic behaviors recalled as the dependent variable. As predicted in H1a, there was a significant main effect of impulsivity. Impulsive people recalled more hedonic behaviors compared to non-impulsive people ($X_{imp} = 2.28$, $X_{nonimp} = 1.66$; $F(1,55) = 8.61, p<.01, \eta^2 = .14$). Further, as predicted in H1b, there was also a main effect of prime. Participants who were primed with hedonic attributes recalled more hedonic behaviors compared to those who were assigned to the neutral condition ($X_{prime} = 2.24$, $X_{neutral} = 1.70$, $F(1,55) = 6.46, p<.05, \eta^2 = .11$). The interaction between prime and impulsivity was not significant ($F<1$).

*Clustering.* The Adjusted Ratio of Clustering (ARC) was used as a measure of clustering (Roenker, Thompson and Brown 1971). Research has shown that the ARC is the best overall clustering measure available and is least confounded by extraneous factors, because it adjusts for the number of categories recalled and the different number of categories that are presented to the participant (Murphy 1979). The formula is:

$$ARC_i = \frac{R_i - \text{Exp}(R_i)}{\text{Max}(R_i) - \text{Exp}(R_i)}$$

where $R_i$ is the number of repetitions of items belonging to a category, $\text{Exp}(R_i)$ is the expected value of such repetitions, $\text{max}(R_i)$ is the maximum number of possible repetitions, which is $1$ less
than the total number of items recalled. The ARC typically ranges between 0, meaning that clustering is no better than chance, and 1, meaning perfect clustering. However, Roenker, et al. (1971) point out that it is possible for ARC values to be below 0, indicating a non-random alternation among categories.

An ANOVA was run on ARC scores with impulsivity and prime condition as independent variables. As hypothesized in H2, there was a significant interaction between impulsivity and prime condition ($F(1,55) = 4.49, p<.05, \eta^2 = .08$). Impulsive people had similar levels of clustering regardless of whether they were primed or not ($\bar{X}_{\text{prime}} = .57, \bar{X}_{\text{neutral}} = .58$, contrast $F <1$). Non-impulsive people on the other hand were much more likely to cluster their recall of hedonic behaviors when they were primed than when they were not primed ($\bar{X}_{\text{prime}} = .54, \bar{X}_{\text{neutral}} = -.14, F(1,55) = 8.08, p<.01$).

Discussion

The results of study 1 indicate that trait impulsivity leads to greater accessibility of hedonic associations and behaviors in memory. Such facilitation in accessibility causes a greater degree of organization of hedonic behaviors in memory. Notably, non-impulsive people do not show such organization in memory but can be temporarily primed for such an effect to manifest. Such an account of accessibility is consistent with the idea that people may have well-developed knowledge structures that could potentially play a role in guiding perceptions and behavior. Such knowledge structures may manifest either in the form of goals or semantic constructs. The results in Study 1 do not unequivocally show support for one or the other forms of accessibility. Study 2 attempts to tease apart these processes, arguing for the presence of chronic hedonic goals among impulsives while showing that such goals do not exist among non-impulsives.
STUDY 2: CONSTRUCT OR GOAL ACTIVATION?

In this study, our primary objective was to establish an unequivocal link between trait impulsivity and the presence or absence of chronic hedonic goals. While there is considerable evidence that impulsivity is associated with other manifestations such as sensation seeking (Zuckerman, et al. 1993), it is not clear whether such manifestations are merely behavioral tendencies rather than goals or motivations. In order to examine this issue, we focused on one key property of goal-directed behavior: persistence in the face of obstacles (Lewin 1935). Specifically, forcing people to respond in a manner counter to their chronic goals, if they exist, should lead to compensatory behavior in order to satiate these goals.

Method

Sixty-nine undergraduate students from a large mid-western university participated in this study, for which they received a compensation of $6. We used the procedure followed by Moskowitz et al. (1999) in order to determine the chronicity of hedonic goals among impulsives and non-impulsives. If some people do have chronic goals and are committed to the pursuit of such goals, they are expected to hold on to these goals even in the face of barriers or obstacles. If these barriers prevent them from pursuing these goals, a sense of incompleteness is induced, leading them to try to compensate for having violated the goal. Accordingly, we forced participants to respond prudently to a set of four different tempting situations (see Appendix B). If respondents did indeed possess a chronic hedonic goal, this would be reflected in compensatory behavior in terms of increased liking for hedonic products. Semantic activation, on the other hand, would predict a reduced liking for such products, since the prudence task would have activated thoughts related to self-control.
Participants, in groups of 3-7 persons, completed two sets of tasks in this study. In the first phase, participants completed a chronic goals task. This task had different components to it. First, participants rated a set of fifteen pictures of various hedonic objects. There were five pictures that could be classified as sweet foods (e.g., ice-cream, danishes), five that were non-sweet foods (e.g., chips, steak) and five that were non-foods (e.g., diamond ring, perfume, MP3 player). Participants responded to each picture by indicating how much they liked the product featured in the picture on a nine-point semantic differential scale anchored on “1 = dislike very much” to “9 = like very much.” Following a distractor task, participants next completed an incompleteness task that was designed to induce a feeling of goal violation among those who were committed to the pursuit of hedonic goals. In this task, participants read four situations they were asked to imagine themselves being in. Each of these situations comprised of temptations (e.g., “You go to Nordstrom’s and see a very attractive sweater on display). They were then asked to respond by clicking on the button that best described how they would feel in that situation. Each of the three options was designed to be a prudent response. In this example, the three responses were: (a) It is important to save for a rainy day and you certainly believe in this; (b) It is important to prioritize spending and you don’t want to spend money on indulgences when there are more important things to buy; and (c) It is important not to yield to temptation.

Next, participants were again presented with the set of fifteen pictures with the order rotated randomly and asked to indicate once again how much they liked or disliked each product. The cover story was that we were interested in knowing whether their gut responses are stable. After another distractor task, participants were told to complete a series of questions about themselves including their self-ratings on the Consumer Impulsiveness Scale (Puri 1996). They were also asked to indicate how health-conscious and how hungry they were on seven-point
scales ("1 = not at all" and "7=very much"). After other background measures were collected, participants were dismissed.

Results

In order for hypothesis 3 to be supported, those with chronic hedonic goals should demonstrate compensatory behavior by rating hedonic products higher after the incompleteness task. Those without such chronic goals would not experience a sense of incompleteness. Rather, they would act in a manner consistent with what was being semantically primed, namely, prudence. Compensatory behavior was measured by averaging the difference scores between the Time 1 rating and Time 2 rating of the various hedonic products. Such difference scores were computed separately for the sweet foods, non-sweet foods and non-foods, together with a combined difference score for all hedonic products.¹

The predictor variables of interest were participants’ scores on the hedonic ($X = 4.39$, s.d. = 1.19) and the prudent sub-scales ($X = 3.01$, s.d. = 1.03) of the CIS. Correlations between these variables and difference scores for each of the product categories are shown in Table 1. Significant correlations were obtained between the impulsiveness scores and the difference scores for each product category as well as for the total set of products.

Insert Table 1 about here.

¹ Mean ratings for each product sub-type were similar ($\bar{X}_{\text{sweet}} = 6.5$, $\bar{X}_{\text{non-sweet}} = 6.4$, $\bar{X}_{\text{non-food}} = 5.9$) and a comparison against the neutral condition of “5 = neither like nor dislike” showed that all three categories were rated as hedonic ($t(68)$ for sweets = 10.5, $p<.01$; $t(68)$ for non-sweet = 8.6, $p<.01$; $t(68)$ for non-food = 4.97, $p<.01$). Hence, we computed a combined difference score for all hedonic products.
A multiple regression analysis was then carried out, including the two impulsiveness sub-scales as predictor variables. In addition, state of hunger, health-consciousness, and gender were included as predictors. The analysis showed that the score on the hedonic sub-scale was a significant predictor of difference scores on sweet foods (β = -.26, t(63) = -3.7, p < .01). It was also a significant predictor of difference scores for non-foods (β = -.11, t(63) = -2.18, p < .05) and for the total set of products (β = -.12, t(63) = -2.87, p < .01). There was no significant effect of hedonic score on difference scores for non-sweet foods. Further, none of the other predictor variables had a significant effect on any of the difference scores.

Participants were categorized into impulsives and non-impulsives based on their scores on the two impulsiveness sub-scales. A MANCOVA was run with the various difference scores as dependent variables and impulsiveness class and gender as independent variables. State of hunger and health-consciousness were included as covariates. Consistent with H3, there was a significant main effect of impulsiveness on all the difference scores (multivariate F(3,61) = 4.65, p < .01). In particular, impulsiveness had a significant effect on difference scores for sweet foods (X_{imp} = .22, X_{non-imp} = -.22, F(1,63) = 10.62, p < .01), non-foods (X_{imp} = .04, X_{non-imp} = -.24, F(1,63) = 8.18, p < .01) and total for all products (X_{imp} = .10, X_{non-imp} = -.18, F(1,63) = 12.84, p < .01). None of the other variables had any significant effect on any of the difference scores (p_s > .05).

Discussion

The results obtained in this study indicate that there is a significant link between impulsiveness as a trait and chronicity of hedonic goals. Impulsive people, particularly those with a strong drive to seek pleasure (as evidenced by their scores on the hedonic sub-scale), are
likely to be committed to hedonic goals and experience a feeling of incompleteness when these goals are violated. This leads them to compensatory behavior in terms of higher evaluations of hedonic products. This is particularly striking because a simple knowledge activation or semantic priming mechanism would actually dictate the opposite effect to occur since all participants were asked to respond prudently. Interestingly, however, we find that non-impulsives do report a lower liking for hedonic products after being asked to respond prudently to the set of situations. This indicates that such individuals do not possess readily accessible hedonic goals and that they are susceptible to the effects of whatever constructs are activated at the moment.

One interesting finding was the absence of such compensatory behavior for non-sweet foods. Our manipulation of incompleteness did not include anything specific to this domain, while there was one situation specific to the sweet foods domain. We conjecture that people do not have overarching hedonic goals across domains. Rather, they may have specific goals such as the need to have something sweet or the need to indulge in something luxurious. At the same time, the activation of one such sub-goal may suppress the activation of another related sub-goal. Thus, activating the sweetness goal could have suppressed the activation of the non-sweet goal.

Study 3 investigates this particular effect more thoroughly, testing the idea that the activation of specific goals among impulsive people may interact with the affective response to stimuli related to the goal over time. It also tests the effects of the alternative route of construct activation that we hypothesize to hold true for non-impulsive people.

**STUDY 3: DYNAMICS OF COGNITION, AFFECT AND MOTIVATION**

We referred earlier to the fact that impulsive behavior is characterized by the experience of immediate affect (Rook 1987; Shiv and Fedorikhin 1999). Our findings in study 2 argue for
the implication of the motivational system among impulsive people. A key question that then arises is the following: How do affective responses triggered by hedonic products interact with these motivational influences? In particular, do the properties of goals such as strengthening with time (cf. Atkinson and Birch 1970) manifest even in affective responses to stimuli? Further, does the presence of a focal goal diminish the affective response to stimuli negatively related to the goal? Studies using physiological measures such as skin conductance and cardiac acceleration have shown that emotional reactions to stimuli are linked to underlying appetitive and defensive motivational states (Bradley, et al. 2001). Recent work in connectionist models (Smith 1996) suggests that the dynamic evolution of behavior is an integrative function of perceptual, affective and motivational processes. The strength of a particular behavioral path depends on the accessibility of the individual processes influencing it and of their relative intensity.

Several studies on accessibility have shown that temporary and chronic sources of accessibility influence judgments or evaluations independent of each other (e.g., Aaker and Lee 2001). Bargh et al. (1986) found that participants who possessed chronically accessible constructs for a given trait gave more extreme evaluations of an ambiguous behavior when they were also primed with the same construct. In other words, the chronic construct formed a baseline level of activation independent of context, while the situational prime served to activate the construct further, leading to an increase in activation over the baseline. Pitting chronic sources of accessibility against situational ones (i.e., contextual primes) in a study that also manipulated delay since the priming event, Bargh, Lombardi and Higgins (1988) found that chronics were progressively more likely to use their chronically accessible construct instead of the primed alternative construct to categorize an ambiguous behavior.
The purpose of this study was to examine how people evaluated moderately hedonic objects as a function of their chronic goals and contextually primed concepts. In particular, our focus was on the effect of delay, not in a between-subjects design, but in a within-subjects one, where we could examine the dynamic effects of the interaction between the chronic and situational sources of accessibility over time. The studies on accessibility cited earlier essentially found a polarization of evaluations among chronics primed contextually. However, no study in the extant literature has examined the dynamics of such polarization across time. Do people’s evaluations of objects get increasingly extreme as a function of delay? Alternatively, do they start high, and then decay to levels that are more neutral? Do more and more people make those extreme evaluations over time? Alternatively, is it the same number of people making more extreme evaluations?

A pure affective explanation would hold that delay should lead to a decrease in liking or, at best, that liking should remain constant once both chronic and situational sources of accessibility are active. On the other hand, if the motivational system is also implicated, as we claim in study 2, liking for an object should increase as a function of delay, intensifying in response to the lack of satiation of the jointly operating chronic and temporary hedonic goals. We therefore hypothesize that the increase in liking associated with the implication of the motivational system is likely to manifest only in the presence of a situational source of accessibility and not merely due to chronic sources of accessibility. Again, we would also expect a reverse pattern for those without chronic hedonic goals. Consistent with our findings in Studies 1 and 2 regarding construct activation for non-impulsive people, the temporary prime should enhance liking for an object after a shortest delay, but the liking should then decay after a longer
delay. This is also consistent with the literature on the effects of temporary accessibility (Bargh et al. 1988).

**H4:** The effects of goal priming and delay on intensity of evaluations will be moderated by impulsivity such that:

(a) Impulsive people will experience a progressively higher degree of liking over time for hedonic products related to a primed hedonic goal as compared to a neutral condition.

(b) Non-impulsive people will experience an immediate increase in liking for hedonic products related to a primed hedonic goal but liking will diminish to baseline levels over time.

Our results in Study 2 suggest that activating a goal of wanting something sweet might lead to a suppression of the opposite goal of wanting something savory. Brendl, Markman and Messner (2003) found that activating a focal goal leads to a devaluation of objects unrelated to the goal. Consistent with goal theory (Lewin 1935), we hypothesize that this devaluation effect is likely to intensify over time as the focal goal gains strength. We expect this effect to be particularly strong for objects negatively related to the goal, based on our findings in Study 2. Further, given our findings in Study 2 about the lack of any chronic hedonic goals among non-impulsive people, we expect that the devaluation effect will not be seen among this group of people. Hence:

**H5a:** Impulsive people will report a progressively lower liking over time for products unrelated to a primed hedonic goal as compared to a neutral condition.

**H5b:** This effect will not be observed among non-impulsive people.
Further, we hypothesize, following from the literature on accessibility, that impulsive people are likely to be faster at reporting their liking for hedonic objects as compared to non-impulsives. This is particularly likely when impulsive people are primed with a hedonic goal, so that both chronic and temporary sources of accessibility are operating simultaneously. On the other hand, non-impulsive people may show faster response times immediately following a prime due to temporary accessibility, but the effect of the prime is expected to wear off after a delay. We also conjecture that goal priming should be more sensitive to applicability in terms of influencing the interaction between chronicity and delay. Theories on goal structure suggest that goals and associated behaviors are organized hierarchically. Activating a goal should cause the likelihood of activation of behaviors associated with the goal to go up. For example, Kruglanski et al. (2002) found that reaction times to behaviors associated with a particular goal were significantly faster for participants primed with the goal as opposed to those primed with a non-goal control. However, the difference in reaction times disappeared when the goal primed was not one that participants were currently pursuing. Consequently, the effects of goal priming are particularly likely to be felt on those behaviors or objects with the highest applicability to the goal. Hence,

**H6:** The effects of a goal priming and delay on speed of evaluations will be moderated by impulsivity such that:

(a) Impulsive people primed with a hedonic goal will be faster to report their liking for hedonic objects positively related to the goal compared to those who are not primed with the goal.
(b) Non-impulsive people primed with a hedonic goal will be faster than those not primed with the goal to report their liking for hedonic objects positively related to the goal immediately after being primed, but not after a delay.

Method

Pretest for Stimulus Development. Thirty pictures of different types of products known to possess moderately hedonic qualities were used as part of a pretest. Product categories included were desserts, candies, cookies, pizza, chips, steak, jewelry, luxury cars, MP3 players and PDAs. A group of 65 respondents (30 female, 35 male) provided ratings on sliding 100-point scales as to how much they liked each product. Stimuli were shown one at a time for three seconds on a computer monitor and ratings were elicited for each picture immediately after the picture was shown. Based on the results of the pretest, 18 pictures were chosen for the main study: six pictures that could broadly be categorized as sweet foods (e.g., desserts, candies), six that were of non-sweet foods (e.g., pizza, steak, chips) and six that were of non-foods (e.g., MP3 players, cars, PDAs, CDs). Three blocks of six pictures each were constructed of two sweet foods, two non-sweet foods and two non-foods, matching the average rating of each of the blocks as well as the average ratings of each of the component categories across the three blocks. We ensured that the ratings were also matched across gender.

Procedure. Eighty-three undergraduate students at a large northeastern university participated in the main study for partial course credit. Participants were seated in front of an IBM compatible personal computer that randomly assigned them to either the neutral or the hedonic primed condition. The experiment was introduced as a study on consumer decision-making and product evaluation and participants were informed that they would be performing
three separate decision tasks and evaluating multiple sets of products. There were two neutral
decision tasks (refrigerators and lawn mowers) common to both priming conditions. On the third
task, half the respondents evaluated and chose from brands of cereal on the neutral attributes,
while the other half evaluated and chose cereal based on hedonic attributes, as reported in Study
1. Each decision task was followed by three blocks of pictures presented at different intervals of
delay. The purpose of the two sets of blocks preceding the final task was to ensure that response
times were stable on the final task. Participants were told that the second part of the study
pertained to how product evaluations could be influenced by their mathematical skills.
Immediately before each block of pictures was presented, an interference task designed to clear
working memory after the priming was presented to each participant (Bargh et al. 1988). This
consisted of counting backwards from a given number (e.g., count backwards from the number
357 by 3s, 484 by 4s and 980 by 5s) till they were told to stop; we used a different starting
number and subtracting amount in each series to ensure that task difficulty would remain the
same across all blocks. The stop instruction appeared after five seconds in the no-delay
condition, 60 seconds in the medium-delay condition and 150 seconds in the long-delay
condition. We estimated that the task of rating each block of pictures would take approximately
one minute. Thus, the actual delay intervals before each block of pictures was presented are 5
seconds, 120 seconds and 210 seconds respectively. For each participant, the computer picked a
random starting order of blocks, ensuring that every combination of orders was equally
represented across the set of participants. Within each block, the position of the six images was
rotated at random for each participant.

Participants were instructed to look at each picture and then give their immediate gut feel
reaction to it by pressing the key “1” if they liked it and “0” if they disliked it. They were told to
give their reaction as quickly as possible by keeping their fingers on the respective keys as they saw the picture. Reaction times were measured by the computer. On the following screen, they were asked to indicate how much they liked the product in the picture by moving a slider along a scale anchored on 0 to 100.

After each set of blocks was completed, participants completed the next decision task and then evaluated the next set of blocks of pictures. We then collected measures about covariates and ratings on the 12-item Impulsiveness Scale (Puri 1996; resulting in 33 out of 83 participants classified as impulsives and the rest as non-impulsives). Participants were then debriefed and thanked.

Results

Liking Score. Based on the liking score on the 100-point scale, an average liking score was computed for each category of pictures within each block. We subjected the average liking scores for each product category to a repeated measures mixed analysis of variance, with prime condition (hedonic versus neutral) and impulsivity (impulsive versus non-impulsive) as between-subjects variables and time of presentation for each category within a block (5 seconds versus 120 seconds versus 210 seconds) as a repeated measure across the three blocks. We also included the order of the blocks (there were six possible orders) as a between-subjects factor, in order to rule out any effects of the order in which the blocks were presented. Finally, we included state of hunger and health consciousness as covariates. For the purpose of the analysis, only the scores from the final decision task were taken into account. We assumed that any familiarity effects because of multiple exposures across the decision tasks would accrue equally to both the hedonic and the neutral condition, as all pictures had been presented an equal number of times prior to the
beginning of the third task. In order to avoid sphericity issues, we used the multivariate test statistic (Wilks’s Lambda) for all our repeated measures analyses (Vasey and Thayer 1987). We now report the results separately for sweet foods, non-sweet foods, and finally for non-foods in order to test H4 and H5.

(a) Sweet Foods. When we examine the data pertaining to sweet products, the overall repeated-measures ANCOVA showed a significant three-way between-subjects by within-subjects interaction for priming condition and impulsiveness by time interval for liking score (multivariate $F(2,56) = 6.91, p < .01, \eta^2 = .20$). This was qualified by a significant two-way interaction between impulsivity and time interval ($F(2, 56) = 9.7, p < .01, \eta^2 = .26$). None of the other effects was significant. The test of between-subjects effects showed that there was a main effect of impulsivity ($F(1, 57) = 5.23, p < .05, \eta^2 = .08$), such that impulsives reported a higher liking for the sweet products than did non-impulsives ($X_{imp} = 65.2, X_{non-imp} = 57.8$). None of the other effects, including order of presentation, was significant.

Consistent with H4a, impulsive people primed with a hedonic goal related to sweetness reported a progressively higher liking for sweet products ($\bar{X}_{5sec} = 62.5, \bar{X}_{120sec} = 66.2, \bar{X}_{210sec} = 73.7$) compared to when they were in a neutral condition ($\bar{X}_{5sec} = 61.2, \bar{X}_{120sec} = 63.9, \bar{X}_{210sec} = 63.8$). A test of within-subjects effects among impulsives revealed that there was a significant interaction between priming condition and average liking score (multivariate $F(2, 18) = 4.04, p < .05$). The linear trend for this interaction was also significant ($F(1, 19) = 6.26, p < .05$). The between-subjects main effect of priming condition was also significant ($F(1,19) = 5.6, p < .05$).

Consistent with H4b, non-impulsives showed an increase in liking immediately after being primed, but this liking declined after the delay ($\bar{X}_{5sec} = 65.3, \bar{X}_{120sec} = 57.9, \bar{X}_{210sec} = 54.5$). On the other hand, in the neutral condition, liking scores remained stable throughout
Dynamics of Impulsive Behavior

(\ \bar{X}_{5\text{sec}} = 56.6, \ \bar{X}_{120\text{sec}} = 56.0, \ \bar{X}_{210\text{sec}} = 56.2). \text{A test of within-subjects effects among non-impulsives showed a significant interaction (F(2, 35) = 2.94, } p = 0.06). \text{ The linear trend for the interaction was significant (F(1, 36) = 4.33, } p < .05).

(b) Non-sweet foods. A similar set of analyses was run for non-sweet foods such as steak, pizza, chips, etc. The repeated-measures mixed ANCOVA showed a significant three way between-subjects by within-subjects interaction between priming condition, impulsivity and time interval considering liking for non-sweet foods (multivariate F(2,56) = 2.85, } p=.06, \eta^2 = .09). This was qualified by a significant two way interaction between impulsivity and time interval (multivariate F(2,56) = 4.11, } p<.05, \eta^2 = .13) and a significant two way interaction between priming condition and time interval (multivariate F(2,56) = 2.82, } p=.06, \eta^2 = .09). Consistent with the devaluation hypothesis of Brendl et al. (2003), there was also a significant main effect of priming condition on overall liking scores such that subjects primed with the sweetness goal reported a lower liking for non-sweet foods as opposed to those in the neutral condition (\ \bar{X}_\text{primed} = 61.9, \ \bar{X}_\text{neutral} = 56.1; \text{ F(1, 57) = 3.9, } p<.05). \text{ Order of presentation did not have any significant effect either directly or in interaction with other variables.}

Further analyses among those categorized as impulsive showed that there was a significant interaction between priming condition and time interval for non-sweet foods (multivariate F(2,18) = 4.90, } p<.05, \eta^2 = .24). Impulsive people who were primed with the sweetness goal reported a progressively lower liking for non-sweet foods with time (\ \bar{X}_{5\text{sec}} = 68.4, \ \bar{X}_{120\text{sec}} = 52.1, \ \bar{X}_{210\text{sec}} = 44.1) while those who were in the neutral condition reported no such decrement in liking (\ \bar{X}_{5\text{sec}} = 63.0, \ \bar{X}_{120\text{sec}} = 63.6, \ \bar{X}_{210\text{sec}} = 62.1). \text{ The linear trend of this interaction was significant (F(1,19) = 9.45, } p<.01). \text{ Order of presentation was not significant and did not interact with any of the other variables.
There was no effect of priming the sweetness goal on liking for non-sweet foods among non-impulsive people (all Fs <1). Non-impulsive people primed with the sweetness goal reported liking scores for non-sweet foods ($\bar{X}_{5\text{sec}} = 56.9$, $\bar{X}_{120\text{sec}} = 59.3$, $\bar{X}_{210\text{sec}} = 58.5$) that were no different from those in the neutral condition ($\bar{X}_{5\text{sec}} = 60.0$, $\bar{X}_{120\text{sec}} = 60.8$, $\bar{X}_{210\text{sec}} = 61.7$).

(c) *Non-foods.* The repeated measures ANCOVA showed that priming the sweetness goal had no effect on reported liking for non-food hedonic items among either impulsive or non-impulsive people. None of the effects was significant (multivariate Fs <1, except for interaction between priming and time interval where $F(2,56) = 1.36$, $p=.27$). We thus note that there was no devaluation effect observed for products completely unrelated to the primed goal, while there was such an effect for products negatively related to the goal. Thus, hypothesis 5a is only partially confirmed. Table 2 shows the pattern of results obtained for all product categories.

Insert Table 2 about here.

*Reaction Times:* In order to test H6, we used a logarithmic transformation of reaction times to the Like/Dislike question to better accommodate outliers, and ran a repeated-measures mixed design analysis crossing impulsivity, priming condition and order as between-subjects factors and time interval as a repeated measure. The ANCOVA showed that while there were no significant within-subjects effects (all Fs <1), there was a main effect of impulsivity such that impulsives were in general faster to respond to the Like/Dislike question compared to non-impulsives ($\bar{X}_{\text{imp}} = 817$ ms, $\bar{X}_{\text{non-imp}} = 1028$ ms, $F(1,57) = 6.98$, $p<.05$). There was also a main effect of priming condition such that people primed with hedonic concepts were faster to respond compared to those in the neutral condition ($\bar{X}_{\text{primed}} = 839$ ms, $\bar{X}_{\text{neutral}} = 1001$ ms, $F(1,57) =$
4.11, \( p<.05 \)). None of the other effects including the interaction between priming condition and impulsivity was significant. H6 was thus not confirmed.

Hypothesizing that there might be differences in reaction times between those classified as moderates and those classified as prudent, we re-analyzed the data, splitting the sample into three groups, impulsive, moderate and prudent, along the lines recommended by Puri (1996).

The analysis showed that the three-way interaction between priming condition, impulsivity and time interval was now marginally significant (\( F(4, 96) = 2.22, \ p = .07 \)). None of the other within-subjects effects were significant. As before, the between-subjects analysis showed main effects of impulsivity and priming condition. Further analysis conducted only for the impulsive group showed that there were no within-subjects variations in reaction times across the three time interval conditions as a function of any of the independent factors (all F’s < 1).

However, as hypothesized in H6a, there was a significant between-subjects main effect of priming condition, such that impulsives primed with the hedonic goal reported their liking faster than impulsives not primed with the goal (\( \bar{X}_{\text{prime}} = 736 \text{ ms}, \ \bar{X}_{\text{neutral}} = 918 \text{ ms}, F(1, 19) = 5.99, p < .05 \)).

On the other hand, a similar analysis run only for the prudent group showed a significant within-subjects interaction between priming condition and time interval (\( F(2, 12) = 4.19, p < .05 \)). Prudent subjects primed with the hedonic goal were significantly faster to respond immediately after the prime but reverted to slower response times after a delay (\( \bar{X}_{5\text{sec}} = 808 \text{ ms}, \ \bar{X}_{120\text{sec}} = 1085 \text{ ms}, \ \bar{X}_{210\text{sec}} = 1252 \text{ ms} \)), while those not primed were relatively uniform and slow in their response times (\( \bar{X}_{5\text{sec}} = 1190 \text{ ms}, \ \bar{X}_{120\text{sec}} = 1015 \text{ ms}, \ \bar{X}_{210\text{sec}} = 1076 \text{ ms} \)). The linear trend for this interaction effect was significant (\( F(1,13) = 6.24, p<.05 \)). A similar analysis run only among moderates showed no significant within-subjects effects (all Fs <1). However,
there was a significant between-subjects main effect of priming such that those who were primed were faster in responding with their like/dislike reaction compared to those who were not primed ($\bar{X}_{\text{primed}} = 978 \text{ ms}, \ \bar{X}_{\text{neutral}} = 1380 \text{ ms}, \ F(1,12) = 9.76, \ p<0.01$). Thus, H6b is partially confirmed to the extent that there was a temporary facilitation in response time for prudent people immediately after being primed. However, moderates responded in a manner more consistent with impulsive people.

Response times for non-sweet and non-food products were not significantly different regardless of priming condition, impulsivity or time interval (all F’s < 1).

Discussion

The results of study 3 indicate that impulsive people primed with a hedonic goal related to the need for something sweet (via the cereal rating task) reported an increase in liking over time for sweet products such as desserts or candy. Concurrent with this increase in liking for sweet products, they also reported a decrease in liking for savory or non-sweet foods over time. However, there was no such devaluation for non-food items such as MP3 players or CDs. This increase in liking for sweet products cannot be explained by a purely cognitive account that would predict a decrease in the effect of a temporary prime over time, an effect that was obtained only among non-impulsives. A pure affect-driven explanation for impulsive behavior also cannot account for the results obtained, since no theory of affect would predict an increase over time. We thus hypothesize that there is interplay between the affective and motivational systems, such that an ongoing goal feeds back into the affective system and thus creates an appetitive liking for objects related to the goal while simultaneously creating an avoidant reaction for objects negatively related to the goal.
The advantage that priming conveyed to impulsive people in terms of facilitated reaction times suggests that there is a degree of automaticity in the process. At the least, these findings suggest that the joint operation of chronic and temporary goals enables more efficient processing, one of the dimensions of automaticity. On the other hand, we found a temporary facilitation for prudent people consistent with previous literature on cognitive accessibility. Our findings for moderates are intriguing. We suspect that there is a limited amount of motivational facilitation for those moderates who have a high score on the hedonic sub-scale. We leave this issue to be investigated in future research. In general, the data on facilitated response times for impulsive people indicates a degree of automaticity in the process, specifically with respect to efficient processing of stimuli relevant to the chronic hedonic goal. This is also an issue for further investigation in future research.

A final test of the goal-priming hypothesis lies in its manifestation in driving actual behavior. A key property of goal-driven processes is that such goals strengthen over time. Study 3 showed that this strengthening effect manifests in greater liking for products related to the goal. Study 4 investigates whether such goals might also go on to influence actual behavior.

**STUDY 4: DYNAMICS OF GOAL- AND CONSTRUCT-ACTIVATED BEHAVIOR**

In Study 4, we once again use one key property of a goal, namely, its tendency to strengthen over time (Atkinson and Birch 1970) to tease cognitive and motivational processes apart. If the prime activated a chronic goal among impulsive people, we should see an increase in tendency to act impulsively over time because the goal had not been satiated. In contrast, since non-impulsive people do not have a chronic hedonic motive, we expect that the effect of the
temporary prime will wear off and that they will revert to being non-impulsive after a delay. Thus, 

**H7:** The effect of a delay after priming will be such that there is a greater tendency towards impulsive behavior among impulsive people, while there is a decrease among non-impulsive people.

Method

Eighty-four undergraduate students at a large northeastern university participated in this study for partial course credit. Each participant completed a cereal choice task based on hedonic attributes, after which they were assigned randomly to a delay or a no-delay condition. Specifically, once participants in the delay condition completed the cereal evaluation task and the associated measures relating to task difficulty and current mood states, they had to complete a second unrelated task (embedded in the same questionnaire) that required them to find the names of eight cars from a word puzzle. A pretest among 25 participants indicated that this task took about 10 minutes to complete, and was rated moderately easy ($\overline{X} = 3.2$ on a 7-point scale anchored on “very easy” and “very difficult”). After the first task, the participant went to a second room. Placed on a table inside the room was a tray of cookies. As the experimenter ushered in the participant, he remarked that the cookies were from a departmental meeting that had just got over. The participant was left alone in the room for up to two minutes, while the experimenter pretended to get the questionnaire. Unknown to the participant, a Logitech Quickcam ProTM videocam, with a motion detector that allows the recording of any motion that is beyond a set sensitivity limit was attached to an IBM PC with its monitor turned off. The videocam was focused on the tray of cookies so that it could record whether the participant
picked up a cookie and how many. After an interval of about two minutes, the experimenter returned to the room with a questionnaire. We elicited confound check measures related to current moods, measures on impulsiveness using the Consumer Impulsiveness Scale (Puri 1996) and covariate measures on liking for cookies, extent of health-consciousness and present state of hunger.

Results

**Impulsivity.** Following the same procedure as in the previous studies, 37 of the 84 participants were classified as impulsive and the remainder as non-impulsive. A test-retest procedure was carried out four weeks subsequent to the main study where the same participants were asked to provide their self-ratings on the impulsiveness scale while participating in a completely unrelated experiment. The correlation between the two measures was 0.88, indicating stability of the trait measures.

**Confound Check.** While there were no mood manipulations, it is likely that the delay condition may have induced some marginal mood effects. We used a mood inventory adapted from the PANAS scale (Watson, Clark and Tellegen 1988) and the pleasant-unpleasant scale (Watson 1988). Participants indicated how their current mood state was on eight seven-point items anchored on “definitely do not feel” (1) to “definitely feel” (7). We subjected Posmood (sub-scale of four items: happy, contented, pleased and peppy, Cronbach’s $\alpha = 0.81$) and Negmood (sub-scale of four items: irritated, downhearted, sad and upset, Cronbach’s $\alpha = 0.79$) to a two-way MANOVA, crossing delay and impulsiveness. None of the effects were significant ($Fs < 1$). Thus, we can reasonably conclude that the delay condition did not induce any mood changes that could potentially confound the results.
Choice. Two measures of choice were used in this study. The first measure was coded as a binary variable (1 = picked up cookie; 0 = did not pick up a cookie). The second measure was the number of cookies picked up, determined from the motion video. We standardized this measure in order to reduce the possibility of a skewed distribution of people taking the cookies. Figure 1 shows the pattern of results for both incidence and intensity of choice.

A log-linear analysis on choice with hunger, health consciousness and love for cookies as covariates revealed a significant main effect of impulsivity. While only 30% of the non-impulsives picked up a cookie, 57% of the impulsives picked up a cookie (β = 1.99, Z = 2.77, p<.01). More interestingly, there was an interaction between delay and impulsivity (β = -1.84, Z = -1.97, p<.05). There was a non-significant increase in the percentage of impulsive people picking up cookies in the delay condition compared to the no-delay condition (62% vs. 52%, χ²(1) = .38, p = .54). The introduction of a delay however caused a sharp decrease for non-impulsives compared to the no-delay condition (18% vs. 48%, χ²(1) = 5.25, p < .05). None of the covariates were significant.

An ANCOVA on the number of cookies picked up (converted to a standardized Z score) indicated that impulsives picked up more cookies than non-impulsives (X_{imp} = .39, X_{non-imp} = -.26, F(1, 77) = 9.84, p < .01). Additionally, the introduction of a delay after the priming manipulation caused a significant change in behavior. There was a significant interaction between delay and impulsivity (F(1,77) = 6.41, p<.05). The standardized number of cookies picked up by impulsives increased from -.04 in the no-delay condition to 0.81 in the delay
condition ($F(1, 77) = 7.61, p < .01$). However there was no significant change in the standardized number of cookies picked up by non-impulsives ($\bar{X}_{\text{no-delay}} = -.16$, $\bar{X}_{\text{delay}} = -.35$, $F<1$). Liking for cookies was the only significant covariate ($F(1, 77) = 4.65, p < .05$). However, its interaction with other independent variables was not significant ($F$’s $< 1$). Viewed together with the results on binary choice, these data provide support for H7.

Discussion

Study 4 shows that there is an increase in the intensity of the behavior for people with chronically accessible motives. While there is no increase with delay in the percent of impulsive people picking up cookies, there is an increase in the number of cookies picked up, thereby showing that the same set of impulsive people act even more impulsively after a delay. Thus, there is a strengthening of the urge manifesting in increased behavior. This finding is in line with Atkinson and Birch (1970) who proposed that the influence of cues in the environment could have a dynamic effect on the inertial tendency to engage in a given behavior. In the absence of a countervailing force, there is not only an increase in a tendency, but also an increase in the magnitude of the activity itself. For impulsive people who have a chronic goal of gratification, temporarily activating the same goal causes the two to act in tandem in strengthening with delay.

In the case of non-impulsive people, on the other hand, we see that there is no significant decrease in the number of cookies picked up. Rather, delay after temporary activation of a construct related to sweetness causes fewer people to act impulsively. Thus, interestingly, we see two different effects of delay on behavior, one where the intensity of behavior is affected and the other where the incidence of behavior is affected.
GENERAL DISCUSSION

The results from the four studies demonstrate that impulsive behavior is driven by two mechanisms: activation of chronic hedonic goals among those who are impulsive in trait terms and activation of temporary cognitive constructs that could potentially override self-control in the short-term among those who may otherwise be called non-impulsive. Study 2 shows that trait impulsivity is associated with chronicity of hedonic goals such that inducing a feeling of incompleteness with respect to a specific hedonic goal leads to a rebound effect in terms of evaluations of products associated with the goal. It also shows that this effect does not generalize to evaluations of all hedonic products but rather only to those that are relevant to the goals that are activated. Both routes to behavior activate knowledge structures that may facilitate recall or cue accessibility, as evidenced in Study 1. Both routes also activate spontaneous affective reactions immediately upon perception of hedonic stimuli, as shown in Study 3. The differences between the two routes are most apparent when time elapses between the activation of the constructs/goals and the perception of the relevant stimuli. The goal-driven route to impulsive behavior causes an increase in affective reactions (Study 3) and a concomitant increase in the intensity of actual behavior (Study 4). In contrast, the construct activation route to impulsive behavior causes a temporary increase in liking for hedonic products that then decays to baseline levels (Study 3) and decay in behavior in terms of reduced incidence of impulsiveness (Study 4). Interestingly, the goal-driven route also leads to a devaluation of negatively related hedonic products, an effect that is not observed in the construct activation route (Study 3).

Theoretical Contributions
Together, these four studies present the argument that impulsive behaviors are a joint product of cognitive, affective and motivational factors, echoing what was proposed by Smith (1996). We suggest that trait impulsivity is characterized by the possession of chronic hedonic goals that allow for better organization and accessibility to a variety of hedonic behaviors. We also suggest that the pursuit of hedonic goals feeds back into the affective system and that it can proceed to completion relatively smoothly at least for those with chronic hedonic goals.

Our proposition is that the goal of hedonic gratification has several alternative responses associated with it, each of which may be engaged in flexibly in response to the environment. Our innate impulsivity can lead to a greater level of abstraction in the way we organize the behaviors that may satisfy the goal. Impulsive people have a better organization and clustering of hedonic behaviors regardless of whether they are being primed or not. On the other hand, non-impulsive people do not exhibit such organization in memory for hedonic behaviors when they are not primed. Thus, while a non-impulsive person may be impulsive with respect to chocolate ice cream, s/he may be able to exercise self-control when confronted with an apple pie. However, an impulsive person may have a much wider set of behaviors accessible chronically and thus may be likely to engage in any of them when the goal of gratification is triggered. There is also an increased liking for anything sweet once the hedonic goal has been activated. Thus, there is a higher likelihood that any of these sweet products could be picked up on impulse in a relevant situation. Delay causes this effect to get strengthened both in terms of liking and in terms of expression of the behavior. We also show that relevance does matter – it is not as though impulsive people primed with a hedonic goal would then go on to act impulsively in every domain. The lack of any effect on liking for non-food hedonic products such as MP3 players shows that the impulse is specific to the particular goal being primed. At the same time, there is
also a devaluation of products negatively related to the goal that is being primed as evidenced by the lower liking scores for savory products.

These results argue against a purely cognitive route to behavior. A cognitive model such as semantic priming would predict decay in the effects of accessibility with delay. Even if there is accompanying affect due to cognitive appraisal of the stimulus, no purely cognitive model would predict an increase – at best, the affective reaction would remain constant. There is clearly a need to understand the interplay among cognitive, affective and motivational forces, a point that we underscore with these findings.

Our research thus contributes to the literature on impulsive behavior by demonstrating how the cognitive, affective and motivational systems are jointly implicated in influencing behavior. We thus provide empirical support for the propositions advanced by Smith (1996). We demonstrated that currently operating hedonic goals may cause an increase in liking over time for hedonic products related to the goal that in turn leads to increased impulsive behavior. This increase in liking is efficient and fast, another characteristic of impulsivity.

Most accounts of impulsive behavior agree that it is characterized by an experience of immediate and spontaneous affect (e.g., Rook 1987). However, a given stimulus may activate several subsystems at the same time (Smith 1996). When we encounter a stimulus, our perceptual, evaluative and motivational systems are all likely to be energized. Shiv and Fedorikhin (2002) argued that low-road affective reactions might lead to goal activation that in turn leads to hedonic behavior. We provide evidence that the reverse path is also likely - goal activation may lead to increased affect that, in turn, affects behavior. Future research on behavior would need to pit motivation and evaluation against each other to see which of these gains priority in the motorium. Finally, we demonstrated that chronic and temporary hedonic goals
facilitate faster response times, a key dimension of impulsive behavior. This presents the possibility that there is automaticity in the process to the extent that behavior is efficient and effortless once it has been activated by chronic and temporary goals.

Practical Implications

Marketers and public policy makers are both likely to find the results in this paper interesting. Marketers and retailers often try to influence in-store behavior by using stimuli such as ambient scents (Mitchell, Kahn and Knasko 1995), displays, coupons, etc. Our research suggests that there are dynamic effects of such activation on behavior and underscores the importance of delay as a strategic tool for manipulating behavior. If marketers could segment customers based on their levels of impulsiveness, targeted cues aimed at activating specific hedonic goals could be given to such consumers before they enter the store. We expect such cues to have a powerful influence in driving impulsive behavior. We show that it is possible to activate chronic hedonic goals among impulsive consumers and that such activation manifests in a greater liking for products related to the goal in question and a greater intensity of impulsive behavior.

Our findings relating to the organization and accessibility of hedonic behaviors in memory for impulsive consumers point to the need for marketers to understand the structure of hedonic goals among such consumers. Specifically, it is important for marketers to develop a structural map of behaviors associated with particular hedonic goals. Knowing which behaviors are likely to be activated and which of them are likely to be devalued will enable a better targeting of messages aimed at influencing behavior.
The fact that there is a response time facilitation for impulsive people primed with temporary cues that activate hedonic goals shows that the process is relatively automatic. Public policy makers should be concerned about this particular finding. If impulsive behavior can be influenced so efficiently and automatically to the extent that there may even be overindulgence, there is potential for a deleterious impact on social welfare. In an era of binge drinking and binge eating, any data pointing to the likelihood of consumers being influenced in an automatic fashion should be cause for concern. Further research needs to be done on how controllable such behaviors are when people become aware of what is guiding their behavior.

Areas for Future Research

The four studies reported this research demonstrate consistently that impulsive behavior is driven by the activation of constructs and goals that then proceed to create affective reactions to stimuli. Nonetheless, the studies harbor a few limitations that future research can possibly address. First, we document an increase in impulsive behavior with delay of up to 5 minutes. We do not have any evidence regarding what could happen after longer periods of delay. It is likely that the increase in behavior plateaus after some time. Future research could address this more explicitly.

It would also be interesting to examine what happens when currently operating hedonic goals are frustrated. Past work on goal frustration has shown that people are likely to ruminate extensively when they are prevented from attaining their goals (e.g., Martin and Tesser 1989). Research has also shown that people with chronic goals find alternate routes to goal-attainment (Bargh 1990). Thus, would presenting impulsive people with alternative means of reaching a hedonic goal lead to a dampening of ruminations after frustrating the original goal?
Another question is whether non-impulsive people have similar chronic motives to be prudent and whether such motives would operate in the same way if primed, except to cause a greater tendency to favor a healthy good among both impulsive and non-impulsive people. It is not clear whether health- and hedonic-related motives map onto each other orthogonally and whether non-impulsives are likely to behave automatically under such circumstances. However, we do expect a prudent choice to be possible under such a temporarily primed goal.

Finally, as we suggested earlier, it is likely that several processes may be simultaneously at play when a stimulus is encountered. There is very little research on how multiple automatic processes may operate. Future research could examine interaction between multiple automatic processes such as evaluation and motivation to see which of these get precedence. For example, would people act impulsively if they have an active goal of gratification, but the stimulus object is automatically evaluated negatively (e.g., a less than appetizing display)? Manipulating the strength of the opposition of these two processes may enable us to decompose the processes.
TABLE 1

Study 2: Correlations of hedonic and prudent sub-scale scores with difference scores

<table>
<thead>
<tr>
<th>Sub-scale</th>
<th>Difference Scores for Each of the Product Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sweet</td>
</tr>
<tr>
<td>Hedonic</td>
<td>-.49**</td>
</tr>
<tr>
<td>Prudent</td>
<td>.28*</td>
</tr>
</tbody>
</table>

** * p < .01
*  p < .05
### TABLE 2
Study 3 Results

<table>
<thead>
<tr>
<th>Impulsivity</th>
<th>Delay</th>
<th>Mean Liking Score</th>
<th>Mean Liking Score</th>
<th>Mean Liking Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Sweet (100 point scale)</td>
<td>Savory (100-point scale)</td>
<td>Non-foods (100-point scale)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Neutral</td>
<td>Primed</td>
<td>Neutral</td>
</tr>
<tr>
<td>Impulsive</td>
<td>5 sec</td>
<td>61.2</td>
<td>(3.94)</td>
<td>62.5</td>
</tr>
<tr>
<td></td>
<td>120 sec</td>
<td>63.9</td>
<td>(4.40)</td>
<td>66.2</td>
</tr>
<tr>
<td></td>
<td>210 sec</td>
<td>63.8</td>
<td>(4.19)</td>
<td>73.7</td>
</tr>
<tr>
<td>Non-Impulsive</td>
<td>5 sec</td>
<td>56.6</td>
<td>(2.74)</td>
<td>65.3</td>
</tr>
<tr>
<td></td>
<td>120 sec</td>
<td>56.0</td>
<td>(3.06)</td>
<td>57.9</td>
</tr>
<tr>
<td></td>
<td>210 sec</td>
<td>56.2</td>
<td>(2.92)</td>
<td>54.5</td>
</tr>
</tbody>
</table>

Note. Figures in parentheses are standard deviations.
FIGURE 1
Study 4: Incidence And Intensity Of Impulsive Behavior

Incidence of Impulsive Behavior

![Graph showing incidence of impulsive behavior with delay condition.]

Intensity of Impulsive Behavior

![Graph showing intensity of impulsive behavior with delay condition.]

- **Incidence of Impulsive Behavior**
  - No Delay: Impulsive = 62, Non-Impulsive = 18
  - Delay: Impulsive = 52, Non-Impulsive = 48

- **Intensity of Impulsive Behavior**
  - No Delay: Impulsive = 0.81, Non-Impulsive = -0.35
  - Delay: Impulsive = 0.81, Non-Impulsive = -0.04
APPENDIX A
Study 1 – List of behaviors on recall protocol

Meditating about your life
Listening to music
Working out at the gym
Eating chocolate ice cream
Watching a TV drama
Taking an afternoon nap
Tasting Mom’s homemade cookies
Lying down on the couch
Going on a diet
Reading a best-seller
Buying a box of candies
Taking a warm bath
Playing a game of tennis
Playing a video game
Drinking diet soda
Eating a piece of cheesecake
APPENDIX B
Study 2 – List of tempting situations

For each of the following four situations, please indicate which answer is the most reasonable response to the situation by circling it. Circle only one answer even if you think more than one answer seems to be right.

**Situation 1:** Pam goes to Nordstrom’s and sees a very attractive sweater on display.

1. It is important to save for a rainy day and Pam certainly believes in this.
2. It is important to prioritize spending and Pam just doesn’t want to spend money on indulgences like sweaters when they are other more important things to buy.
3. It is important not to yield to temptation and Pam is a prudent person.

**Situation 2:** John is standing in line at Starbucks and sees those delicious muffins on display.

1. Muffins add unnecessary calories and John is health-conscious.
2. John does not care to be called impulsive – he considers muffins an unnecessary temptation.
3. Too much sugar is bad for the teeth and John does not want to spend money on or go through the ordeal of visiting a dentist.

**Situation 3:** Kate has an examination the next day, and her friends call her with tickets to the latest movie featuring her favorite star.

1. Kate values long-term rewards of doing well on an exam higher than the short-term rewards of being entertained.
2. Kate hates to procrastinate – she wants to get her work done right away rather than waste time.
3. Kate has a strong willpower – she does not give in to urges easily.

**Situation 4:** David is considering buying a car and is debating whether to go for a standard model with all the utilitarian features he wants in a car or for a premium model with leather, Bose speakers, heated seats, heated steering wheel, etc.

1. David is a rational man – he recognizes that premium features cost a lot of money.
2. David is a planner – he likes to plan his expenses and go with what is absolutely necessary.
3. David acts on what his head says, not on what his heart says.
REFERENCES


__________ (2002), “Spontaneous versus Controlled Influences of Stimulus-Based Affect on Choice Behavior,” *Organizational Behavior and Human Decision Processes*, 87(March), 342-370.


