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The Dilution Model: How Additional Goals Undermine the Perceived Instrumentality of a Shared Path

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Six experiments tested a dilution model of self-regulation, whereby increasing the number of goals (e.g., building muscles and losing weight) that a single means (e.g., exercising) can satisfy reduces the perception of its instrumentality with respect to each goal. The authors found that an increase in the number of simultaneous, salient goals that can be satisfied via a single means weakens the associative strength between that means and each individual goal, and as a result, individuals perceive the means as less effective for the attainment of each goal. Consequently, means that are connected to multiple (vs. single) goals are less likely to be chosen and pursued when only one of these goals is activated.

Keywords: goal systems, self-regulation, associative network, dilution

In the course of self-regulation, a single means is often used to achieve several and potentially unrelated goals. For example, a person who desires a cup of coffee and a sandwich can attend a shop that serves them both, or a person who requires a pen to take notes and a laser pointer to make presentations may decide to purchase a pen that can also be used as a laser pointer. A question that arises is how learning that one's coffee shop also serves sandwiches would influence one's judgment of the quality of the coffee and the subsequent readiness to get coffee there when a sandwich is not desired. Similarly, how realizing that a pen can also be used as a laser pointer influences one's evaluation of the pen's writing function and the likelihood that one would use this particular pen when needing to take notes. In the present article, we consider the general question of how adding more salient goals to a given means affects the individual's evaluation of the means' instrumentality and the motivation to use it when one only of these goals is activated.

In contrast, adding more goals (e.g., getting coffee and sandwiches) to a single means of attainment (attending a coffee shop) increases the value of that means because it maximizes the gains from this particular action or object (Thompson, Hamilton, & Rust, 2005; Tversky & Kahneman, 2002). However, adding more goals to a single means decreases the strength of association between this means and any associated goal (e.g., the association between the coffee shop and getting coffee), which, in turn, may decrease the inferred instrumentality of the means with respect to a specific goal that an individual may be pursuing. As a result, the tendency to pursue a means would be lower if the activated goal was one of several objectives associated with the means because the expectancy of goal fulfillment, based on inferred instrumentality, is reduced. We investigate this possibility in the present research, based on a dilution model of goal pursuit, whereby adding more goals to a single means reduces the perception of its instrumentality with respect to the goal in question.

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The Structure of Goal Systems

The present prediction is grounded in a general conceptualization of goals as knowledge structures (Kruglanski, 1996). We assume that people's everyday choice of actions is driven by the mental representation of goals that they chronically hold or that are elicited by contextual cues in a given situation (e.g., Aarts & Dijksterhuis, 2003; Bargh, Gollwitzer, Lee-Chai, Barndollar, & Trötschel, 2001; Cantor & Langston, 1989; Gollwitzer & Moskowitz, 1996; Markus & Ruvolo, 1989). Such goals are typically associated with various means that can promote their attainment. For example, the goal of traveling may be associated with the means of catching a flight and the goal of staying in shape with the means of jogging. The cognitive organization of goals and their related means was recently explored by research on goal systems theory (e.g., Fishbach, Friedman, & Kruglanski, 2003; Fishbach, Shah, & Kruglanski, 2004; Kruglanski et al., 2002; Shah & Kruglanski, 2003). This theory assumes that goals follow the general principles that govern other cognitive constructs (e.g., semantic concepts) and that, therefore, goal-driven phenomena may be illuminated via the use of cognitive methods and on the basis of cognitive theories.

According to goal systems theory, goals are organized in associative networks (Anderson, 1983; Anderson et al., 2004), connecting higher order goals with lower level means of attainment. Goals can become accessible through spreading activation either from a higher, overarching goal or from a lower order attainment means (Bargh & Gollwitzer, 1994; Chartrand & Bargh, 1996; Higgins, 1996; Shah & Kruglanski, 2003). Each goal may be associatively linked to several attainment means. Similarly, each means may be connected to several goals that it can potentially

serve (Aarts & Dijksterhuis, 2000; Bargh & Ferguson, 2000). For example, the goal of having a good figure may be connected with the means of eating healthy food and exercising, and the means of exercising may be connected with goals of having a good figure and leading a healthy lifestyle. When multiple goals are connected to a single means, they collectively define the value associated with that particular means.

On the basis of the associative model of goals, we further assume that the perceived instrumentality of a given means to goal attainment is determined by the strength of the association between the means and the goal, with stronger associations leading to higher perceived instrumentality (e.g., Shah & Kruglanski, 2003). Because an efficient means is likely to be used often, which strengthens its association with the goal, individuals may assume that the opposite direction of causality also holds and infer that a stronger association between a means and a goal attests to greater efficacy. But what factors determine the degree of such an association?

Determinants of Associative Strength and Means Instrumentality

The associative strength linking a goal and a means—and the resulting perceived instrumentality of the means—may be determined by several factors. First, it may depend on the *number and frequency of instances* in which the two entities (the goal and the means) have appeared together in the past (cf. Meyer & Schvaneveldt, 1971, 1976). Although creating a connection between a means and a goal, in the first place, does not necessarily require repeated co-occurrence, and means and goals may also become initially associated as a result of a single act of volition (Gollwitzer, Bayer, & McCulloch, 2005), association strength between a means and a goal is expected to increase as a function of the frequency of past co-occurrence. In turn, as noted earlier, the strength of association should increase the means' perceived instrumentality with respect to goal attainment.

Second, according to the dilution model, the means–goal associative strength may further depend on the *uniqueness of the association*, that is, on the number of additional means related to the goal or the number of additional goals related to the means (Shah & Kruglanski, 2003). According to a spreading activation model (Anderson, 1983; Anderson & Bower, 1973), as the number of associations attached to a mental construct increases, each association becomes weaker, as demonstrated by a lower retrieval rate of the associated target when the central construct is activated. With regard to the means–goal relationship, when several goals are attached to a means, the activation by the means of any one of those goals is impeded, and the goal does not come to mind as readily when the means is presented. This leads to an inference that the means is less instrumental with respect to the goal. Phenomenally, this could mean that when several goals are attached to a means (vs. the means being associated with a single goal), the means should evoke a weaker expectancy that the goal will be attained.

In a similar manner, it was recently shown that means attainment is experienced in a similar way as the attainment of the goal that the means is assumed to serve and that the magnitude of "affective transfer" from goals to means depends on the number of means related to the focal goal: Adding more means to a given goal reduces the goal-imbued affective experience of the means (Fishbach et al., 2004), presumably because of a diluted associative connection between the goal and the means. In the present series of studies, we explored the opposite direction of dilution, resulting from adding more goals to a given means (rather than adding more means to a given goal), which should lead to lower perceived instrumentality or expectancy of goal attainment.

Third, the dilution model further proposes that the strength of the means–goal association depends on the extent to which the goals simultaneously connected to certain means subjectively differ from each other. The more distinctive, or different from each other, those goals are perceived to be, the stronger should be their tendency to undermine each other's association with the shared means. Vice versa, the more similar, overlapping, or mutually facilitating the goals appear to be, the less their joint presence is likely to weaken their associative strength with the shared means. That may be so because if the goals are similar, then one of them activates the other, and as a result, if one of the goals is activated by the means, then the other would be activated as well. This tendency may counteract the dilution effect and cancel its impact. Thus, even though the activation of any one goal by the means may be weakened by the linkage between that particular means and a second goal, the activation of that second goal may spread to the first goal if the two are similar. But if the goals are dissimilar, activation of one goal only dilutes the association between the means and another goal.

Preference for Means and Means Choice

An important challenge people face in the course of self-regulation is to choose the best means for the goals they hope to attain, and one of the determinants of a person's preference for certain means can be the number of goals it can satisfy. People often simultaneously hold multiple goals they hope to accomplish (Cantor & Langston, 1989; Emmons & King, 1988; Fishbach & Dhar, 2005), and they may wish to maximize goal attainment by choosing means that serve more than a single goal. For example, a person who holds commuting and exercising goals may choose to commute by bike. Holding the original goal constant, the fact that a means can satisfy additional goals often renders the means more attractive (Köpetz, Fishbach, & Kruglanski, 2006; Thompson et al., 2005). The preference for means that are "multifinal" in the sense of serving more than a single goal is further normative (e.g., von Neumann & Morgenstern, 1947) because preferences are based on the total expected utility of means with respect to the attainment of valuable goals. Yet, the multifinality of a means may exact a price when only one of its associated goals is activated. Specifically, the preference for the means may be reduced by the nonuniqueness of its relations to a given goal one hopes to accomplish (Kivetz & Simonson, 2003; Shafir, Simonson, & Tversky, 2000).

A preference for a means that satisfies a single (vs. multiple) goal was demonstrated in previous studies in which irrelevant goals decreased the preference for a multifinal means instead of having no influence on such a preference as a normative model would predict (Kivetz & Simonson, 2003; Simonson, Nowlis, & Simonson, 1993). Thus, for example, research participants were less interested in a multifinal means selected by another person if the choice was based on a goal that was unique to that person but

irrelevant for the participant. For instance, participants were less likely to choose to study in Chicago if they read that another person expressed a preference for Chicago schools because that person (but not the participants) had family in the city. Similarly, participants expressed a lower preference for a brand of ice cream preferred by another person if the latter's preference had to do with the fact that the ice cream was kosher and participants did not adhere to a kosher diet themselves (Simonson et al., 1993). According to a normative analysis, learning that another person has family in Chicago or follows a kosher diet should not influence one's preference for the city or the ice cream brand. However, it appears that once a means (e.g., consuming a given brand of ice cream) is seen to serve multiple goals (e.g., of tastiness and the satisfaction of religious standards), it becomes less attractive for individuals who do not subscribe to the same goals.

Previous research thus demonstrates a preference for means that serve fewer goals, rather than more goals, granting that the additional goals are irrelevant for the individual (Kivetz & Simonson, 2003). Whereas existing works assume that only irrelevant goals decrease the preference for a common means, our dilution model predicts similar effects with regard to relevant goals as well, providing that some of such goals are not actively pursued at the moment. According to our model, then, the lower preference is explained by the decrease in perceived instrumentality of the means, resulting from the dilution of means–goal association by the additional goal. Furthermore, a dilution model predicts that the decrease in the perceived instrumentality of the means will depend on the degree of distinctiveness between the multiple goals associated with a given means because similar or overlapping goals may not reduce their association to a common means as extensively as do distinct goals.

The Present Research

The aforementioned predictions were tested in six experimental studies. We manipulated the number of goals attached to a given means, the goals' distinctiveness, and the strength of association between the means and the additional goals. The main dependent measure of present interest was the perceived instrumentality of the means with respect to the focal goal. In Studies 1 and 2, we tested the general hypothesis that an increase in number of salient goals decreases the perceived instrumentality of the means for any specific goal attainment, with Study 1 using experimenter-provided goals and Study 2 using self-generated goals. In Study 3, we tested whether perceived goal distinctiveness moderates the degree of the dilution effect. In Study 4, we tested whether the strength of the association between the means and one goal influences perceived instrumentality of the means to another goal. We further assessed in Study 5 whether the associative strength (i.e., the degree to which the means primes the goal) mediates the effect of goal number on perceived instrumentality of means for goal attainment. Finally, we used a choice measure in Study 6 to examine whether the dilution-induced changes in perceived instrumentality correspond to changes in preference for a given means when it came to actual goal pursuit.

Study 1: Adding Goals to a Means

The purpose of Study 1 was to demonstrate that perceived instrumentality of a means for goal attainment diminishes as the number of goals connected to the means increases. By associating a means with either one or two goals, we expected to change participants' perceived instrumentality of the means with respect to the attainment of any one of those goals.

Method

Participants

Ninety-seven University of Chicago undergraduates (43 women, 54 men) participated in the study in exchange for $2. Participants' gender showed no significant effects on our dependent variables here and in following studies; hence, it is disregarded in subsequent discussions.

Procedure

This study used a 2 (goal number: one vs. two) × 3 (means domain: aerobic exercise vs. consuming tomatoes vs. withdrawing from caffeine) mixed design, with goal number manipulated between subjects and means domain within subjects. Participants were invited to participate in a study on how people acquired health-related information from scientific articles, and they were told that they would read three short essays and answer a few questions following each essay.

Three short essays (about 80 words each) discussed aerobic exercise, consumption of tomatoes, and withdrawing from caffeine, respectively. In each essay, there was one sentence that described how each of those means may satisfy one or two goals. The first essay discussed how aerobic exercises could contribute to people's health. In the one-goal condition, the essay read:

> Regular aerobic exercise helps protect you from heart disease. For the greatest overall health benefits, experts recommend that you do 20 to 30 minutes of aerobic activity three or more times a week and some type of muscle strengthening activity and stretching at least twice a week. However, if you are unable to do this level of activity, you can gain substantial health benefits by accumulating 30 minutes or more of moderate-intensity physical activity a day, at least five times a week.

In the two-goals condition, the first sentence was replaced with "Regular aerobic exercise not only helps protect you from heart disease, but also helps maintain healthy bones." In order to counterbalance the content of the first and second goals, half the participants in the one-goal condition read that a regular aerobic exercise "helps maintain healthy bones," and half of participants in the two-goals condition read that aerobic exercise "not only helps maintain healthy bones, but also helps protect you from heart disease." After reading their essay, participants were asked to rate the extent to which aerobic exercise was effective in pursuing the first goal listed (prevent heart disease or maintain healthy bones) on a 7-point scale ranging from 1 (*not at all*) to 7 (*extremely*). This question was embedded among four filler items.

The same procedure was then repeated for the other two essays on the consumption of tomatoes and on withdrawing from caffeine. The essay on consumption of tomatoes described tomatoes as being able to either "prevent heart cancers" or "prevent degenerative disease of the eye" (in the one-goal condition) and as being able to prevent both (in the two-goals condition). The subsequent question, embedded among other filler questions, asked participants to rate the extent to which tomatoes were effective in attaining the first goal listed. Finally, the essay on withdrawing from caffeine described how caffeine could cause either one or two types of health risk. In the one-goal condition, consumption of caffeine was described as an activity that would "increase the risk of cardiovascular disease" or "reduce fertility in people trying to conceive," whereas in the two-goals condition, caffeine consumption was described as causing both. Subsequently, participants rated the extent to which caffeine causes the

first risk listed. This question (reverse coded) was designed to assess the perceived instrumentality of withdrawing from caffeine to preventing the first listed risk. After completing the survey, participants were debriefed and dismissed.

Results and Discussion

The ratings of means' effectiveness were analyzed as a function of Goal Number × Means Domain × Counterbalancing Condition. An analysis of variance (ANOVA) of this variable yielded a main effect for goal number, $F(1, 93) = 6.03$, $p < .05$, indicating that additional goals attached to a single means decreased the perceived instrumentality of the means in satisfying the first goal (Ms = 5.14 and 4.68, for one goal and two goals, respectively). Furthermore, as expected, there was no effect for goal domain or counterbalancing condition, and there was no interaction involving these factors (Fs < 1). Results from all three goal domains displayed the same pattern (see Figure 1).

Above results provide initial support for our hypothesis that an increase in the number of goals connected to a given means decreases the perceived instrumentality of the means to the focal goal. More important, we found this effect to be consistent across domains and independent of the content of the means or of the goals. This initial demonstration, however, is somewhat limited because participants may have been relatively unfamiliar with the functionality of the means. It was therefore possible that they made inferences on the basis of a conversational norm that if more goals are mentioned when discussing a certain means, then it is because the means may not be particularly effective in serving any of them. In addition, in Study 1, the sheer amount of information was greater in the two-goals (vs. one-goal) condition, and therefore it was possible that adding any information (regardless of its goal status) led to decreased effectiveness via a distraction mechanism. To address these limitations, in Study 2 we presented participants with means and asked them to generate the goals, controlling for the amount of information presented.

Another objective of Study 2 was to test a related prediction of the dilution model, namely, that considering goals that a means cannot attain would highlight the uniqueness of the means–existing-goal association and therefore increase the perceived means instrumentality. Because increasing the number of goals that a means can attain (in Study 1) weakened the perceived instrumentality of the means for each goal, we reason that adding goals that a means cannot attain should highlight, via a contrast mechanism, the perceived instrumentality of the means for the goal that it can attain.

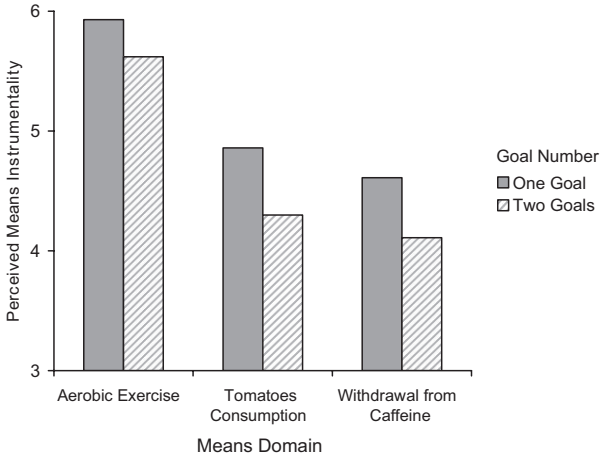

Figure 1. Perceived instrumentality of means for the first listed goal as a function of goal number.

Study 2: Effectiveness of Means for Self-Generated Goals

Study 2 instructed participants to self-generate a goal for a given means and, depending on experimental conditions, provide several adjectives that describe the means (single-goal condition), several additional goals that the means can serve (multiple-goals condition), or several goals that the means cannot serve (unique-goal condition). We reasoned that, compared with listing control adjectives, generating additional goals would decrease the perceived instrumentality of the means to the original goal, and generating two nonservable goals would increase the perceived instrumentality of the means to the original goal.

Method

Participants

Eighty-six University of Chicago undergraduate students (36 women, 48 men, and 2 who did not report their gender) participated in the study in exchange for $2.

Procedure

This study used a 3 (goal number: unique goal [+ nonservable goals] vs. single goal [+ non-goal-type adjectives] vs. multiple goals) × 3 (means: library vs. college vs. laptop) mixed design, with goal number manipulated between subjects and means within subjects. Participants read that the study concerned how people made use of some school-related objects in their daily lives. They were asked to consider three "means" that college students were familiar with—library, college, and laptop—and to self-generate a different number of goals that each of these means could serve before assessing the effectiveness of the means for goal attainment.

In the library-as-means section, participants in the unique-goal condition were asked to list one thing that they could accomplish in the library and two things that they could not accomplish in the library. Participants in the single-goal condition were asked to list one thing that they could accomplish in the library and then two colors (non-goal-type information) that could best describe the library. Finally, participants in the multiple-goal condition were asked to list three things that they could accomplish in the library. Participants' listed goals included, for example, doing homework, getting books, and reading.

Next, participants in all three conditions rated the effectiveness of visiting the library for accomplishing the goal/s they had listed on 9-point scales ranging from 1 (*not at all*) to 9 (*extremely*). Participants in the unique-goal condition and single-goal condition evaluated the effectiveness of the library for accomplishing the single goal they listed, whereas those in the multiple-goals condition were provided with three scales and rated the effectiveness of the library for achieving each one of the three listed goals (the dependent variable of interest was the means effectiveness for the first listed goal).

Similarly, in the college-as-means section, participants listed one goal served by attending college plus two nongoals, one goal plus two colors that characterized college, or three goals that they intended to attain by attending college (e.g., "getting good education," "making friends," and "enjoying the city"). They then indicated how effective attending college

was for achieving each of the goal(s). In the laptop-as-means section, participants listed one thing they could do using a laptop plus two things they could not do using a laptop, one thing that they could do using a laptop plus two colors that describe most laptops, or three things they could do using a laptop (e.g., typing homework, checking e-mail, and watching DVDs). Participants then reported the effectiveness of a laptop in delivering each of their listed goals. All effectiveness ratings were made on 9-point scales. After completing all three parts, participants were debriefed and dismissed.

Results and Discussion

The ratings of instrumentality of means for the first listed goal were analyzed as a function of Goal Number × Means Domain. An ANOVA of this variable yielded the predicted main effect for goal number, $F(2, 83) = 7.13$, $p < .01$. As shown in Figure 2, when participants listed one goal that the means satisfied and two goals that the means could not satisfy (unique-goal condition), the means seemed more effective ($M = 8.23$) for the attainment of the original goal than when they listed one goal that the means satisfied and two colors that described the means (single-goal condition; $M = 7.80$), $t(54) = 2.34$, $p < .05$, which, in turn, seemed more effective compared with when they listed three goals that the means satisfied (multiple-goals condition; $M = 7.03$), $t(58) = 2.16$, $p < .05$. All three domains displayed the same pattern. It appears that compared with generating only one goal that the means satisfies, generating three goals the means satisfies leads participants to believe the means is less effective in satisfying the first listed goal; however, generating two goals that the means cannot satisfy leads participants to believe the means is more effective in satisfying the first listed goal, presumably because these additional goals highlight the instrumentality of the means for the first goal.

The ANOVA also yielded a main effect for domain, $F(1, 83) = 6.41$, $p < .05$, indicating that participants perceived enrolling in college ($M = 8.01$) was more effective than using a laptop ($M = 7.77$), or visiting the library ($M = 7.21$), for the attainment of their respective goal. The Goal Number × Domain interaction was nonsignificant ($F < 1$, *ns*), suggesting that the main effect of goal number was independent of the content of the means.

Results of Study 2 support the dilution model in a situation in which the amount of information associated with the means remained constant, but the content of the information varied. Retrieving additional goals that the means can serve and that potentially compete with the focal goal attainment highlights other functional associations attached to the same means, which weakens the association between the means and the original goal and decreases its perceived instrumentality for goal attainment. In addition, Study 2 demonstrates that retrieving goals that the means cannot serve strengthens the perceived uniqueness of the means–goal association, leading people to perceive the means as more effective in contributing to goal attainment.

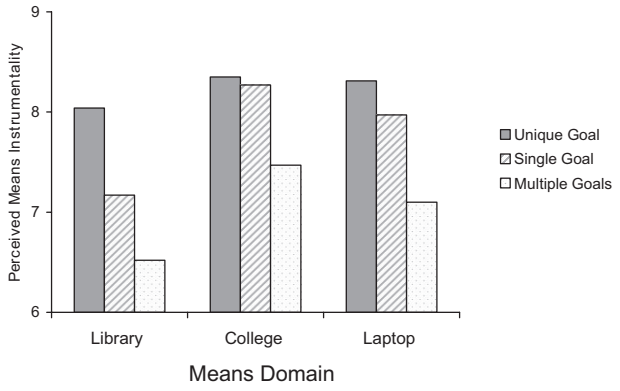

Figure 2. Perceived instrumentality of means for the first listed goal as a function of number and type of additional goal.

According to the dilution hypothesis, the degree of dilution of the means–goal association is related to the uniqueness of the association, and it should be most pronounced if the additional goals are dissimilar and unrelated to the original one. When two goals are similar (vs. dissimilar), the dilution of the means–goal association should be less because the additional goal is connected with the original goal and can activate it, thus counteracting the dilution effect. Our next study was designed to examine this possibility.

Study 3: Goal Distinctiveness

In the present study, we manipulated the perceived distinctiveness of two goals with respect to each other by asking participants to elaborate on what makes these goals similar or different, and we measured the perceived efficacy of the means for attaining each goal. By asking participants to elaborate on how the same two goals are either similar or different, we sought to demonstrate the effect of perceived distinctiveness independently of goal content (i.e., the amount of actual feature overlap between the goals).

Method

Participants

Fifty-four University of Chicago undergraduates (30 women and 24 men) participated in the study in exchange for $2.

Procedure

A high- versus low-perceived distinctiveness between-subject design was used in the present experiment. Participants were asked to take part in an experiment on people's understanding of scientific articles, and their task was to read a scientific essay and answer a few questions about its content. The essay that participants read was about organic food (about 300 words in length). It provided the definition of organic food and described that the main goals of eating organic food were to (a) reduce the health risks related to use of chemicals and (b) get more nutrition from the food.

After having perused the essay, participants went on to the reading comprehension section. Half the participants, in the low-distinctiveness condition, were asked to describe in their own words how the goals of reducing health risks and getting more nutrition were similar to each other (they wrote, for example, that "both are ways to get people healthier" and "by reducing health risks. your body is less likely to fall to some diseases; likewise, getting more nutrition decreases the likelihood of a person becoming ill"). The other participants, in the high-distinctiveness condition, were asked to describe how these two goals differed from each other (they wrote, for example, that "getting more nutrition does not necessarily reduce health risk" and "reducing health risks is avoiding toxins; getting more nutrition is seeking out more nourishing elements").

Finally, participants in both conditions evaluated the extent to which organic food was (a) effective for reducing health risks and (b) effective for

getting more nutrition (between 1 = *not at all* and 9 = *extremely*). These questions were embedded among six filler questions (e.g., "How necessary is it to regulate the use of the term organic in food labeling?"). After completing the survey, participants were debriefed and dismissed.

Results and Discussion

Effectiveness ratings were analyzed as a function of perceived distinctiveness and goal ordinal position (first vs. second). An ANOVA performed on these results yielded main effects for perceived distinctiveness, $F(1, 52) = 3.16$, $p = .05$, and for goal, $F(1, 52) = 8.10$, $p < .01$. That is, for both goals, participants who described how the two goals were similar perceived the means to be more effective than participants who described how the two goals were different (see Figure 3). In addition, participants perceived the means to be more effective for the first goal they read about ($M = 6.89$) than for the second goal ($M = 6.48$), $t(53) = 2.84$, $p < .01$, suggesting that reading about a goal initially (vs. subsequently) resulted in stronger means–goal association, and hence greater perceived instrumentality. Finally, as predicted, the interaction between perceived distinctiveness and goal (first vs. second) was nonsignificant ($F < 1$).

We manipulated the perceived distinctiveness of goals without changing goal content, which allowed us to demonstrate the role of goal distinctiveness on the dilution of functional associations. We find that the more distinctive two goals are, the more pronounced the dilution effect. Our next experiment tested an additional implication of our analysis. Recall that our model predicts that the change in perceived instrumentality of means is caused by the dilution in the strength of the means—original-goal association—prompted by the addition of further goals. In the next experiment, we sought to explore this assumed process more directly by manipulating the strength of the association between the additional goal and the focal means. We expected that the stronger the degree of association between a means and an additional goal, the lower the perceived instrumentality of the means with respect to the original goal.

Study 4: Associating Means With an Alternative Goal

This study presented participants with the means of jogging that serves two separate goals: increasing the oxygen in the blood and strengthening various muscles. We hypothesized that by enhancing the association between jogging and strengthening the muscles, we would dilute the association between jogging and the increasing-oxygen goal; in turn, this should decrease the perceived instrumentality of jogging for the attainment of the latter goal.

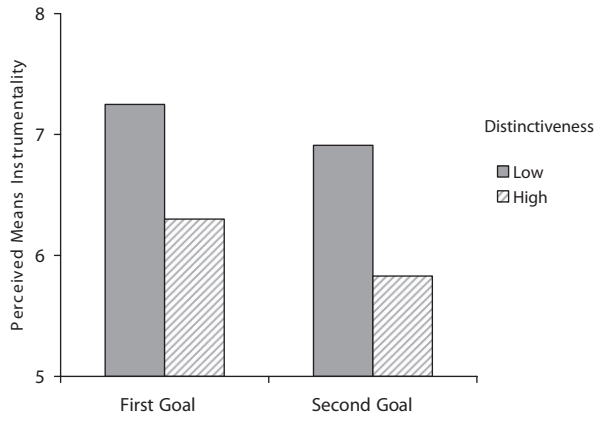

Figure 3. Perceived means instrumentality as a function of goal distinctiveness.

We enhanced the strength of the means–goal association by subliminally flashing words related to the goal of strengthening muscles (i.e., *muscle*) before presenting words related to the means of jogging (i.e., *jogging*) in a sequential priming task. In the control condition, the same procedure was repeated, with the exception that the target means-related words were preceded by control subliminal primes. Participants then assessed the effectiveness of jogging for serving the goal of increasing oxygen level in the blood as well as for that of strengthening muscles. We predicted that enhanced jogging, strengthening–muscles association, would increase the perceived instrumentality of jogging for that particular goal and, more importantly for the present purpose, would decrease the perceived instrumentality of jogging for the increasing-oxygen goal.

Method

Participants

Seventy University of Chicago undergraduates (32 women and 38 men) participated in the study in exchange for $4.

Procedure

This study used a 2 (means–goal association: baseline vs. strengthened) between-subjects design. Participants were asked to take part in a study on "scientific reading" and were informed that the study concerns people's understanding of scientific reading after a time delay. The entire study was completed on a computer and included three sections: reading a scientific essay, performing a sequential priming task, and rating means' effectiveness.

Participants were first instructed to carefully read a short essay that described the benefits of jogging. The essay described jogging as capable of satisfying two separate goals. Specifically, participants read the following passage:

> Jogging is a poorly-defined term which generally refers to a type of slow running, previously called "roadwork" of athletes in training, such as boxers. Jogging is a "high-impact" exercise that places strain on the body, notably the joints of the knee. The main goals of jogging are to increase the oxygen level in the blood and to strengthen various muscles.

Participants then moved on to an alleged filler "word judgment" task that presumably was incorporated in order to separate the reading and the comprehension questions. The real purpose of the task was to manipulate the strength of the association between the means (jogging) and the "muscle-strengthening" goal. Onscreen instructions informed participants that in this word judgment task, they would be presented with some letter strings and their task was to judge as quickly as possible whether each letter string was a word or not. The task included 100 trials, with an equal number of words and nonwords as target letter strings. Each target letter string was paired with another word, which was presented subliminally before the appearance of the target letter string. In 12 of the 100 trials, the target letter string was the means discussed in the essay (*jogging*). In the strengthened-association condition, the word *muscle* (i.e., the second goal discussed in the essay) was subliminally primed each time before *jogging* was presented as the target letter string. In the baseline condition, the target

jogging was paired with control words such that on 12 trials, participants categorized the letter string *jogging* following a subliminal presentation of irrelevant words (e.g., *desk*). Using this procedure, we administered the same number of trials using the means as a target in both conditions; however, the means was associated with the "muscle" goal only in the strengthened-association condition and with control words in the baseline condition. The remaining 88 trials were identical in both conditions and used irrelevant words or nonword letter strings as targets. To further conceal the purpose of the word judgment task, we also included a similar repetition of target letter strings among those filler trials.

On each trial, a fixation point (a "*plus*" sign) appeared at the center of the screen for 300 ms. Participants were asked to focus their attention on this sign. The fixation point was then replaced by a prime word, presented for a brief period of 30 ms and was then replaced by a masking string (a row of *X*s) to ensure that it did not reach the threshold of conscious perception (e.g., Bargh & Chartrand, 2000). After another 150 ms, the masking string was replaced by the target letter string, resulting in a stimulus onset asynchrony (SOA) of 180 ms. Participants' task was to classify the target words as either a word or a nonword, using the *Z* and "*slash*" keys, respectively. Each response was followed by a 700-ms pause before the next trial. Participants completed eight practice trials before commencing the main part of the task.

Following the sequential priming task, participants turned to their final assignment, which was to answer a few questions about the content of the essay they had read. Participants then evaluated how effective the means ("jogging") is for attaining each of the specified goals. Specifically, participants rated (a) how effective jogging is for increasing the level of oxygen in the blood and (b) how effective jogging is for muscle strengthening. The order of these questions was counterbalanced, and they were embedded among six filler questions (e.g., "How well is the term jogging defined?"). All answers were recorded on 9-point scales ranging from 1 (*not at all*) to 9 (*extremely*). After completing the survey, participants were debriefed and dismissed. No participant reported being aware of the subliminal primes in the sequential priming task.

Results and Discussion

Manipulation Check

In order to lessen the influence of outliers, all individual reaction times to the target words were first transformed using a natural log transformation and were then excluded from further analysis if they were more than three standard deviations away from the cell mean (Bargh & Chartrand, 2000; Fazio, 1990).

To test whether the repeated exposures to the means–goal sequence in the strengthening-association condition indeed strengthened the association between these concepts, we regressed the response times for recognizing a means (jogging) on the trial's position in the sequence (1–12). As expected, subliminally pairing a means with a goal strengthened the means–goal association, as indicated by decreased response times to the means as a function of degree of exposure to the subliminal goal prime before the means' presentation ($\beta = -.63$), $F(1, 10) = 6.60$, $p < .05$. A similar analysis conducted on the data from the baseline condition indicated that response times to means in the absence of the goal prime were not affected by the degree of exposure to the control primes ($\beta = -.42$), $F(1, 10) = 2.17$, *ns*.

Perceived Instrumentality

We expected that strengthening the association between a means and a given goal would increase the perceived instrumentality of the means for attainment of the associated goal but decrease the perceived instrumentality of the means for attainment of the alternative goal also known to be served by that means. Accordingly, a repeated measures ANOVA yielded an Associative Strength × Goal interaction, $F(1, 68) = 13.33$, $p < .01$. As shown in Figure 4, enhancing the means–Goal B (strengthening muscles) association impaired the perceived instrumentality of the means for Goal A (increasing oxygen; $M = 7.08$), compared with the baseline condition ($M = 7.91$), $t(68) = -2.03$, $p < .05$. In addition, enhancing the means–Goal B (strengthening muscles) association enhanced the perceived instrumentality of that means for that Goal B ($M = 7.03$), compared with the baseline condition ($M = 6.09$), $t(68) = 2.10$, $p < .05$. Also, a goal main effect appeared, indicating that participants judged the means to be more effective for satisfying Goal A (increasing oxygen; $M = 7.49$) than for Goal B (strengthening muscles; $M = 6.57$), $F(1, 69) = 12.09$. This effect is consistent with our previous finding that a means is seen as more effective with respect to the first listed goal.

Using a sequential priming task, we thus manipulated the strength of the means–goal association outside of participants' conscious awareness. We find that an experimentally enhanced association leads to increased perceived instrumentality of the means to the associated goal, and, of greater theoretical significance, it dilutes the perceived instrumentality of the means for another goal that is also attached to it. Notably, although differences in goal content may be responsible for the presently found goal main effect, they could not account for the observed interaction between goal and manipulated association strength.

Study 4 thus illustrates more directly the effect of associative strength on perceived efficacy: Associating a means with one goal reduces the instrumentality of the means with respect to another associated goal. Associative strength between goals and means thus seems to observe a constant sum principle, for which the stronger the association between one means and one goal, the weaker the association between the same means and another associated goal, as demonstrated by decreased perceived instrumentality. We further predicted that the lower associative strength when another goal is added mediates the effect of goal number (one vs. two) on perceived means instrumentality. The purpose of Study 5 was to specifically explore the possibility of such mediation.

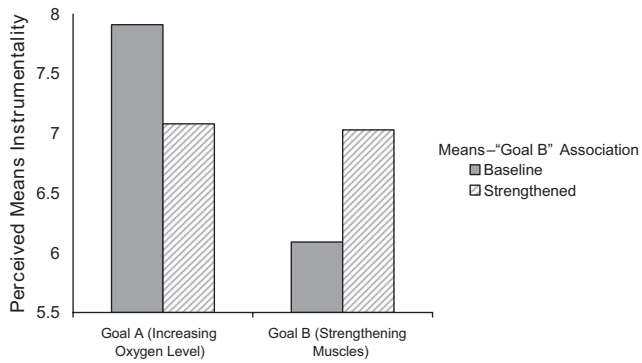

Figure 4. Perceived means instrumentality as a function of goal content and means–Goal B association.

Study 5: Mediation by Associative Strength

Study 5 manipulated the number of goals attached to a given means and assessed changes in (a) associative strength and (b) perceived instrumentality of the means. We predicted that associative strength would mediate the impact of goal number on perceived instrumentality of the means with respect to the original goal. Specifically, in this study we associated a single means either with a single focal goal or with the focal plus another goal, and then measured, via reaction time methodology, the means–focal goal associative strength. We expected that the means–focal goal association will become weaker when another goal is added to the mix and that the weakened association would further predict the lower perceived instrumentality of the means with regard to the focal goal.

Method

Participants

Seventy five University of Chicago undergraduate students (33 women and 42 men) participated in the study in exchange for $4.

Procedure

A 2 (goal number: one vs. two) × 3 (means domain: consumption of oranges vs. consumption of tea vs. jogging) mixed design was used in this study, with goal number manipulated between subjects and means domain within subjects. The entire study was completed on a computer. Participants read that its purpose was to study people's understanding of scientific facts after a time had elapsed from exposure to those facts. Participants were further informed that they would read three short scientific essays and would perform a "word judgment" filler task before answering some questions about the content of each essay. The three essays were designed to (a) introduce the means and the goals, (b) measure the means–goal associative strength, and (c) measure the perceived instrumentality of the means with respect to the different goals. We repeated the procedure three times, in different domains (i.e., in reference to the goals of consuming oranges, consuming tea, and jogging).

Consumption of oranges. The first essay introduced the goals of consuming oranges. In the two-goals condition, oranges were described as serving two separate goals. Participants read that:

> Oranges are clearly the most popular fruit consumed today in the United States. They are available year-round, but their peak season is January to May. The best quality oranges are firm and heavy. Eating oranges is believed to help satisfy the need for fiber. In addition, eating oranges is also shown to be one way to acquire vitamins.

In the one-goal condition, the essay was the same except that the last sentence described only one, henceforth "focal," goal that consumption of oranges satisfied (i.e., "Eating oranges is believed to help satisfy the need for fiber").

The second part of the study measured the means–common-goal (oranges–fiber) associative strength. A sequential priming task was used, similar to the one described in Study 4. This time the task was used to assess the strength of the means–goal association rather than to manipulate it as in Study 4. Therefore, participants in all conditions completed the same sequential priming task, and differences between conditions should not be attributed to the completion of this task. The prime in this task was supraliminal and consisted of the means word. The word representing the focal goal was used as the target. The onscreen instruction described the task as a filler task that included a series of lexical judgments on whether the target letter string appearing on the screen was or was not a word. Participants were further advised that for each judgment, two letter strings would appear in a sequence: The first letter string was always a word, and it pointed to the location of the second letter string. It was followed by a row of *X*s before the second (target) letter string appeared. Participants' task was to decide as quickly as possible whether the second letter string was or was not a word.

Following eight practice trials, a total of 100 actual trials were presented. We used an equal number of words and nonwords as targets. Among the 50 pairs with actual words as targets, five consisted of means–goal pairs. For the "consuming oranges" essay, the supraliminally presented priming word was *orange*, and the target letter string was *fiber*. The order of presentation was fully randomized. The remaining 95 pairs all used unrelated words as primes and irrelevant words and random letter strings as targets.

On each trial, a fixation point (a "*plus*" sign) appeared in the center of the screen for 300 ms. Participants were asked to focus their attention on this sign. The fixation point was then replaced by a prime word, presented for a brief period of 150 ms, that was replaced, in turn, by a masking string (a row of *X*s). After another 150 ms, the masking string was replaced by the target letter string, resulting in an SOA of 300 ms. Participants' task was to classify the target words as either a word or nonword, using the *Z* and "*slash*" keys, respectively. Each response was followed by a 700-ms pause, followed by the next trial.

Following the word judgment task, participants' judgment of means instrumentality was assessed. They moved on to the "reading comprehension" portion of the study, in which they rated on a 9-point scale ranging from 1 (*not at all*) to 9 (*extremely*) the extent to which consumption of oranges was effective for acquiring fiber. This item was embedded among six filler questions.

Consumption of tea and jogging. The same procedure was then repeated twice for the other two essays concerning the consumption of tea and jogging. In the consumption of tea essay, tea was said to "strengthen the immune system" in the one-goal condition and to "strengthen the immune system" and "protect vision" in the two-goals condition. The essay on jogging was similar to the one used in the previous study, which described jogging as an activity meant either to "increase the oxygen level in blood" (one-goal condition) or to "increase the oxygen level in blood" and "strengthen various muscles" (two-goals condition). After each essay, participants completed a sequential priming task, in which the means (tea or jogging) was used as the priming word and the common goal (immune or oxygen) as the target word in the 5 out of 100 experimental trials. Finally, for the essay on tea, participants rated the effectiveness of tea for strengthening the immune system, and for the jogging essay, they rated the effectiveness of jogging for increasing the oxygen level in the blood. These questions were embedded among other filler questions.

After completing all three parts of the experiment, participants were probed for possible thoughts and guesses about the purpose of the study and then debriefed and dismissed. No participants reported any suspicion about the connection between the sequential priming task and other parts of the study.

Results and Discussion

The strength of association between the means and the goals was assessed by the response time to the goal when the means was primed, averaged across all five trials. Because the latency of incorrect responses would be difficult to interpret, only correct responses were used in all the subsequent analyses (see Bargh, Chaiken, Govender, & Pratto, 1992; Fazio, 1990). The percentage of errors was 7%. As in our prior study, all individual response times were first transformed using a natural log transformation and were then excluded if they were more than three standard deviations away from the cell mean (Bargh & Chartrand, 2000; Fazio, 1990).

We analyzed the response times to the goal as a function of goal number (one vs. two) and domain. Consistent with our hypothesis, an ANOVA yielded the predicted main effect for goal number, $F(1, 73) = 6.93$, $p = .01$. Participants were faster in responding to the goal following means prime in the one-goal condition (M = 554 ms) than in the two-goals condition (M = 598 ms), $t(73) = 2.63$, $p = .01$, suggesting a stronger means–goal association when the means was associated with only a single goal than when it was also associated with an alternative goal. Furthermore, there was a main effect for domain, $F(2, 73) = 3.13$, $p = .05$, indicating that participants were slower in responding to the word *fiber* for the essay on oranges (M = 590 ms), compared with responding to *immune* for the essay on tea (M = 564 ms) and to *oxygen* for the essay on jogging (M = 566 ms), $F(1, 74) = 6.18$, $p < .05$. Consistent with our hypothesis, the Goal Number × Domain interaction was nonsignificant (Fs < 1), indicating that the effect on response times was independent of the means content.

Next, the ratings of means effectiveness were analyzed as a function of Goal Number × Domain. Consistent with our previous studies, an ANOVA performed on this variable yielded a main effect of goal number, $F(1, 73) = 4.37$, $p < .05$, indicating that additional goals attached to a single means decreased the perceived instrumentality of the means in satisfying the original goal (Ms = 7.46 and 6.83, for one-goal and two-goals conditions, respectively). Furthermore, there was no main effect for domain, and the Goal Number × Means interaction was nonsignificant (Fs < 1), indicating that the effect of goal number was independent of the content of the means.

To test whether the strength of the means–goal association mediated the effect of goal number on effectiveness ratings, we first averaged the perceived instrumentality ratings and the associative-strength response times across all three domains. By using a series of regression analyses, we then tested whether the strength of the means–goal association mediated the effect of number of goals on perceived instrumentality of the means in serving the original goal. The results of the mediation are displayed in Figure 5.

We found that consistent with the ANOVA, goal number (one vs. two) negatively predicted the perceived instrumentality of the means in serving the original goal ($\beta = -.24$), $F(1, 73) = 4.37$, $p < .05$. In addition, increase in goal number lowered the associative strength between the means and the original goal, as measured by the reaction time to the goal following the presentation of the means (thus greater number corresponds to slower reaction and weaker association), ($\beta = .30$), $F(1, 73) = 6.93$, $p = .01$, which, in turn, decreased the perceived instrumentality of the means in serving the goal ($\beta = -.30$), $F(1, 73) = 7.13$, $p < .01$. Controlling for the means–goal associative strength, the effect of goal number on perceived instrumentality diminished and became nonsignificant ($\beta = -.16$, *ns*). A Baron and Kenny's version of Sobel's test (Baron & Kenny, 1986) indicates that the mediation was significant ($Z = 1.97$, $p = .05$). That is, controlling for means–goal association strength, associating the means with two (vs. one) goals did not directly impair the perceived instrumentality of the means for the attainment of the common goal. It did, however, indirectly impair perceived instrumentality through means–goal associative strength. Similar patterns of meditation were obtained for each goal if analyzed separately.

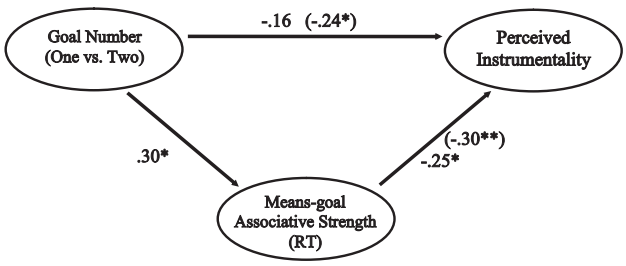

Figure 5. Path model of the influence of goal number on perceived instrumentality. RT = response time. * $p < .05$. ** $p < .01$.

These results shed light on the cognitive process by which adding an alternative goal to a means that already serves one goal dilutes the perceived instrumentality of the means for that original goal. In what follows, we address the implications of the dilution in means instrumentality. We hypothesize that the dilution of perceived functionality negatively impacts actual means preference. In our final study, we therefore investigate means choice when a means is associated with the attainment of either one or two goals.

Study 6: Dilution Effects on Means Choice

In Study 6, we highlighted either one goal that a means (an office pen) could satisfy (i.e., writing) or two goals that this means could satisfy (i.e., writing and serving as a laser pointer). We then measured participants' tendency to choose this means (the pen) in a subsequent task in which the original goal of writing was activated. We predicted that participants who associated the pen with two goals would be less likely to choose this pen for writing notes as compared with participants who associated the pen with the sole goal of writing.

Method

Participants

Sixty-one University of Chicago undergraduate students (33 women and 28 men) participated in this study in exchange for $3.

Procedure

Materials. The object used in this study was a pen that could also serve as a laser pointer. The laser pointer pen seemed identical to a typical ballpoint pen, except for a small button located near its top, designed to turn the laser pointer function on and off.

Means elaboration. A one-goal versus two-goals between-subject design was used for this study. Upon arriving in the lab for a survey on "study habits," each participant received a filler survey purportedly assessing such habits and a laser pointer pen to complete the survey. Half the participants, assigned to the one-goal condition, completed only the filler survey using the pen. The other half, assigned to the two-goals condition, completed the same survey and, at the end of the survey, were asked to quickly evaluate the pen's laser pointer function. Participants were informed that they could use the laser pointer function by pressing the small button and were asked to evaluate this function by writing down a short sentence. Thus, participants in this condition practiced the two functions of the pen, both as a pen and as a laser pointer.

Means choice. Once participants completed the survey, the experimenter collected both the questionnaire and the pen. All participants were

then led to another room and told to put down their names and other information on a single sheet of paper in order to receive a compensation for the study. Two pens were left on the desk for participants to use: One was a regular office pen, and the other was a laser pointer pen that was identical to the one participants had just used for the filler survey. Participants picked one of them to write down their personal information. The position of the two pens was counterbalanced between participants. An experimenter, blind to participants' condition, indicated participants' choice, either a regular pen or a laser pointer pen. After choosing a pen and entering their personal information, participants were debriefed and dismissed.

Results and Discussion

In support of our hypothesis, among participants who were not asked to evaluate the laser pointer function (i.e., those in the one-goal condition), 54.8% chose to use the laser pointer pen (vs. the regular office pen) to write their personal information, whereas only 16.6% of participants who evaluated the laser pointer function (those in the two-goals condition) chose this pen, $\chi^2(1, N = 61) = 9.63$, $p < .01$. Apparently, participants who were not exposed to the laser pointer function were as likely to choose the laser pen as a regular pen (50% chance); however, introducing the laser pointer function significantly decreased their likelihood of choosing the pen in order to write notes.

On the basis of our theoretical analysis, we interpret this finding to mean that exposure to the laser pointer function diluted the associative strength between the laser pointer pen and the goal of writing and hence lowered the probability of choosing the laser pointer pen when writing constituted the sole salient goal. In general, this result suggests that associating a means with additional goals dilutes the functional association between the means and the original goal, which lowers the means' perceived instrumentality and one's actual preference for it when only the original goal is being pursued.

General Discussion

Our cognitive analysis of human motivation implies that as the number of goals attached to a single means increases, the association between this means and each individual goal decreases (cf. research on the fan effect, Anderson, 1974; Anderson & Reder, 1999). On the basis of this assumption, we propose a dilution model of goal pursuit, whereby adding goals to a single means reduces its perceived efficacy for the attainment of each goal. Several specific hypotheses followed from our model and were tested in the present research: First, the basic premise of the dilution hypothesis is that adding more goals to a single means renders this means subjectively less instrumental with regard to each individual goal. Second, the degree of reduction in subjective instrumentality depends on the perceived distinctiveness between the goals connected to the shared means, with highly distinctive goals amplifying the dilution effect, and less distinctive (or more similar) goals attenuating it. Third, the degree of reduction in subjective instrumentality is directly related to the reduction in associative strength linking a goal and a means. Fourth, means associated with multiple goals are less likely to be chosen and pursued in the course of self-regulation toward any one of those goals.

These varied predictions received consistent support in our studies. Beginning with Study 1, we found that means that serve two (vs. one) goals are seen as less effective tools for attaining any one of the goals. For example, learning that aerobic exercise could prevent heart disease as well as help maintain healthy bones resulted in it being perceived as less effective for preventing heart disease. Study 2 then demonstrated that whereas adding goals that the means could satisfy led to lower perceived instrumentality, adding goals that a means could not satisfy enhanced the perceived instrumentality of the means for the original goal because it highlighted the uniqueness of the means–goal association. Study 3 tested for the effect of goal distinctiveness and found that thinking about how two goals connected to a single means were different from (vs. similar to) each other decreased the perceived instrumentality of the shared means for serving each of these goals.

Studies 4 and 5 explored the possibility that the reduction in perceived means instrumentality occasioned by added goals was the result of decreased associative strength between a means and the goals it was assumed to satisfy. In Study 4, we either enhanced the associative strength between a means and a goal (i.e., between the means of jogging and the goal of muscle strengthening) by repeatedly pairing these stimuli in a sequential priming procedure or left it intact. Participants in the enhanced-association condition (vs. baseline-association condition) perceived the means as more effective for satisfying the associated goal (of muscle strengthening) but as less effective for satisfying an alternative goal (of increasing the oxygen level in the blood). The unconscious nature of the association strength manipulation in this study suggests that a dilution of instrumentality does not rely on conscious, metacognitive processes or deliberation.

In Study 5, we found that the strength of the *means–goal association*, operationally defined as the time for recognizing the goal after means priming in a sequential priming task, mediated the negative relationship between the number of goals attached to a single means and perceived means instrumentality. Finally, Study 6 examined the implications of our analysis for means choice. Consistent with our theory, we found that when a single means (i.e., a pen) served two (vs. one) activated goals (writing and laser pointing), it was less likely to be chosen when only one of these goals was activated. Taken together, these studies demonstrate the dilution of functional association between a means and a goal across several self-regulatory domains (e.g., health and fitness, academic goals, and completing an experimental task), and independently of the specifics of experimental procedure of evoking and manipulating the strength of the means–goal association.

Alternative Explanations

According to the dilution model, the more goals a means is assumed to serve, the weaker the associative strength between the means and each individual goal becomes, which accounts for the observed decrease in perceived instrumentality of the means and the lower preference for the means when only one of the goals is activated. The notion that people are reluctant to choose options related to additional, irrelevant (or mildly relevant) goals was supported by previous research, showing that irrelevant goals negatively affect preference (Kivetz & Simonson, 2003; Shafir et al., 2000; Simonson et al., 1993). In this vein, we earlier reviewed research indicating a lower preference for a brand of ice cream that

is kosher (vs. nonkosher) among participants who do not care for kosher food (Simonson et al., 1993). This finding was explained in terms of the fit heuristic (Kivetz & Simonson, 2003), namely, the idea that people have a preference for options that highly match their personal goals. From this perspective, additional, irrelevant goals that an option may serve are seen to lower the degree of fit, hence lowering preferences and decreasing the likelihood of choice.

The present research is congruent with previous theorizing on the influence of irrelevant goals on choice, and it proposes a more general theoretical framework that can account for both prior and present findings. According to this framework, additional goals dilute the cognitive association between the means and the original goal, which negatively affect perceived instrumentality. This dilution of instrumentality, however, may or may not lead to lower preference for the means, depending on a person's active goals. Our theory thus distinguishes between the negative impact of additional goals on the strength of the means–goal association and perceived instrumentality on the one hand, and their impact on the preference for certain options on the other. Whereas the effect of additional goals on associative strength and perceived instrumentality depends on the number of distinctive goals associated with a single means, the effect on preference depends also on the number of active goals that the chooser wishes to accomplish at the moment of choice: The addition of goals decreases the value of an option when the chooser is solely interested in meeting the original goal because of the weakened associative strength and diluted instrumentality. However, when the chooser holds multiple goals, one could have a greater preference for a "multifinal" means that serves multiple goals, although each of them is less strongly associated with the means (see also Köpetz et al., 2006)

According to this analysis, the negative impact of additional goals on perceived means instrumentality is independent of the status of goals as personal or impersonal (or "irrelevant" for a given actor). For instance, learning that a certain ice cream is kosher renders the ice cream less tasty for everyone, regardless of whether the goal of keeping a kosher diet is personally relevant or not. More important, our research sheds light on the processes by which irrelevant goals negatively affect perceptions of means instrumentality and illustrates the mediational role of reduction in means–goals associative strength. Possibly, then, the reason that irrelevant arguments for means pursuit often act as negative arguments is partially because these arguments dilute the cognitive association between the means and the focal goal.

Another alternative explanation of our findings refers to a possible inference that participants made: Presenting multiple reasons for pursuing a particular means implied that any of these goals is not fully attained by pursuing the means. For example, conversational norms (e.g., Grice, 1975) could possibly imply that presenting two (vs. one) reasons for eating tomatoes in Study 1 suggests that eating tomatoes may not be particularly effective in serving either of these goals. Notably, however, whereas conversational norms may have contributed to the dilution effect in some of our studies (e.g., Study 1), they were less likely to operate in others. Thus, the conversational approach cannot account for a dilution of instrumentality when participants generated their own goals (see Study 2) and when the strength of association was manipulated via repeated co-occurrence (see Study 4), or via previous experience with that particular means (see Study 6). In general, our cognitive approach predicts changes in activation patterns, and is not limited to (but applies also to) experimenter-provided goals provided within a persuasion context. By measuring cognitive activation via sequential priming and manipulating the means–goal association in different ways, we were able to discriminate between our analysis on the basis of a cognitive association and conversational interpretation.

Implications for Research on Motivation

This research indicates that, contrary to conventional belief, the preference for a given means may not always rise with the number of goals attached to this particular means. Although the preference for the multifinal means may increase in situations in which all such goals are simultaneously active, it is likely to suffer when only one of the several goals associated with a given means is active.

The preference for an activity that serves a single goal (as opposed to several goals) was documented previously in research on intrinsic motivation (Deci & Ryan, 1985; Kruglanski, 1975; Ryan & Deci, 2000; Shah & Kruglanski, 2000) and overjustification (Greene, Sternberg, & Lepper, 1976; Lepper, Greene, & Nisbett, 1973). These lines of research documented the negative effect of external rewards on people's motivation to engage in an activity that serves an internal goal, to the point of resignation from the activity after the reward is removed (Greene et al., 1976; Kruglanski, Friedman, & Zeevi, 1971; Lepper et al., 1973). The present data are consistent with these findings. Thus, our results support the structural analysis of motivation, according to which intrinsic motivation emerges when the means–goal association is unique; that is, the means serves only one goal, and the goal is attained via a single means (Fishbach et al., 2004; Kruglanski et al., 2002). By adding and then removing alternative goals, that is, external rewards for performing an activity that also serves a goal of self-expression (e.g., writing, drawing, problem solving), the motivation for pursuing the activity decreases because it is no longer associated with the original goal to the same extent.

According to the present dilution model, any additional goal, regardless of content, decreases the perceived instrumentality of a means to the original goal. Therefore, adding an external or an internal reason for performing an intrinsically motivated activity should have a similar effect on dampened motivation. Because the content of goals is irrelevant for the dilution of associative strength, the dilution model predicts a similar decrease in perceived instrumentality and motivation when there are multiple external goals (e.g., several incentives) and when there are multiple internal goals. These predictions are in fact congruent with research on activity engagement theory (Higgins, Lee, Kwon, & Trope, 1995; Higgins & Trope, 1990; Higgins, Trope, & Kwon, 1999), which documented a decrease in the motivation to pursue an activity after adding and then removing intrinsic reasons for activity performance. For example, it was shown that instructing children to read and color pictures undermined their subsequent motivation to engage in both reading and coloring, which are presumably intrinsically motivated activities. By adopting a structural analysis of motivation specifically, and exploring the effect of dilution of associative strength on perceived instrumentality and choice, the aim of the dilution model is to provide a broader framework wherein these fundamental motivational phenomena

can be studied and to propose a cognitive perspective for the understanding of motivational dynamics in people's general goal pursuit.

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