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Illusory Control as a Function of Motivation for a Specific Outcome in a Chance-Based Situation

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Previous research has provided evidence that an individual's need for a chance-based outcome positively affects perceptions of the skill involved in attaining the outcome as well as certainty of winning. Two experiments were conducted to test several competing alternative interpretations for this effect. In Experiment 1, food-satiated (low-need) and food-deprived (high-need) subjects were given the opportunity to win a food incentive in a chance-based card-drawing game either in the presence or absence of situational cues previously shown to induce skill orientations. Skill and confidence-in-winning ratings were found to be positive function of outcome need regardless of the cues condition, thus not supporting an attentional or vigilance interpretation of the general effect. In Experiment 2, food-satiated and food-deprived subjects faced a similar card-drawing game, but this time were given the opportunity to choose whether or not they wanted to be personally involved in various facets of the game (e.g., shuffling the cards). As predicted, high-need subjects showed a greater propensity to want to be personally involved in playing the game, a finding offering support for a "control" interpretation. Overall results are discussed in terms of control theory.

Numerous studies conducted over the last several decades have shown that people often regard themselves as causal agents in their attempts to attain randomly determined outcomes (Fiske & Taylor, 1984; Nisbett & Ross, 1980; Taylor & Brown, 1988). Langer and colleagues (Langer, 1975; Langer & Roth, 1975) outlined several conditions that give rise to such beliefs in their work on the "illusion of control" (i.e., the tendency to overestimate the probability of personal success in chance-based situations). Specifically, Langer proposed that the illusion will

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occur when factors typically associated with skill-determined situations (e.g., active involvement) are introduced into chance-based events. In such cases, individuals are said to adopt "skill orientations" (i.e., they tend to believe that some degree of skill is involved in the chance event) and, subsequently, exhibit inflated certainty that they will succeed.

Several studies have supported Langer's notions regarding the illusion of control. In the majority of these investigations, individuals were given the opportunity to attain outcomes in purely chance-based games, like rolling dice or drawing cards, into which aspects typically associated with skill-determined situations were introduced (e.g., active involvement, personal choice, task familiarity, stimulus familiarity, and competition). And, in accordance with Langer's propositions, people have indeed tended to exhibit inflated perceptions of their chances of winning the outcomes when such factors are present (Bouts & Avermaet, 1992; Burger, 1986; Dunn & Wilson, 1990; Dykstra & Dollinger, 1990; Fleming & Darley, 1990; Gilovich & Douglas, 1986; Griffiths, 1990; Langer, 1975, Experiments 1 to 5; Langer & Roth, 1975).

Data from three recent investigations have implicated an intriguing additional determinant of the illusion of control, i.e., an individual's *need* for a chance-determined outcome (Biner, Angle, Park, Mellinger, & Barber, 1995, Studies 1 and 2; Biner & Hua, 1995). Specifically, the results of the studies converge in showing that one's confidence in winning a chance-based outcome is a positive function of a person's need for that outcome. In the earliest of these investigations, Biner and Hua gave food-deprived (high-need) or food-satiated (low-need) individuals the opportunity to win a hamburger incentive in a purely chance-based card-drawing task. Some subjects, however, were given relatively good odds of winning whereas others were given poor odds. The subsequent results showed that, overall, those assigned to the high-need conditions believed they had a better chance of winning the hamburger than subjects assigned to the low-need conditions. That is, regardless of their actual odds, subjects' level of need for the incentive positively affected their beliefs that they would win the incentive. Importantly, Biner and colleagues were able to both replicate and extend this finding in a comparable study which also involved a card-drawing game and a food incentive outcome (Biner *et al.*, 1995, Study 1). In this experiment, however, high-need subjects not only reported that they that were more confident that they would win the incentive but also believed that more skill was involved in the card-drawing game relative to low-need subjects.

In a third and final study, Biner *et al.* (1995, Study 2), attempted to (1) conceptually replicate the earlier need-confidence findings using a different operationalization of outcome need and (2) test the notion that skill perceptions mediate the relationship between the need for an outcome and winning confidence. In this field study, state lottery players, i.e., players of the weekly "pick-six" game, were asked to rate their confidence in winning the lottery game as well as the degree of skill that they thought was involved in playing the game. Because the relevant

incentive was money, outcome need was operationalized in terms of personal income (which was also asked of the players). Of course, those with lower incomes were presumed to have a higher need to win. Consistent with the previous laboratory data, the results of this investigation showed that income was strongly related, in a negative fashion, to both confidence and skill ratings. Moreover, when skill ratings were partialed from the analyses, the income-confidence relationship was no longer evident. Noteworthy is that virtually identical results were also found when subjects were similarly queried about playing a lottery-sponsored rub-off card game. Taken together, the findings of this study suggest that skill perceptions play a critical role in mediating the need-confidence relationship. In other words, it would appear that the need for a randomly determined outcome enhances perceptions of the degree of skill involved in attaining that outcome, and these enhanced skill perceptions, in turn, induce the illusion of control (i.e., inflated confidence perceptions).

The combined results of the aforementioned investigations offer reasonably compelling evidence that skill orientations (and subsequent winning confidence) are influenced, in a positive manner, by the need for an outcome. However, the precise theoretical mechanism responsible for effect of outcome need on skill perceptions has yet to be fully explored. The working, although to date untested, interpretation posited by the authors was based on the assumption that the need for an outcome produces heightened attentiveness (see Biner *et al.*, 1995). That is, the researchers argued that several of the situational factors previously shown to produce skill orientations in subjects (e.g., personal choice, involvement, and stimulus familiarity; see Langer, 1975) were present in all of their investigations. And they contended that subjects in high need, because of their greater desire to attain the available outcomes, likely paid greater attention to aspects of the experimental/field situations, and thus were more apt to note and thereby be affected by the skill-related factors that were present (see Bouts & Avermaet, 1992).

Importantly, a second and equally plausible alternative interpretation could also be responsible for the findings. In brief, the explanation is based on the early work of Burger and colleagues (Burger, 1985, 1986; Burger & Schnerring, 1982) which focused on the motivation-based perceptual errors that occur as a result of a heightened desire for control. In particular, Burger and others have shown that, presumably due to a motivational bias, individuals who have a high desire for control (viewed as a relatively stable personality characteristic) more readily adopt skill orientations in chance-based games (e.g., coin tossing) relative to individuals who have a low desire for control (e.g., see Burger, 1986). Related to Biner's work, these results present the possibility that heightened outcome need simply manifested itself in a higher desire for control (similar to the individual difference variable proposed by Burger, but of a more generalized nature). And this desire for control led directly to the adoption of skill orientations (i.e., viewing the chance-based event as a skill-based event). In other words, it could be plausibly argued that,

as the need for a chance-based outcome increases, so too will the desire to control situations in which that outcome can be attained. And, as the desire to control such situations increases, so too will the beliefs that skill is involved in securing the outcome. Although erroneous from an objective standpoint, such beliefs offer the "participant" a simple and available means of attaining situational control.

The converging results showing that outcome need positively affects skill perceptions, combined with the definitive lack of data implicating a specific theoretical mechanism responsible for the effect, provided the impetus for the two experiments reported in this paper. In the first experiment, we attempted to test between the two above-noted explanations for the need-skill relationship. In the second, we focused on an additional alternative interpretation for the effect.

EXPERIMENT 1

Our first experiment was designed to test between the two heretofore-mentioned competing explanations for the effect of outcome need on skill orientation induction, i.e., the attention explanation versus the control explanation. In a 2 × 2 between-subjects factorial design, food-deprived (high-need condition) or food-satiated (low-need condition) subjects were given the opportunity to win a food incentive in a chance-based card-drawing game. The card-drawing procedure, however, was described to some subjects (skill-cues condition) as involving personal choice and stimulus familiarity (i.e., situational cues that have been previously shown to induce skill orientations; Langer, 1975). For other subjects (no-skill-cues condition), the procedure was described as being void of these features. On the one hand, the *attention interpretation* would predict an interaction effect such that the need for an outcome should positively affect subjects' perceptions of skill (and winning confidence), but only in the presence of skill cues, i.e., the absence of such cues would preclude the impact of subject attentiveness. On the other hand, the *control interpretation* would predict a positive effect of outcome need on skill orientation (and winning certainty) both in the presence as well as in the absence of skill cues, i.e., a main effect for the need manipulation would be expected. In addition, all subjects in the study performed a brief incidental recall task at the close of the experimental session to assess procedural attentiveness. A main (positive) effect of outcome need on recall, of course, would lend support for the attention explanation.

Method

Subjects. Because a high-caloric fast-food item was to be used in this study as an incentive, it was important to keep the number of subjects on weight-loss diets to a minimum. One way of doing so was to employ only male subjects. That

is, prior survey data collected from individuals in this subject pool indicated that the approximately twice as many females were on such diets relative to males (see Biner & Hua, 1995). Thus, 72 male undergraduates enrolled in introductory psychology courses at a large Midwestern university participated in the study as subjects. Participation in psychological experiments was one of several options from which these students could choose to fulfill class requirements. Subjects were run in small groups of approximately 15 individuals.

Procedure. The evening prior to their experimental session, subjects were telephoned by a female experimenter who delivered a prescripted message. For subjects randomly assigned to the *high-need condition*, the following statement was read:

> I'm calling to remind you that you signed up to be in an experiment tomorrow: Experiment #22. We will be starting promptly at 1:00 in classroom TC 200A. For purposes of the experiment, we would like you not to eat any solid food from the time you wake up tomorrow until after the experiment. Liquids are fine, though. Is there any reason why you couldn't do this? OK. We'll see you tomorrow at 1:00. Thank you.

For subjects randomly assigned to the *low-need condition*, the following statement was read:

> I'm calling to remind you that you signed up to be in an experiment tomorrow: Experiment #22. We will be starting promptly at 1:00 in classroom TC 200A. For purposes of the experiment, we would like you to make sure to eat both breakfast and lunch tomorrow before the experiment. Is there any reason why you couldn't do this? OK. We'll see you tomorrow at 1:00. Thank you.

Although only one individual (a diabetic) expressed reservations about complying with the request, several did inquire about the nature of the experiment. To these inquiries, the experimenter responded uniformly, "I'm not sure. I just make the reminder calls." In addition, individuals who had signed up for the experiment, but could not be contacted directly by the experimenter, were designated as such on the experimental sign-up sheet. For practical and ethical reasons, it was decided beforehand that these individuals (as well as the diabetic) would be run through the experimental procedure and that their data would be disregarded thereafter. The 72 subjects participating in the experiment represented 90% of those contacted by telephone, i.e., 36 of 41 contacted individuals in the low-need condition showed up for the experiment whereas 36 of 39 contacted individuals in the high-need condition showed up for the experiment.

Upon arriving at the designated classroom for the experimental session on the following day, subjects were greeted by another female experimenter. Each was given an instruction booklet, directed to "quietly take a seat" at one of the desks, and asked to place the booklet face-down on the desktop. Once everyone was seated, the experimenter announced: "Please turn your materials over and begin reading. Instructions as to whether you should continue to the next page or not are given at the bottom of each page. Follow these instructions carefully. You

may begin." The first page of the booklet consisted of a standard informed consent statement. Subjects were instructed to read the statement and sign it if choosing to participate in the study.

The skill-cues manipulation was introduced on the second page of the booklet. Here, subejcts read that they would be given the opportunity to win a McDonald's Big Mac hamburger in a card-drawing game. Specifically, they learned that they would win the hamburger if, and only if, a single predesignated card was blindly selected from a shuffled deck of 10 cards. For subjects randomly assigned to the skill-cues condition, the game was presented such that it involved personal choice and stimulus familiarity (i.e., two skill-related factors previously shown to induce the illusion of control; see Langer, 1975, and Bouts & Avermaet, 1992, respectively). That is, these subjects learned that they would be able to personally pick a card from a deck of 10 standard playing cards, i.e., the ace-of-hearts through the 10-of-hearts (with the winning card being the six-of-hearts). Conversely, for those randomly assigned to the no-skills cues condition, the game was presented as being void of choice and stimulus familiarity. That is, these subjects learned that the experimenter would be selecting a card "for them" from a deck of 10 index cards on which lower-case Greek letters had been printed. The letters shown to the subjects in the instruction booklet were α, ϖ, δ, ε, ϕ, γ, η, χ, ξ, and ζ (with the winning card being the one with ζ printed on it).

It should be noted that the experimenter running the procedure was blind to the need manipulation as well as to the skill-cues manipulation. The latter manipulation was introduced unbeknownst to the experimenter in the subjects' booklets. Also, a large bag of freshly made Big Mac hamburgers was prominently displayed on the experimenter's table from the outset of the procedure.

Under the ostensible purpose of developing materials for a future study, subjects were then informed that they would be performing a brief sentence-completion exercise before the card-drawing game. It was explained that the exercise involved adding verbs to 20 sentences and, because there were no right or wrong answers, any verbs that "came to mind" would suffice. On the following page, subjects found 20 sentences, each beginning with a first name followed by a blank space (for the verb), and then either an object or a prepositional phrase.

Once subjects had finished the exercise, they were asked to complete a brief questionnaire on the following page. Keeping with prior illusion of control studies, the questionnaire had subjects rate (1) the degree of skill that they thought was involved in the card-drawing game where 1 = *luck* and 9 = *skill* (Dunn & Wilson, 1990; Fleming & Darley, 1990; Griffiths, 1990) and (2) how confident they were that they would draw the winning card where 1 = *not at all confident* and 9 = *very confident* (Dykstra & Dollinger, 1990; Gollwitzer & Kinney, 1989; Langer, 1975, Experiments 4 and 5). In addition, subjects were also asked to rate how hungry they were at the moment (1 = *not at all hungry* and 9 = *extremely hungry*), how attractive they found the Big Mac hamburger (1 = *not at all attractive* and

9 = *extremely attractive*), and whether or not they had eaten any solid food prior to the experimental session.

After responding to the questions, subjects turned to the final page of the booklet. At this point, they were instructed to try, "without looking back," to remember as many of the first names from the sentences as they could, and to list those names on the page. Once it was evident that everyone in the room had stopped writing, the experimenter ended the session. Subjects were then debriefed and each was given a Big Mac hamburger.

In an effort to keep the familiarity variance of the first names at a minimum, the 20 names we employed in the study were the top 10 most common male names and top 10 most common female names given to children in the year 1970 (Dunkling & Gosling, 1984). The order of the names, as they were listed in the sentences, was randomly determined.

Results

Manipulation Checks. With respect to the need manipulation, all subjects who had been directly contacted by the experimenter indicated that they had complied with the request either to eat or not to eat prior to the experiment. Moreover, 2 (Need) × 2 (Skill Cues) analyses of variance performed on subjects' ratings of hunger and hamburger attractiveness showed only strong main effects for the need manipulation, Fs$(1, 68) > 11.23$, ps $< .001$. Specifically, subjects who were instructed not to eat before the experiment reported being far hungrier and viewed the hamburger incentive as much more attractive than subjects who were instructed to eat both breakfast and lunch. Mean ratings of hunger and incentive attractiveness are displayed in the first two columns of Table I.

Although there was no direct check on the skill-cues manipulation, lengthy postexperimental debriefing sessions indicated that subjects, regardless of the condition to which they had been assigned, clearly understood what would occur during the card-drawing phase of the study.

Appraisals of Skill and Confidence. Subjects' ratings of the degree of skill involved in the card-drawing game and confidence in selecting the winning card were also analyzed employing two-way analyses of variance. In support of the control explanation, both measures produced significant main effects for the need manipulation in conjunction with nonsignificant interaction terms and skill-cues effects. That is, the high-need (food-deprived) subjects reported that more skill was involved in the game, $F(1, 68) = 5.07$, $p < .03$, and were more confident that they would win, $F(1, 68) = 5.85$, $p < .02$, than the low-need (food-satiated) subjects, regardless of the presence of skill cues. Mean ratings of confidence and skill across conditions can be found in Table I.

Recall of First Names. The numbers of names correctly recalled from the sentence-completion exercise were analyzed in a similar fashion (i.e., employing

Table I. Condition Means and Standard Deviations (in Parentheses) for Hunger, Incentive Attractiveness, Skill Involved, Winning Confidence, and Incidental Recall Measures—Experiment 1[a]

Condition		Hunger	Incentive attractiveness	Skill involved	Winning confidence	First names correctly listed	First names incorrectly listed
Skill cues							
Low need (food-satiated)	*M*	3.28	4.22	1.50	4.33	5.94	1.22
($n = 18$)	*SD*	(1.56)	(2.07)	(1.09)	(1.61)	(2.58)	(2.34)
High need (food-deprived)	*M*	6.79	6.11	2.21	5.47	4.68	1.00
($n = 19$)	*SD*	(1.75)	(2.62)	(1.65)	(1.78)	(2.03)	(1.63)
No skill cues							
Low need (food-satiated)	*M*	2.72	4.11	1.56	4.44	4.39	.33
($n = 18$)	*SD*	(2.05)	(2.91)	(.98)	(1.79)	(1.79)	(.49)
High need (food-deprived)	*M*	6.76	6.29	2.47	5.29	4.18	.41
($n = 17$)	*SD*	(2.14)	(2.59)	(2.12)	(1.83)	(1.33)	(.62)
MS_e		3.55	6.59	2.33	3.07	3.97	2.22

[a] Higher mean values indicate greater perceived hunger (where 1 = *not at all hungry* and 9 = *extremely hungry*), greater perceived incentive attractiveness (where 1 = *not at all attractive* and 9 = *extremely attractive*), stronger beliefs that skill was involved in the card drawing (where 1 = *luck* and 9 = *skill*), and higher confidence in winning the card-drawing game (1 = *not at all confident* and 9 = *very confident*).

an analysis of variance) and, in further accordance with the control notion, no main effect for the need manipulation was evident. Rather, the results showed only an unexpected main effect for skill cues, $F(1, 68) = 4.83$, $p < .04$. As can be seen in Table I, the pattern of condition means indicated that subjects in the skill-cues conditions were able recall more of the first names than subjects in the no-skill-cues conditions.

Although by no means prevalent, we did note during data entry that at least some subjects listed first names during the recall phase of the study that were *not* presented in the sentence completion phase. To explore the extent to which this occurred as a function of our manipulations, another 2 × 2 analysis of variance was performed on the number of first names listed by subjects that were not presented in the earlier exercise. As with the prior analysis, this test also yielded only a main effect for the skill-cues manipulation, $F(1, 68) = 4.41$, $p < .04$. That is, those exposed to the skill cues tended to list more incorrect first names than those not exposed to the cues. Condition means are displayed in the last column of Table I.

Discussion

The results of Experiment 1 were in contrast to Biner *et al.*'s (1995) contention that high-need individuals exhibit greater procedural vigilance, and therefore, are more likely to notice situational cues that lead to skill orientations (i.e., the attention

interpretation). Specifically, heightened need for a randomly determined outcome was found to enhance subjects' perceptions of the level of skill involved in attaining the outcome as well as subjects' confidence that they would win the outcome. Importantly, and in support of the control interpretation, these effects occurred not only in the presence, but also in the *absence*, of situational skill cues.

The recall data of the experiment were also at odds with the attention interpretation in that outcome need was found to have no effect on the recall of first names. This, of course, suggests that those in high need were no more attentive than those in low need. Interestingly, however, an unexpected main effect for the skill-cues manipulation did occur. That is, the skill-cues subjects correctly listed a greater number of first names from the prior sentence-completion exercise than the no-skill-cues subjects. Moreover, a comparable skill-cues main effect was also evident when the incorrectly listed names were analyzed, i.e., the first names listed by subjects that were *not* presented earlier. The question as to why these effects occurred is somewhat difficult to answer especially in the absence of additional data. However, one seemingly plausible explanation is that the procedure of the skill-cues condition simply engaged subjects more so than the procedure of the no-skill-cues condition. And, of course, recall performance would be expected to be a positive function of subject involvement. Assuming the validity of this reasoning, the effect, in some sense, may be construed as a demonstration of the impactfulness of the skill cues manipulation. However, we hasten to add that, because these finding were not anticipated, any interpretation of them should be viewed guardedly until corroborated by further data.

Although the overall results of Experiment 1 were congruent with the theoretical notion that need manifests itself in a generalized desire for control which directly results in the adoption of skill orientations, the existence of such a desire was not directly established. In light of this, the present findings can also be explained in a learning-based fashion, i.e., in a way that does not presuppose the existence of a control motive. The particular reasoning rests on the assumption that high-need individuals view motive-relevant outcomes as more valuable than low-need individuals, an assumption supported by the incentive attractiveness data—see Table I. Given this, it could be argued that, because valued outcomes, at least in our society, are most often attained on the basis of one's skill, individuals assume that skill *must* be necessary in order to attain such outcomes, even when those outcomes are randomly determined. Again, unlike our control theorizing, this interpretation does not assume, in any way, a desire to attain situational control.

EXPERIMENT 2

The purpose of our second experiment was to determine if, and to what extent, the need for a randomly determined outcome induces a desire for situational

control. Specifically, both high- and low-need subjects faced a situation similar to that of Experiment 1 in that a food incentive could be attained by winning a chance-based card-drawing game. Under the presumption that those individuals choosing to personally involve themselves in the procedure would have a heightened desire for control, subjects in this study were given the opportunity to make choices regarding whether or not they wanted to actively participate in various facets of the card-drawing game. It was predicted that subjects in high need would show a greater tendency to want to be personally involved in the game relative to subjects in low need.

Method

Subjects. Forty-eight male undergraduates, recruited from the same subject pool described in Experiment 1, served as subjects in this study. All were run in small groups of approximately 15 individuals. The 48 subjects represented 92% of those contacted by telephone, i.e., 25 of 27 contacted individuals in the low-need condition showed up whereas 23 of 25 contacted individuals in the high-need condition showed up.

Procedure. The procedure of this study, including the manipulation of need, was identical to that of Experiment 1 up to the point where the food incentive and card-drawing procedure were described to subjects, i.e., on the second page of the instruction booklet. As in Experiment 1, subjects learned at this point that they could win a McDonald's Big Mac in a card-drawing game involving the random selection of a single card from a deck of 10 standard playing cards. In this experiment, however, it was explained that the ten cards (i.e., the ace-of-hearts through the 10-of-hearts with the winning card being the six-of-hearts) would first be removed from an unopened deck and shuffled thoroughly. Moreover, it was also explained that the unopened deck itself would have to be drawn from a bag containing approximately 30 new, unopened decks of cards. A large transparent bag containing 30 unopened decks of standard playing cards was prominently displayed on the experimenter's table in addition to a large bag of freshly made Big Mac hamburgers.

After reading the description of the procedure, subjects then learned that would be making several decisions regarding how much they wanted to be personally involved in playing the game, and that they should continue to the next page and indicate their preferences. On the next page, subjects were asked to specify, using a three-option response scale (*I*, *the experimenter*, and *doesn't matter*), who they would prefer to (1) "pick the unopened deck of playing cards" (from the bag of unopened decks), (2) "shuffle, without looking, the ten cards and lay them face down on the desktop," and (3) "pick the selected card from the stack of ten cards." In addition, subjects were also asked to rate how hungry they were at the moment (1 = *not at all hungry* and 9 = *extremely hungry*), how attractive they found the

hamburger incentive (1 = *not at all attractive* and 9 = *extremely attractive*), and whether or not they had eaten any solid food prior to the experimental session. Once it was evident that all subjects had finished answering the questions, the experimental session was ended. Subjects were then debriefed and each was given a Big Mac hamburger.

Results

Manipulation Checks. All subjects who had been directly contacted by the experimenter indicated that they had complied with the request either to eat or not to eat prior to the experiment. In addition, one-way analyses of variance were performed on subjects' ratings of hunger and the attractiveness of the hamburger incentive. Both measures showed strong effects for the need manipulation in the expected direction. That is, subjects who were instructed not to eat before the experiment (high-need condition) reported being hungrier [$F(1, 46) = 33.31$, $p < .001$] and found the hamburger incentive more attractive [$F(1, 46) = 7.84$, $p < .01$] than subjects who were instructed to eat both breakfast and lunch. Mean ratings of hunger and incentive attractiveness are displayed in Table II.

Involvement Preferences. Chi-square analyses were performed on the proportions of individuals preferring to *personally* involve themselves in the procedure (i.e., subjects indicating I) for each of the three preference measures. The results of these analyses showed that a significantly greater percentage of high-need subjects, relative to low-need subjects, preferred to personally pick the unopened deck (from which the designated 10 cards would be selected), $\chi^2(1) = 6.82$, $p < .01$, and shuffle the 10 cards (from which their specific card would be selected), $\chi^2(1) = 5.65$, $p < .02$. Moreover, the analyses also revealed that, while only marginally significant, a higher proportion of the high-need subjects preferred to pick their card from the stack of 10 cards, $\chi^2(1) = 2.45$, $p < .12$. Percentages of subjects choosing to personally select the deck, shuffle the cards, and select the card (across conditions) are outlined in Table II.

Table II. Condition Means and Standard Deviations (in Parentheses) for Hunger and Incentive Attractiveness Ratings and Condition Percentages of Subjects Choosing to Personally Pick Unopened Deck, Shuffle Cards, and Pick Card—Experiment 2[a]

Condition		Hunger	Incentive attractiveness	Pick deck	Shuffle cards	Pick card
Low need (food-satiated) ($n = 25$)	*M*	2.92	4.24	20%	16%	52%
	SD	(2.06)	(2.59)			
High need (food-deprived) ($n = 23$)	*M*	6.39	6.26	57%	48%	74%
	SD	(2.10)	(2.40)			
MS_e		4.33	6.24			

[a] Higher mean values indicate greater perceived hunger (where 1 = *not at all hungry* and 9 = *extremely hungry*) and greater perceived incentive attractiveness (where 1 = *not at all attractive* and 9 = *extremely attractive*).

Discussion

The results of our second investigation offer evidence in support of the notion that the need for a chance-based outcome gives rise to a generalized desire to control the situation in which that outcome can be attained. And, in doing so, these results lend further support for our control theorizing. Specifically, subjects in high need were found to have a greater tendency to want to personally pick the unopened deck of cards to be used, shuffle the predesignated 10 cards, and pick their card from the stack of 10 cards.

GENERAL DISCUSSION

The results of the present experiments, taken together, provide reasonably convincing evidence that the need for a chance-based, motive-relevant outcome positively affects skill and confidence-in-winning perceptions via the induction of a control motive. In Experiment 1, high-need (food-deprived) subjects given the opportunity to win a food incentive in a chance-based card-drawing game reported that more skill was involved in the game and were more confident that they would win the game relative to low-need (food-satiated) subjects. Moreover, these results were evident regardless of the presence or absence of skill-orientation situational cues. Furthermore, in Experiment 2, subjects in high-need for the same motive-relevant incentive showed a greater tendency to want situational control in the face of the card-drawing game by personally choosing to involve themselves in facets of the game. In doing so, the results of this experiment provided key evidence that heightened need for an outcome does indeed result in desire for situational control. While these findings are in important with regard to their support for the control interpretation, they are equally important in that they failed to support the theorizing proposed in earlier research, i.e., that attentiveness to skill-related situational cues is responsible for the consistently-reported positive effect of need on skill and confidence perceptions (see Biner *et al.*, 1995).

Noteworthy is that the results of our research, particularly those of Experiment 2, appear to converge very nicely with the data of a recent study employing a chance-based *aversive* outcome. Specifically, we refer to an experiment conducted by Friedland, Keinan, and Regev (1992, Experiment 2) in which subjects were to "bet" on a section of a wheel in a roulette game. For some subjects, it was explained that losing would result in a "harmless but painful electric shock" to their "nondominant hand" (shock condition) whereas others were told that losing would involve no consequences (no-shock condition). All subjects were then given the option either to let the wheel come to a stop on its own or to use a hand-brake to stop the wheel (with the front of the wheel facing *away* from the subjects). Moreover, it was explained that, if the handbrake option was chosen, the bet would have to be placed on a smaller section of the wheel, thereby decreasing

the chances of winning. Despite this restriction, results showed that more subjects in the shock condition chose to use the handbrake than subjects in the no-shock condition. To the extent that the shock condition of this study represented a high *need-to-avoid* condition, these results would appear to offer further support for our theorizing. Of course, the degree to which highly aversive, chance-based outcomes lead to enhanced confidence and skill perceptions remains to tested in future research.

Because a number of theorists have argued that the need for an outcome and the magnitude of the valence of that outcome are inextricably bound (see Pinder, 1991), it is worth discussing how the results of our experiments fit with those of several investigations addressing the impact of outcome valence on illusory control. In an early study by Rose Marks (1951), children 9 to 12 years old were asked to blindly draw a "picture" card from a shuffled stacks of cards. For some of the drawings, however, the picture card was described as being "desirable" (i.e., it gained the subject a point toward a game) whereas, for other drawings, the picture card was described as being "undesirable" (i.e., it lost the subject a point from the game). Results showed that the frequency of subjects' expectations of drawing a desirable card (a positive outcome) was significantly greater than their expectations of drawing an undesirable card (a negative event). Importantly, this effect was later replicated by Irwin (1953) using adult subjects. Several years after these investigations, Pruitt and Hoge (1965) reported further converging evidence that outcome valence affects illusory control. That is, these authors found that subjects' subjective probability estimates of the occurrence of positive outcomes (winning points in a game) were significantly greater than their estimates of negative outcomes (losing points in a game) across three different methods of assessing subjective probability.

Finally, in a more recent series of investigations focusing on actual external incentives, Alloy and Abramson (1979, Experiments 3 and 4) gave depressed and nondepressed subjects the prospect of either winning or losing \$5.00 in 25 ¢ increments across a series of trials in which they were to attempt to turn on a green light by pushing a button. In the "win" condition, subjects started with nothing and could win 25 ¢ each time the light went on after a button press. Conversely, in the "lose" condition, subjects started with \$5.00 and would lose 25 ¢ each time the light did not come on after a button press. In actuality, subjects in both conditions had no control over the onset of the light and were reinforced (i.e., where a button press turned on the light) 50% of the time. Among the nondepressed individuals, results showed that subjects facing the winning situation expressed greater illusory control (i.e., they believed they had greater control over the onset of the light) than subjects facing the losing situation. Critical to the present discussion is that these studies, taken as whole, were specifically concerned with addressing the effects of the *direction* of outcome valence (positive vs. negative) on illusory control. That is, the aforementioned researchers in essence created one positively valent condition in which subjects could attain a positive outcome (i.e., win money or game points)

and one negatively valent condition in which subjects could avoid a negative outcome (i.e., lose money or game points). Our studies, on the other hand, differ uniquely from these investigations in that they implicate the *magnitude* of outcome valence as a determinant of the illusion of control, at least to the extent that outcome valence is a direct reflection of outcome need (see outcome attractiveness data presented in Tables I and II).

The present results may also be viewed as having important implications with regard to the contentions proposed in a variety of Expectancy × Value (E × V) theories of motivation (see Kanfer, 1990, for an excellent review of this literature). In particular, we refer to one of the best known and well supported of the E × V models, Vroom's Valence × Instrumentality × Expectancy (VIE) model (Vroom, 1964). In brief, Vroom's VIE model and a host of more recent versions of the model (see Mitchell, 1982a, 1982b, and Pinder, 1991, for reviews) include the proposition that motivation (operationalized most often in terms of task choice and effort expenditure) is determined, in part, by the product of *outcome valence* (the attractiveness of a potential outcome) and *instrumentality* (the certainty of attaining that outcome given the completion of some instrumental activity). While tests of this general proposition have received broad support over the last 20 years (see Wanous, Keon, & Latack, 1983), the present results would appear to call into question the multiplicative relationship proposed in the notion (see Stahl & Harrell, 1981). That is, the proposed multiplicative relationship presupposes orthogonality between the valence and instrumentality constructs. Our data, however, indicate the contrary, i.e., that the two variables are *related.* Specifically, the results of Experiment 1 showed that subjects' certainty of winning a motive-relevant outcome (or instrumentality) varied as a direct function of their need for that outcome (a variable found to be positively related to outcome valence). Thus, it would appear that revisions in these, and other comparable formulations, are in order: revisions aimed at more precisely defining how instrumentality and the need for an outcome combine to predict human motivation.

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