Strategies to Improve the Probability of Winning a Lottery: Gamblers and Their Illusions of Control

Colin Farrell, University of Sydney
Elizabeth Cowley, University of Sydney
Michael Edwardson, Victoria University of Technology

Gamblers often have an illusion of control, believing that they can influence random outcomes. This study explores whether a gambler’s locus of control affects the illusion of control. As expected, the illusion of control was strongest amongst gamblers with an external locus of control (externals). Externals believed that they could choose numbers that would be more likely to be drawn in a lottery. Unexpectedly, gamblers with an internal locus of control (internals) believed the ticket that they were assigned had a better chance of being drawn. We concluded internals may be revealing a more passive form of illusory control.

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ABSTRACT

Gamblers often have an illusion of control, believing that they can influence random outcomes. This study explores whether a gambler’s locus of control affects the illusion of control. As expected, the illusion of control was strongest amongst gamblers with an external locus of control (externals). Externals believed that they could choose numbers that would be more likely to be drawn in a lottery. Unexpectedly, gamblers with an internal locus of control (internals) believed the ticket that they were assigned had a better chance of being drawn. We concluded internals may be revealing a more passive form of illusory control.

“I figure you have the same chance of winning the lottery whether you play or not”

Fran Lebowitz

INTRODUCTION

“People [should] not trust the computer to pick your [lottery] numbers. I trust myself more”

A gambler, after he paid extra to select his ticket.

“Showing the previous sequences makes you [buy] more if you understand the law of averages”

A gambler, also a PhD student.

Do gamblers really believe they have some role to play in the outcome of a randomly determined event such as a lottery draw? Do they believe that they can correctly pick the winning numbers? A number of studies across a range of gambling forms have shown that gamblers engage in high levels of irrational thinking while gambling (Coulombe, Ladouceur, Desharains and Jobin 1992; Delfabbro and Winefield 2000; Gaboury and Ladouceur 1989; Ladouceur and Gaboury 1989; Ladouceur, Gaboury, Dumont and Rochette, 1988; Ladouceur, Gaboury, Bujold, Lachance and Tremblay 1991; Walker 1992b). These irrational beliefs can cause gamblers to misperceive the economic utility of gambling (Ladouceur and Walker 1996), providing them with false expectations of control over events determined randomly, (Wagenaar 1989) and lead them to continued gambling despite the inevitability of monetary loss (Ladouceur and Walker 1996).

Studies into irrationality have identified a number of cognitive biases among gamblers (see Wagenaar 1989; Toneatto, Blitz-Miller, Calderwood, Dragonetti and Tsanos 1997; Toneatto 1999) which have been classified into two categories; errors in estimating the probability of an outcome and perceived control over a randomly determined event (Walker 1992a; Ladouceur and Walker 1996). The first category relates to the overestimation of the chance of winning due to a misunderstanding of the independence of random outcomes. The second category refers to the “illusion of control” (Langer 1975) which occurs when individuals hold erroneous beliefs about his or her control over randomly determined or uncontrollable events.

THE ILLUSION OF CONTROL

Langer (1975) allowed participants to purchase lottery tickets under two conditions. In one condition, participants were handed a lottery ticket (no choice). In the other condition, participants were permitted to select the ticket they would like in the draw (choice). After all tickets were sold, participants were then told that another person wanted to partake in the lottery. The investigator then asked all participants to report how much money would be necessary for them to sell their ticket to this person. Langer (1975) hypothesised that the participants who selected their lottery ticket would demand a higher price. The hypothesis was confirmed, participants in the ‘choice’ condition demanded over 400% more money to part with the ticket (choice=$8.67, no choice=$1.96).

A similar result was found in a study by Ladouceur, Mayrand, Gaboury and St. Onge (1987), where people that chose their ticket numbers in a lottery were more reluctant to part with the tickets, than those who had a ticket with randomly allocated numbers. The result was replicated recently; Wohl and Enzle (2002) allowed 25 students to select a lottery ticket, while another 25 were given a computer selected ticket. They found an illusory control effect on estimated likelihood of winning with participants in the ‘choice’ condition, reporting a significantly greater belief of their chance of winning than participants in the ‘no choice’ condition.

Langer (1975) explained the illusion as a false belief that skill could be used to influence the outcome of a randomly determined event. The illusion occurred because participants saw features in a chance-determined situation as similar to a situation determined by skill. The confusion results in participants using strategies perceived as effective in skill-determined tasks which gave them an illusion of control. Overall, a substantial amount of support for the illusion of control has been found (see Bouts and Van Avermaet 1992; Davis, Sundahl and Lesbo 2000; Langer and Roth 1975; Dixon 2000; Gilovich and Douglas 1986; Davis, Sundahl and Lesbo 2000; Ladouceur, Tourigny and Mayrand 1986).

Are there conditions under which the illusion of control is reduced or even eliminated? Langer (1975) proposed that if participants in a chance-related task were reminded of the objective probabilities of success, the illusion would be reduced. Dunn and Wilson (1990) found an illusion of control in situations when potential losses are low with participants betting more and reporting greater confidence in their chance of winning. However, when they increased the stakes, the illusion was eliminated. Dunn and Wilson’s (1990) explanation was consistent with Langer’s (1975) proposition, that an “intrusion of reality” accompanied the increase in the potential loss. The increase in the stakes encouraged individuals to focus on the objective probability in the task, consequently reducing irrational thoughts. Given that there are boundary conditions, and that not all participants in the studies reviewed here were equally susceptible to the illusion, we suggest that there may be quantifiable differences between those more or less susceptible to the illusion. To our knowledge, there have been only two studies investigating how individual differences affect an illusion of control (see Wildman 1998), both concerning the effect of depression on feelings of control.
The objective of this research is to explore whether a gambler’s locus of control (Rotter 1966) affects the susceptibility to the illusion of control when making decisions on a chance determined gambling task. This objective is consistent with Wildman’s (1998) call for studies into the illusion of control utilising the locus of control formulation and other personality factors because the findings may be useful in improving our understanding of continued gambling behaviour.

**LOCUS OF CONTROL**

According to Rotter’s social learning theory of personality (1966), an individual’s perception of control should increase when events are thought to be determined primarily by an individual’s own behaviour or personal characteristics (internal locus of control or internals). This perception of control diminishes if outcomes are seemed to be determined by a function of external factors beyond the individual’s control such as chance or the control of powerful others (external locus of control or externals) (Rotter 1990). Therefore, individuals whose locus of control is primarily internal believe that their life circumstances and outcomes are the result of their own behaviour. Accordingly, externals tend to see themselves at the mercy of circumstances beyond their control.

Locus of control and games of chance

Internals are predisposed to avoid chance-determined gambling because if they spent considerable time gambling, they would soon discover that they have little influence over determining future outcomes (Walker 1992a). Compared to externals, internals have consistently been found to favour (Lester 1980; Walker 1992a) and perform better on skill-related tasks (Rothbaum, Weisz, and Snyder 1982). On the other hand, externals have been shown to express a stronger liking for chance tasks over skill-related tasks and an overall stronger preference for chance situations. Externals have also been found to try harder and perform better in chance related tasks (Rothbaum, Weisz, and Snyder 1982).

Externals tend to perceive chance as controllable (Rothbaum, Weisz, and Snyder 1982), Rothbaum, Weisz, and Snyder (1982) found that externals behaved in a manner consistent with a perception of control on chance related tasks, but not on tasks determined by skill. The opposite pattern was found for internals. Rothbaum, Weisz, and Snyder (1982) also found on self-report findings that only externals stated that they perceived the chance task as measuring their ability. Consequently, externals are prone to the illusion of control as they tend to believe that successfully predicting future chance outcomes is based on their personal aptitude, and are more likely to engage in skill-related behaviours when participating in such tasks. In this study we have given participants the option of choosing their own numbers or being given a random set of numbers for a lottery draw. Those participants who assign a greater chance of winning or preference to selecting their own numbers would be more susceptible to the illusion of control bias. Therefore, we hypothesize that externals will be more susceptible to an illusion of control than internals on a chance related task.

**METHOD**

Participants and Design

Fifty-three participants (30 females and 23 males) were recruited from a large suburban club that provides a wide range of gaming services to the general public. All participants reported that they gamble. Over 75% of the sample stating they played gaming machines at least once a week.

The research presented here is part of a larger study designed to investigate gambler’s varying susceptibility to a number of cognitive biases. The study was conducted in sessions comprising of 4-6 people who were required to participate in 3 chance-determined gambling tasks. The first task was to report on the likelihood of winning in a lottery. All participants received club membership points for participating in the study and were allowed to keep all money won in the study in the form of club membership points. All participants were required to gamble on every bet offered in the study. These membership points could be used to purchase non-gambling goods and services at the Club. This form of remuneration was used to encourage participants to participate in a realistic manner and provide the study with external validity.

Stimuli

*Lottery Tickets.* Six numbers were chosen at random for each of seven different 6/49 lottery tickets. The tickets designed to appear random using the same technique described in Hardoon, Baboushkin, Hayley, Derevensky, Jeffrey, Gupta’s (2001) a study of cognitions in lottery ticket selection. Participants in each study session were given one of these random tickets (the assigned ticket) and told that this was their ticket in a lottery draw that was about to be held. Numbers were to be called out at random until a participant in the session matches all 6 numbers. The first person to have all their numbers called out will be the winner of the lottery task. The winner would be awarded with $30 that could be used on further gambling tasks in the study and ultimately be converted to club membership points. After participants have considered the pre-selected ticket they were asked to select 6 numbers that they would like to have in the lottery task (selected ticket).

*Dependent Measures.* In previous studies there have been different measures used to measure the illusion of control. They range from ratings of perceived control (Langer and Roth 1975), ratings of confidence (Langer 1975; Dunn and Wilson 1990), bet size (Bouts and Avermaet 1992; Dunn and Wilson 1990; Gilovich and Douglas 1986; Davis et al. 2000; Wolfgang, Zenker and Viscusi 1984), bet difficulty (i.e. betting on low probability options) (Davis et al. 2000), trading selected lottery numbers (Langer 1975) and perceived chance of winning (Wohl and Enzle 2002). Participants in this study were asked to use an associated chance of winning scale to rate their chances of winning the lottery with the assigned and then the selected tickets. The scale was a 12.5cm continuous scale anchored by “very good” to “very bad.” The preference scale asked the participants to indicate their preference for choosing the selected ticket using a 12.5cm continuous scale anchored by “yes, definitely [choose the selected ticket]” to “no, definitely not [choose the selected ticket].”

*Locus of control questionnaire.* As devised by Rotter (1966), this scale comprises of 29 pairs of statements including six filler items. In each pair of statements, one relates to an internal locus of control and the other an external locus of control. In its original format, participants are asked to indicate which one of the two statements better describes their thoughts and behaviours (Rotter 1966). Valecha (1972) augmented the scale by requiring that participants state if the choice is much closer or slightly closer to their actual opinion. We used the augmented scale in this analysis. The locus of control scores were distributed normally. A median split was used to place participants into internal and external groups. This resulted in 26 internals and 26 externals.1

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1The money won in the study was converted to club membership points and awarded to the participant.

2One person did not complete the locus of control questionnaire reducing the sample size to 52 people.
Procedure
Participants were recruited from the gaming floor. The cover story was that the study was investigating gambler’s perceptions and opinions of a number of new gambling games. All participants were handed the assigned lottery ticket and completed the associated chance of winning measure. Participants then chose six numbers for the selected ticket and completed the associated chance of winning and preference measures. Participants were asked to select only one of these tickets to enter into the lottery draw. After the lottery was held, participants participated in two further gambling games for about 20-30 minutes and then completed the locus of control questions.

RESULTS
External locus of control gamblers. The illusion of control occurs when gamblers believe that they can affect the outcome of a random event by choosing numbers or otherwise actively affecting their odds of winning. The illusion has been a robust finding. Are all gamblers susceptible? The hypothesis for this study was that gamblers with an external locus of control are more likely to have illusions of control compared to gamblers with an internal locus of control.

Did the gamblers externals believe that they would be more likely to win the lottery if they were allowed to choose the numbers on their ticket? The difference between the gamblers’ belief that a ticket with their choice of numbers would win versus the probability that the ticket they were assigned would win was the first measure to test for the illusion of control. Gamblers were categorised as to their susceptibility to the bias with the difference variable. A chi-squared test reveals that externals were more likely to believe that a ticket with their choice of numbers would win (externals=53%, internals 31%, $\chi^2=2.84, p=.09$). The second measure is the preference for trading the assigned ticket for the ticket with numbers the gambler could choose. The gamblers indicating that they would believe their active participation in the lottery would improve the probability of winning also had a significantly greater preference for the new ticket ($r=3.46, p<.05$).

Internal locus of control gamblers. What did the internals believe? Other than not being as susceptible to illusions of control, we did not offer a hypothesis. Previous research suggests that internals are less likely to believe that they can affect the outcome of a game of chance (Lester 1980; Rothbaum, Weisz, and Snyder 1982; Walker 1992a). For this reason, the internals might be hypothesised to be ‘rational’ and have no preference for control. However all people in the study reported that they do gamble with 75% gambling on a regular basis. Although internals do not generally exhibit behaviour consistent with having an illusion of control, the regularity of gambling behaviour by internal gamblers in this study could indicate some level of misunderstanding of the nature of chance outcomes.

Upon closer inspection of the data, it was revealed that the proportion of the sample that did not believe that their active participation in the lottery would positively affect the probability of winning were not as rational as it initially appears. It was not the case that these gamblers understood the probability of random events as equal across ticket numbers. Most of this group actually believed the assigned ticket had a better chance of winning than a ticket they could choose. The sample was divided into 3 groups; those that believed the ticket of their choice had a better chance of winning, those that believed the probabilities associated with the two tickets were equivalent, and those that believed the assigned ticket had a better chance of winning. The internals were susceptible to the latter bias which is labelled the ‘Passive Control’ in Figure 1. The rationale for the label will be explained in the following paragraphs.

There are two cognitive biases that might explain the unexpected result, the endowment effect and the status quo bias. The endowment effect occurs when people demand more money to give up an object than they were willing to pay for the same object (Thaler 1985). The status quo bias occurs when individuals have a strong preference for the status quo (Samuelson and Zeckhauser 1988). A loss aversion explanation has been offered to account for both effects (Kahneman, Knetsch, and Thaler 2000). Since the individual’s focus is on the potential losses involved with changing the situation, the disadvantages of choosing a new alternative loom larger than the advantages to be gained by the trade. In this case, if a gambler has a lottery ticket and is asked if they want to change it for a different ticket, the status quo bias would predict that they would not change the ticket, in fact, they might even pay to keep their own. However, this effect is not driven by a perceived enhancement of the ticket the gambler owns, but the predicted pain of giving it up (Kahneman, Knetsch, and Thaler 2000). The loss aversion explanation requires that the gambler does not believe the ticket has a better chance of winning than the alternative ticket, but because they are psychologically at the origin of the value function, they see giving up the ticket as a loss. The data presented here shows that internals do believe that the ticket they are holding is more likely to win, therefore, these alternative explanations are ruled out.

Ryckman & Rodda (1971) found that internals experienced a significantly greater decrease in confidence than externals following failures on a chance task. However, they also discovered that externals increased in confidence more than internals following initial successes on the chance task. They attempted to explain this surprising finding by contending that externals tend defend against failure by refusing to change their confidence ratings. However, it could be hypothesised that although internals tend not to believe that chance outcomes are controllable, the fact that their confidence decreased after failure on a chance task suggests that they do perceive some element of control when predicting future outcomes.

In this study all participants were required to gamble on 3 chance determined tasks with the lottery being the first such task. Perhaps, when responding to the chance of winning items, internals were considering the future betting opportunities to come in the study. From their gambling experiences, they could have perceived that if they did actively participate in the lottery draw and lost, it would have reduced their confidence, as they had the opportunity to exhibit some control when selecting their own numbers. This loss of confidence could be perceived as potentially impacting their performance on the future games. If they simply chose the assigned ticket and lost they could attribute the losses to an aspect totally beyond their control. This attribution could be perceived as not impacting their confidence and ultimately their performance on future bets.

Langer (1975) manipulated task participation by either allowing individuals to choose their own numbers for a lottery draw (active participation) or by assigning numbers for a lottery draw to individuals (passive participation). The key finding in the paper is that individuals in the active participation condition had a greater illusion of control. The illusion of control was measured by an increased belief in the ability to affect the outcome of the randomly determined event. In the results presented here the internals appear to believe that a passive strategy of accommodating the environment (Toneatto, Blitz-Miller, Calderwood, Dragnaettti, and Tsanos 1997) would improve the probability of their winning. It is referred
to as a secondary type of control. In other words, the internals may also have an illusion of control, but it manifests itself in a behaviour that is diametrically opposed to the behaviour of the externals: Accommodating the environment versus modifying the environment. This is a post-hoc explanation only and requires further research.

DISCUSSION

The illusion of control has been found to be very prevalent amongst gamblers (Ladouceur, Mayrand, Gaboury and St. Onge 1987; Langer 1975; Wohl and Enzle 2002). In fact, some suggest that it is a defining characteristic of a gambler. We found that the preference for control was strongest in the gamblers with an external locus of control. Internals did not believe that their active participation would positively affect the outcome of the lottery. Quite the opposite, although not hypothesised, the internals preferred not to actively participate in the lottery. They believed that the ticket they were assigned had a better chance of winning. We suggest this may be a different strategy for controlling situations. This strategy is related to the passive control discussed by Toneatto, Blitz-Miller, Calderwood, Dragonaetti, and Tsanos (1997) as a secondary type of control.

This is interesting because by definition, in situations that are not determined by chance, internal locus of control individuals are more likely to believe they can control the environment. They tend to be convinced that their own skill, ability and efforts determine the bulk of their life experiences. In other words, they can modify the environment by their actions. Externals are less likely to believe in their ability to control the situation. They believe that their lives are determined mainly by sources outside themselves—fate, chance, luck or powerful others. In other words, they are forced to accommodate the environment. However, the ‘accommodate or modify’ decision reverses when the outcome of an event is to be determined by chance.

Internals may understand that chance will determine the outcome, but are still not completely rational as they use a passive strategy to improve the probability of a positive outcome. Externals, who do not generally believe they can hone skills to control the future, appear to believe that they have some power to influence the outcome of a randomly determined event. Gamblers in this study were not provided an opportunity to report why they believed the ticket they were assigned and the ticket they could choose had different probabilities of winning. There were two reasons why we did not include a question allowing them to justify their decisions. First, the lottery draw was followed by other gambling tasks not reported here. Asking them to justify their decision may have affected future behaviour. Second, we were not convinced that gamblers can articulate the rationale behind their decisions (Delfabbro and Winefield 2000).

The results here contribute to a burgeoning literature on gambling behaviour. The illusion of control is believed to be one of the key determinants of prolonged gambling sessions. Insights into when the illusion occurs and what strategies lottery ticket holders use to try to improve the probability of holding a winning ticket is critical to our understanding of behaviour in this $124 billion a year industry (Productivity Commission 1999). Our contribution is that
both internal and external locus of control gamblers try to control the situation, but their strategies are completely different: Internals use a passive approach, externals use an active approach.

REFERENCES


SESSION SUMMARY

Prior research in marketing has shown time and time again that consumers prefer choosing from larger assortments (e.g., Kahn 1995, McAlister and Pessemier 1983) and are more likely to shop at stores offering greater variety (Arnold, Oum and Tigert 1983). As a result, retailers, particularly online (Alba et al. 1997), often position themselves in terms of the size of their assortments. Their hope is that by offering a larger assortment, consumers will be more likely to find better fitting products, thereby improving sales, satisfaction and loyalty. Based on this reasoning, retailers have been uneasy to cut back on the number of SKUs even though prior research suggests such reductions may go unnoticed (Broniarczyk, Hoyer and McAlister 1998).

The three papers presented in this session offer novel and nuanced insights into how assortment size and variety affect consumer behavior. Together these papers suggest that (1) consumers and marketers alike overestimate the value of more choice—not only because they underestimate the costs, but because they also overstate the benefits. (2) Retailers, however, may rightfully be weary of simply cutting the number of SKUs since such reductions could have negative implications for sales. (3) Rather than focusing merely on the number of options available, closer consideration should be given to variety on the attribute level and its implications for search and choice. Recognizing that responses to variety can be both positive and negative and may also depend on the types of products in the assortment, the three papers included in this proposal all try to show how variety can be used to influence and predict consumer purchase decisions.

While greater variety often leads to positive outcomes, recent work demonstrates that offering too much variety may be overwhelming and demotivating for consumers due to choice overload (Huffman and Kahn 1998; Iyengar and Lepper 2000). Indeed, prior research suggests that there are significant costs associated with choosing from larger assortments. In addition, the paper by Diehl and Poynor suggests that consumers and retailers may overestimate the benefits derived from larger assortments. Their work shows that larger assortments create heightened expectations regarding the preference match one will be able to find. Such extreme expectations are likely to be disconfirmed, leading consumers to be less satisfied with the same product chosen from a larger compared to a smaller assortment. Even for objectively better preference matches, such improvements do not translate into greater willingness to pay and thus the benefits of larger assortments may not necessarily materialize.

Work on choice overload suggests that consumers experience lower cognitive costs when choosing from smaller assortments. Gone unnoticed, such reductions could also lead to substantial monetary savings for retailers (e.g., Broniarczyk, Hoyer and McAlister 1998). However, if the decrease in assortment is noticed, consumers may experience reactance (Fitzsimmons 2000) and reduce purchases. The work by Nunes and Boatwright presented in this session examines the impact of assortment size on purchase intent. Contrary to recent work on assortment reductions (FMI 1993, Drèze, Hoch, and Purk 1994; Broniarczyk, Hoyer, and McAlister 1998; Boatwright and Nunes 2001, 2004), they find that reducing assortment size decreases shopping frequency as well purchase quantity. However, they also find that the negative impact resulting from assortment reductions differs largely by category, suggesting that reductions can be made strategically for certain categories without suffering the full extent of negative consequences.

While prior research has mainly treated variety and the total number of options available synonymously, not all variety is created equal. People respond differently to the variety in an assortment, depending on the type of attributes involved. Inman (2001), for example, found that consumers are more likely to seek variety and satiate on sensory attributes (e.g., flavor) versus non-sensory attributes (e.g., brand). In the last paper, Morales, Moe, and Kahn show a distinction in how product-related versus non-product related attributes influence perceptions of variety (Keller 1993). While differences on product-related attributes (e.g., calories for nutrition bars) make product assortments seem high in variety, non-product related attributes (e.g., number of servings) offer very little variety. Consistent with the idea that variety seeking along a given attribute is an indicator of preference uncertainty for that attribute, they find that consumers who search across products that differ only on non-product related attributes are more likely to make a purchase, while consumers who search across products that differ on product-related attributes are less likely to make a purchase.

Takend together, this session broadens our knowledge of how variety in product assortments can influence consumer decisions. Based on experimental as well as field data that has been already collected for all three projects, these papers make it clear that bigger is not necessarily better with regard to assortment size. More importantly, they also show several ways that assortment variety can affect the likelihood of consumer purchases as well as marketers’ ability to predict such purchases. Given the importance of these issues, it is expected that this session will be of interest to a wide audience, including researchers interested in variety, assortment, retailing, and decision-making in general, as well as marketing practitioners alike.

SESSION ABSTRACTS

“Great Expectations?! Assortment Size, Expectations and Purchase Likelihood”

Kristin Diehl and Cait Poynor, University of South Carolina

Many studies in marketing have shown that consumers value greater selection (e.g. Kahn 1995; McAlister and Pessemier 1982). Recently, however, researchers have demonstrated that consumers can experience choice overload. Consumers are less likely to actually purchase when faced with larger as opposed to smaller selections (Iyengar and Lepper 2000, Iyengar and Jiang 2003) and may be less satisfied with their chosen option (Wood, Swain and Wadden 2004) as well as less confident in the choices they made (Chernev 2003). This stream of research suggests that greater selections can be ‘demotivating’ because such assortments may be overwhelming and can heighten decision difficulty (e.g. Huffman and Kahn 1998).

We propose an additional mechanism, based on the effect of assortment size on consumers’ expectations that, alongside the effect of cognitive load, may explain lower purchase likelihood.
from larger assortments. We predict larger assortments will raise expectations about the preference match that can be achieved from that selection. Higher expectations may give rise to negative disconfirmation when searching a particular assortment thus leading to fewer purchases.

In expectation, consumers should always be able to find at least as good a match from larger as from the smaller sets. However, negative disconfirmation from larger assortments is still likely because (1) consumers may overestimate the extent to which they will be able to choose more advantageously (e.g. Diehl, Kornish Lynch 2003) and (2) because discrepancies from the ideal will be perceived as more severe (Wedell 1996). We therefore make the following predictions: (1) Larger assortments lead to lower purchase likelihood. (2) Larger assortments increase expectations about the best fitting product available. (3) The effect of assortment size on purchase likelihood will be mediated by experienced negative disconfirmation.

So far, we have collected data from a scenario study and a real choice study, supporting our proposed framework. Note that in these studies, the dependent variables are willingness-to-pay (WTP) and product usage, respectively, rather than purchase likelihood measures.

In study 1, participants were asked to review a restaurant menu on behalf of a Diet Club and to select the option that best met the goal of 10 total carbs or less. The design was a 2 (menu size: 10 vs. 30) by 2 (expectation measure taken prior to choice: Yes/No) between-subjects design. In both menus, the best and second best option as well as the worst option were identical; however, the larger menu featured more items within the same range. As predicted, a larger assortment raised the degree of preference match participants expected. We also found that larger assortments decreased participants’ WTP and satisfaction for the same, good option. Note that assortment size had this effect regardless of whether or not participants had previously expressed their expectations.

In Study 2, participants chose an actual pen from a large (25 pens) or small (5 pens) catalog. Subsequently they used this pen to answer an unrelated, open ended questionnaire. As predicted, participants expected to find a more ideal pen when given the larger catalog to choose from. Interestingly, however, those choosing from the smaller catalog actually used the chosen pen more extensively, i.e., wrote more words in the subsequent task, than those choosing from the larger catalog. Controlling for choice from the larger catalog being perceived as more difficult, these results still hold.

Recently, researchers have challenged the idea that greater choice is always desirable, focusing on the effects of choice overload. We contribute an additional mechanism to the current discussion, suggesting that increasing consumers’ expectations of what should be available and therefore what constitutes acceptable products can have negative consequences.

“Effect of Product Assortment Changes on Customer Retention”
Peter Boatwright, Carnegie Mellon University
Sharad Borle, Rice University
Joseph B. Kadane, Carnegie Mellon University
Joseph C. Nunes, University of Southern California
Galit Shmueli, University of Maryland

Recent research in both the academic and the practitioner literatures suggests grocery retailers can reduce product assortment with little or no loss in sales. A Food Marketing Institute study (1993) found no significant loss in sales after a reduction in the number of Stock-Keeping Units (SKUs) in six test categories across three retail chains, and Boatwright and Nunes (2001, 2004) also found no impact on sales in a study of 42 categories. Drèze, Hoch, and Purk (1994) found sales actually went up nearly 4% in eight test categories after experimenters deleted 10 percent of the less popular items. Similarly, a study by Broniarczyk, Hoyer, and McAlister (1998) found substantial reductions of low-selling or small-share items can occur without significantly impacting perceptions of assortment within a category.

Offering large assortments is costly, and Wal*Mart’s success has forced retailers to re-evaluate the current business model. According to the notion of “efficient assortment,” cost reductions associated with reducing the number of slow-selling items a grocer carries within a category should result in increased category profits. For example, Progressive Grocer (Krum 1994) reported 87% profit gains in a study of cat box filler where the number of category items was reduced from 26 to 16. Nevertheless, retailers remain reluctant to cut assortments. One of the primary value propositions offered by many grocers is one-stop shopping; customers can find exactly what they are looking for without visiting multiple stores. Retailers fear that backing off from this principle could steer consumers to a competitor that continues to offer a broader product assortment. Simply put, retailers fear assortment reductions erode customer retention.

This research evaluates the outcome of an extensive reduction in assortment conducted by a retailer abiding by the principles of efficient assortment espoused by analysts and supported by prior studies. Specifically, we investigate the impact of a large-scale, one-time assortment reduction on customer retention across each and every category within the store. At the most basic level, we investigate whether or not customers changed their shopping behavior after being offered fewer alternative products from which to choose. The results from our panel level model indicate that the reduction in assortment reduces overall store sales, and decreases both sales frequency (store visits) and quantity (total basket size). We also find that the assortment reduction had a greater overall effect on purchase frequency than on purchase quantity. The decline in sales is in contrast with previous research suggesting that eliminating moderate amounts of low-selling SKUs results in unchanged or increased category sales (Broniarczyk, Hoyer, and McAlister 1998; Drèze, Hoch, and Purk 1994; Boatwright and Nunes 2001, 2004). It is important to point out that earlier research focused on assortment changes within select sets of categories, while we investigate the effects of an assortment reduction on customer retention both across all categories and within individual categories.

Our category-level analysis reveals that less frequently purchased categories are more adversely affected by the reduction in assortment than other categories. We also find that the reduction has a greater effect on purchase frequency than on purchase quantity at the category level (category purchase incidence and purchase quantity), just as it did at the store level. Recent empirical studies have focused on exploring the effects of assortment cuts on purchase quantities in popular categories. We suspect this concentration on frequently purchased categories, where our model predicts a decline in purchase frequency would have a less profound effect, may contribute to the varying results across different studies. It is important to note that sales did not decline in every category, and our results also reveal certain categories for which purchase frequency actually increases while quantity remains unchanged.

To summarize, the primary purpose of this research is to explore the effect of a large-scale, one-time decrease in assortment on customer retention at both the store and category level simultaneously. We utilize sales data from each and every category within a store to examine the effect of a reduction in low-selling SKUs on
both category and storewide sales. We document that, while the impact was positive in several individual categories, overall store sales decreased, a result not predicted by previous academic or industry research, or by management at the online grocer providing the data.

Andrea Morales, University of Southern California
Wendy Moe, University of Maryland
Barbara Kahn, University of Pennsylvania

Several researchers have argued that not all types of product attributes play the same role in a consumer’s decision process. Keller (1993) dichotomized attributes as product-related versus non-product related attributes. Product-related attributes are defined as those “ingredients necessary for performing the product or service function sought by consumers.” Non-product related attributes are defined as “external aspects of the product or service that relate to its purchase consumer;” these include price information, packaging or appearance, and user/usage imagery.

Inman (2001) also proposed different categories of product attributes. He found a distinction between sensory attributes (e.g., flavor) versus non-sensory attributes (e.g., brand) in terms of the degree of variety consumers sought along each type of attribute. Specifically he shows both empirically and experimentally that consumers are more likely to seek variety and satiate on sensory attributes. Interestingly, although these two types of attributes result in very different buying behavior, both sensory and non-sensory attributes are considered product-related attributes in Keller’s framework.

In this paper we examine attribute-level based perceptions of variety and their impact on the buying process. Building off of Keller’s framework, we first consider both product-related (including sensory and non-sensory) and non-product related attributes, and look at how variety along these two types of attributes impacts overall perceptions and preferences for product assortments. One key difference between this paper and others in the area is that rather than looking at the variety in a store’s product assortment, we focus on the assortment of items consumers choose to look at during the search process and examine how this assortment varies with regard to attribute-level variety.

Previous research has proposed that variance along a product attribute is an indicator for uncertainty (Pras and Summers 1978). In addition, Moe (2003) suggests that consumers may seek different levels of variety depending on where they are in the decision process. Early in the decision process when consumers are first creating their consideration sets and learning more about the products, they are likely to seek more variety, while later in the process when they are evaluating alternatives, they are likely to seek less variety. Building off of these same ideas, we propose that variety seeking along a given attribute in the search process is an indicator of preference uncertainty for that attribute. Consequently, consumers who seek a higher variety of products may be classified in a different stage of the purchasing process. If this is indeed the case, the variety of the assortment searched by a consumer can be a powerful indicator of purchasing behavior and may ultimately be used to predict, and even encourage, the likelihood of purchase. Therefore, it is important to study the relationship between attribute-level variety in the assortment of products searched and purchasing behavior, as it may provide the e-commerce marketer with another way of identifying likely buyers.

In this paper, we use a combination of controlled, laboratory experiments and online clickstream data to show distinctions between variety along product-related and non-product related attributes with regard to where consumers are in the decision process. In the first laboratory study, we vary attribute-level variety in an assortment and measure perceptions of variety and preferences for the assortment. The results indicate, across several product categories, that the two types of attributes have differential effects on perceptions of variety. Specifically, attributes that make products least similar (or most different) are all product-related attributes that change the product substantively (e.g., calories for nutrition bars, flavor for cake mixes, fragrance for facial tissue), while people see no differences between products that differ on non-product related attributes (e.g., brand, price, number of servings). We complement these initial results with an empirical investigation of an online retailer to show how attribute-level variety in the assortment of products searched can be used to assess where consumers are in the decision process and their likelihood of making a purchase. Preliminary results indicate that consumers who are more likely to make a purchase search across products that differ only on non-product related attributes, while consumers who are less likely to make a purchase search across products that differ on product-related attributes. Finally, in a second experimental study, we replicate these empirical findings in a laboratory setting, again showing that consumers who are further along in the decision process choose to look at products with different non-product-related attributes, such as brand.