E C O N O M I C S B U L L E T I N

The next new thing: curiosity and the motivation to purchase novel products

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Abstract

Consumers motivated by curiosity may enter a 'hot' state when confronted with a desirable novel product and be unable to judge their future actions in a 'cold' state. To test this, a multiple week auction experiment was conducted using an opportunity to rent an MP3 player. Subjects initially recorded non−binding bids to rent the player for both the first and second weeks. The only significant differences between these and actual bids were with week one renters bidding lower in week two. Results showed that people have difficulty forecasting their future value of a product, especially when it is one about which they are curious or eager to try. Even consumers with a higher opinion of the product after use had a lower valuation of it after they gained experience with it.

The authors wish to thank Thomas Gilovich and Robert Frank for their help in the design of the experiments, George Loewenstein and Katie Gifford for comments on the manuscript, and Daria Bernard and Sinan Ünür for assistance in conducting the experiments.
Citation: Bernard, John C. and William Schulze, (2005) "The next new thing: curiosity and the motivation to purchase novel products." *Economics Bulletin*, Vol. 3, No. 32 pp. 1−8
Submitted: April 18, 2005. **Accepted:** July 4, 2005.
URL: http://www.economicsbulletin.com/2005/volume3/EB−05C90020A.pdf

1. Introduction

This research examines the economics and psychology of consumer decision-making when faced with a novel product. While consumers may gain utility from the novelty, this attribute should rapidly decay. The objective of the experiment described in this paper was to test if consumers can anticipate this decay. We hypothesize that consumers motivated by curiosity may enter a 'hot' state when confronted with a desirable novel product and be unable to judge their future actions in a 'cold' state. A second objective was to test if consumers are more interested in an upgraded or improved version of a novel product after they have had some initial experience with it, and possibly returned to a 'cold' state.

2. Background

The motivation for this research came from a growing series of psychological studies dealing with either curiosity or happiness. Starting with the former, in a paper that attempts to explain the peculiar features of curiosity, Loewenstein (1994) summarized existing psychological research and put forward a new theory of the psychology of curiosity. The stylized facts about curiosity Loewenstein attempts to explain are its intensity, transience, associated impulsive behavior, and the tendency of its satisfaction to disappoint. These attributes are well illustrated in a study cited by Loewenstein who writes: "For example, Felcher, Petrison, and Wang (1993) interviewed 30 people about their attitudes toward mail and found that although the daily mail delivery is looked forward to with anxious anticipation and impatience, most respondents reported almost always being disappointed by the actual mail that they received."

The state of anticipation is described as a 'hot' state (Loewenstein, 2000) while the satisfaction of the curiosity results in a 'cold' state, even if the product did not disappoint. People in a 'hot' state are not able to accurately value the satisfaction of their curiosity, and tend to over-value it. Loewenstein argues that curiosity is a form of cognitively induced deprivation that arises from a perception gap in knowledge or understanding. Thus, curiosity is aversive and may result in a form of loss aversion. Many economic experiments that have examined loss aversion have found that presenting the same commodity in a loss as opposed to gain frame approximately doubles values (see, for example, Knetsch and Sinden, 1984; Kahneman, Knetsch, and Thaler, 1990; McClelland and Schulze, 1991; Boyce et al., 1992; and Shogren et al., 1994). In a 'hot' state, much like a loss frame, the consumer may assign an inflated value to a product due to the deprivation or curiosity they feel by not having the item; in a 'cold' state, they may more accurately appraise the value of a purchase.

Secondly, there have been an increasing number of psychological studies that have examined happiness (see for example Diener and Diener, 1995). This body of evidence suggests that increased consumption of ever more refined luxury goods does not in-and-of-itself make people happier as simple utility theory would suggest. Rather, although relative consumption is correlated with happiness within a particular country, absolute consumption across countries is not correlated with happiness (as long as the standard of living is above subsistence levels). Also, while average consumption in western economies and Japan has tended to increase over time, average measures of happiness have remained relatively constant. Similarly, although income increases over the life cycle, happiness again remains relatively constant.

Frank (1999) summarized this evidence in a book entitled *Luxury Fever*. He explains these results using the biological and psychological theory of adaptation. Although the acquisition of luxury goods provides transient pleasure, people quickly adapt to their changed situation and no longer notice the improved commodity that has become part of the *status quo*. Frank also argues, consistent with the arguments presented by Duesenberry (1949), that the motivation for purchase of ever more luxurious and expensive goods comes from the desire to keep up with the consumption of others. If ownership by a neighbor of a more luxurious car or a more elaborate backyard barbecue grill creates a feeling of relative loss that motivates purchase of comparable commodities, Frank argues that an externality exists. This externality leads to over-consumption of luxury goods and insufficient expenditures on goods such as health, education, and the environment. However, for this process to continue over time, someone must initiate the next incremental purchase of even more luxurious "new" goods. It is this part of the proposed process, the behavior of early adopters, that we wish to examine in this experiment.

It should be noted that the psychological and sociological theory of diffusion of innovation argues that new products go through a number of phases where innovation is communicated through different channels over time among members of a social system (Rogers, 1995). Initially during the knowledge stage, information about the innovation is communicated by the mass media, which motivates early adopters to purchase the new product. Then, during the persuasion stage, interpersonal communication dominates the diffusion of innovation. The literature focuses on describing the characteristics of early adopters such as having more years of education, higher social status, a greater ability to deal with abstractions, greater rationality, greater intelligence, greater ability to cope with risk, higher aspirations, greater exposure to mass media, and more information seeking. However, diffusion of innovation theory does little to explain the particular psychological or economic motivations of early adopters.

3. Experimental Design

The commodity utilized in our experiment was a Rio MP3 player. These players, the first in a new product category that had just recently been introduced at the time of the experiment in April 1999, produce digital quality sound in a unit a fraction of the size of a portable CD player. Unlike many technologically novel products, the per-unit cost of around $200 was reasonable enough to make the purchasing of multiple players feasible. The product also met our second design goal by being available in an upgraded version with twice as much memory installed to allow for a longer playing time.

To keep the experiment manageable and affordable, 22 subjects were recruited (one failed to complete the experiment, leaving a sample of 21 subjects) from electrical engineering undergraduate majors at Cornell. These subjects had interest in the players both from a user's perspective and from a technical standpoint. In advertising the experiment, the player itself was featured along with a mention of an opportunity to try one. This was done to both help capture those already curious about the product and to heighten the curiosity and anticipation of those that signed up. The experiment was closed to those that had already purchased a player, although it was new enough at the time that few students had any experience with the product. Payment for the experiment was advertised as $40 minus any expenses incurred.

The experiment was conducted over three successive weeks. On each of the first two weeks subjects were presented with the opportunity to rent one of the Rio players for a one-week period starting on that day. To avoid the potential for students to copy the software included with the player, only the player itself was rented. Subjects were instructed to bring their favorite CD's and a play list of songs they would like to install in the player's memory in case they became one of the renters. At the start of each of the first two weeks, subjects were required to show that they had brought music with them. To keep subjects coming every week and to prevent them from buying a player during the experiment, the third week was reserved to randomly give away six of the players. Subjects needed to come every week to have a chance at the give-away.

In more detail, in the first week subjects were given a chance to briefly listen to the players with a variety of pre-installed MP3 music files. After their examination, subjects were instructed to write down a series of four bids. The first pair of bids was how much they would be willing to bid to rent the basic player and the upgraded player for one week starting on that day. The second pair of bids was how much they predicted they would be willing to bid the next week to rent either of the two player types for a week starting then. Bidding values were restrained to a maximum of twenty dollars, the amount they were given in cash as a starting balance each week. Subjects were advised that they would not be required to bid the same as they indicated.

In each of the two weeks, players were rented for one week to ten subjects using a sealed-bid Vickrey auction (making it an 11^{th}-price rule). Having half of the subject pool ending up renting a unit was essential for the design in the comparisons between the different groups in their week two behavior. Given the importance of bidding accuracy, subjects were initially given a lecture explaining why the best strategy was to bid their true value for renting a player. In addition, subjects were run through five paid practice rounds with induced values. This combination appeared effective. For the five periods overall, the average difference between induced value and bid was 3% and in the last practice period, average bids were only 0.15% different from the average induced value.

After the practice periods, one auction was run for the basic player, followed immediately by the auction for the upgraded player. No results or bidding information was given between the two auctions. On neither week were subjects informed in advance which of the two types of players was actually being rented. On the first week, however, the design required that we rent the basic player. To accomplish this without misleading the subjects they were informed that the information of which player was to be rented was written on a piece of paper sealed in an envelope visible at the front of the room. On the second week, subjects were informed that the player type to rent would be determined by a coin toss conducted by one of the subjects after the auctions. Both weeks, once the player type to be rented was established, only the rental price for that player was revealed. No other bidding information was made public.

The design also relied on subject questionnaires. Everyone filled out questionnaires regarding their opinions of the players before and after their initial listening experience. For renters, separate questions were constructed to determine their opinions and attitudes after renting, as well as how they used the player and how much time they spent listening to it. This information was collected to help determine the causes of any unusual behavior that might have appeared in the bidding data.

4. Results

Analysis of the results could be classified into five different components. First, on the initial week of the experiment there was no significant difference between anticipated and actual bids. Table I shows average actual bids of 7.92 and 9.65 for the basic and upgraded player, respectively, while Table II shows average anticipated bids of 7.54 and 9.04 for the two player types. Comparing the sets of values with a t-test, the hypothesis that actual and anticipated bids were equal could not be rejected for either player type at the 5% level. Tables I and II additionally show average actual and anticipated bids for the basic and upgraded versions of the player over the first two weeks broken down by week one renting status. Further dividing the bid comparisons this way also found no significant differences between anticipated and actual bids for either class.

Table I. Comparisons of Actual Bids for the Basic and Upgraded Players

		Average		
Player	Subjects	Week 1	Week 2	Ratio
Basic	Week 1 renter	12.38	5.23	2.37
	Week 1 non-renter	3.86	4.00	0.97
	All	7.92	4.58	1.73
Upgraded	Week 1 renter	14.68	7.55	1.94
	Week 1 non-renter	5.09	5.25	0.97
	All	9.65	7.44	1.30

Table II. Comparisons of Anticipated Bids for the Basic and Upgraded Players

		Average		
Player	Subjects	Week 1	Week 2	Ratio
Basic	Week 1 renter	12.28	11.83	1.04
	Week 1 non-renter	3.23	3.45	0.94
	All	7.54	6.35	1.19
Upgraded	Week 1 renter	14.28	13.93	1.03
	Week 1 non-renter	4.27	4.49	0.95
	All	9.04	9.04	1.00

The second major component of the results was that subjects did not anticipate changes in their bid from week one to week two. The hypothesis that week one and week two anticipated bids were equal could not be rejected for either category of renter status or player type. This situation can be seen clearly by the ratios expressed in Table II. Thus, neither set of subjects viewed the possibility of a change in their state with regard to the player. Despite this, bids the second week did not correspond to the anticipated bids the subjects had recorded the first week. Averages of actual and anticipated bids that week were 4.58 and 6.35 for the basic player, and 7.44 and 9.04 for the upgraded player, respectively. Thus actual week two bids were substantially below the anticipated values,

both for the basic player that had been rented, and for the upgraded player. For both types, the hypothesis that the two sets of values were equal was rejected at the 1% level.

The third major result component, however, was that whether week two anticipated bids differed from actual bids depended on week one renter status. Figures 1 and 2 show all actual and anticipated bids each week by status (ordered by bids) highlighting the drastic shift in week one renter's actual bids.

Figure 1. Comparisons between Actual and Anticipated Bids during Week 1 for the Basic Player by Week 1 Renter Status

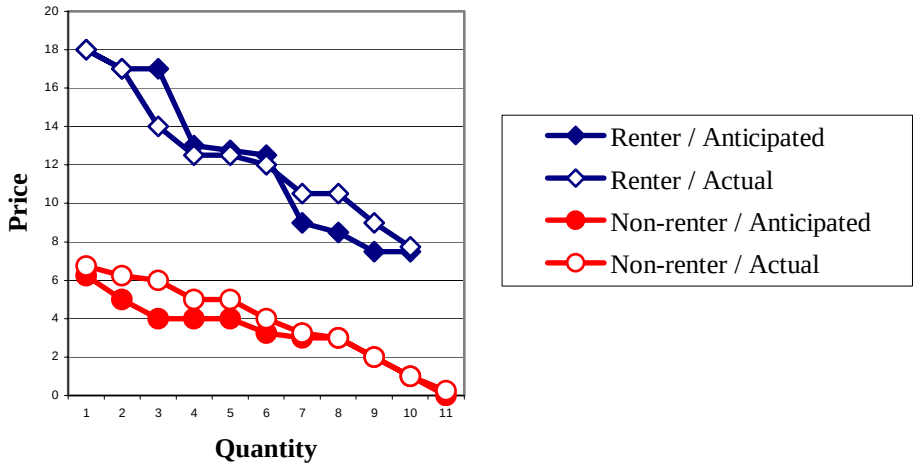
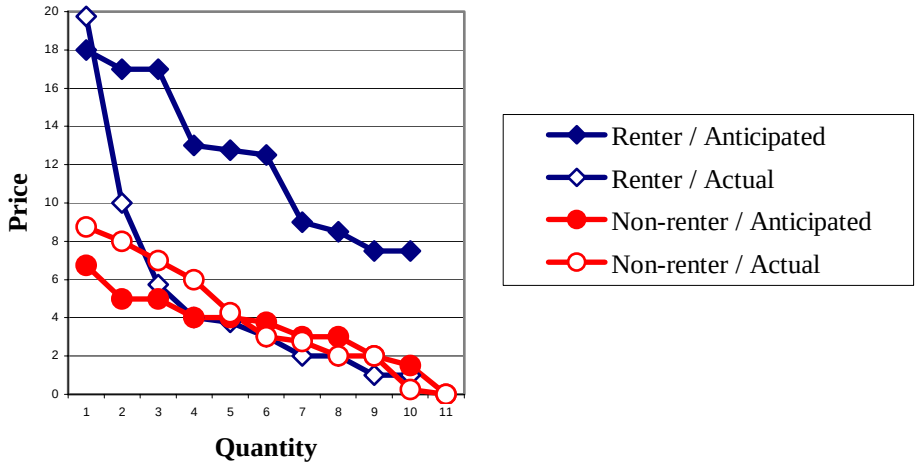


Figure 2. Comparisons between Actual and Anticipated Bids during Week 2 for the Basic Player by Week 1 Renter Status



For week one non-renters, anticipated and actual bids were not significantly different at the 5% level. In contrast, week one renter actual bids the second week were

significantly lower than their anticipated bids, a result of nine of the ten renters lowering their bids. These results stand out clearly graphically. The ratios expressed in the first two tables also show this result. Week one renters' bids changed significantly in the second week by a ratio of 2.37 for the basic player and 1.94 for the upgraded player. This corresponded well with the aforementioned two-to-one value changes found in economic experiments investigating framing effects, and suggests a framing change had occurred with the renters. In terms of Loewenstein's explanation of curiosity, the perception gap was filled with the weeklong experience and subjects had moved from a loss frame to a gain frame.

A fourth component of the results was that for the second week the bids of week one renters were not significantly different from non-renter bids for the basic player. This was a drastic change from the first week, where the bids were different at the 1% level. The comparison is summarized in Table III, where the ratio between the categories was only 1.31 compared to at least a value of 3 for the other ratios. It appeared as if week one renters adjusted to the valuation held by the initial non-renters, an event particularly interesting since no information on actual bids was divulged. This potentially suggests that, given the similar demographic profile within the subject pool, renters have returned to a common 'cold' state shared with the other subjects.[1]

Table III. Bid Ratios between Renters and Non-Renters

Player	Week	Actual Bid	Anticipated Bid
Basic	Week 1	3.21	3.80
	Week 2	1.31	3.43
Upgraded	Week 1	2.88	3.34
	Week 2	1.44	3.10

The fifth result component was that renters' actual bids the second week fell substantially even for the upgraded player. In fact, only one renter increased their bid for the upgraded player in week two. This was counter to our second hypothesis that renters' values for the upgraded player would increase. It may be that this is a result of the extent to which subjects viewed extra memory as an upgrade to the product. Although useful to the product, the additional memory may not be considered a novel element to the extent implied by the examples of Frank (1999), and thus not inductive to motivating further curiosity. Future research should include a more cogent upgrade to better allow testing of this aspect. It should be noted though that renter bids were still significantly higher than non-renter bids for the upgraded player. Since not even the price that would have held the first week for the player was announced, this may not be surprising. Still, as also seen in the table, the ratio of difference had declined from 2.88 to 1.44 with the other ratios again over 3.

While bidding behavior appeared to verify the first hypothesis of failure to anticipate declines, questionnaires were used to try and determine in more detail why bids had changed. Importantly, no evidence appeared to suggest the bid change was due to

[1] Since all knew a zero bid was allowed, this also suggests that the week one renters did not simply lower bids to take the given $20 instead. Indeed, many of the same subjects did rent again the second week.

dissatisfaction or boredom with the player. These two would have been the most harmful to the results, implying a change in opinion of the product rather than in curiosity level. Indeed, four of the ten renters' opinions of the player increased after the week while only one's opinion lowered. Renters spent substantial time using the devices, with an average of 11 hours usage per subject. Many indicated it had become a regular habit for them either between classes or while exercising; perhaps then part of the *status quo* suggested by Frank. The one renter that increased their bid stated that they did so to be sure and be able to rent again.

The main reason cited for lowering bids the second week, noted in various forms by seven of the renters, was that they were now bidding what the player was really worth to them. These subjects directly stated that they had bid higher before due to the novelty of the product. In this, interestingly, there did not appear to be any regret at the size of the bids they had entered the week prior by the renters. While their answers seemed to suggest this was an obvious course of action from one week to the next, none of the subjects had managed to recognize this in their anticipated bids. No initial hypothesis had been made regarding regret, although the lack of it may hint towards why it may often be the same people that are willing to go out and buy novel products at high prices. These are the people that start the process towards the next round of more luxurious products and create the externality proposed by Frank. A further investigation of this would be a useful direction for new research.

5. Conclusions

When novel products appear on the market, particularly those utilizing advanced technology, a segment of consumers are commonly observed purchasing it at substantial prices. For example, a segment did not too long ago purchase DVD players, now sold for $100 or less, for over $1,000. While it is unlikely the purchasers feel the higher price is the true value, it is more likely there are other components to the purchase that are not yet fully explained by economic theory. To begin improving knowledge in this area, auction experiments and questionnaires were used to examine the economics and psychology of consumer decision-making when faced with a novel product.

The results of this experiment conformed to our primary expectation in that renters did bid more the first week than the second week by about two to one, and that the subjects did not anticipate this decline in value. Both our own observations of subjects' behavior during the experiment and comments from the subjects suggest that a major motivation for subjects both to participate in the experiment and for renting players was curiosity. Thus, the difference between the week one and week two bids for both the basic and upgraded Rio players among renters may have resulted from a shift in framing: from a 'hot' state to a 'cold' state. Specifically, curiosity may have created a loss frame for the week one values, while the resolution of that curiosity shifted the week two values to a gain frame - "what the player was really worth" according to one of our subjects.

This experiment should be considered a start in this area and hopefully motivate others to further work. While conducting similar experiments is quite costly and time-consuming, larger samples and more product types are needed for verification of our conjectures. There are many possible extensions and limitations. A potential avenue exists in comparing the effects found here with those involving known products, where curiosity would not be a factor. Also as research progresses, the theory surrounding

consumer responses to novel products should be further developed. While recent work involving curiosity and happiness has been important, a better understanding of the economics and psychology behind consumer reactions to novel product still needs to be developed.

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