The Psychology of Intuitive Forecasts of New Product Utility

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Abstract

When faced with the decision to adopt a product or service innovation consumers often need to forecast the long-run utility it will provide relative to incumbent goods. In this paper we review recent psychological research on the ability of people to forecast their own future preferences and discuss its implications for new product adoption decisions. We identify and review evidence for four distinct ways in which new product valuations may depart from those that would be prescribed by normative economic theory: projection biases, telescoping, emotional myopia, and loss framing. One of the implications of these biases is a predicted tendency for consumers to systematically overvalue and overbuy technology—at least under some conditions. We conclude with a discussion of the opportunities—and risks—these biases pose for managers seeking new ways to encourage consumer adoption of novel products and services.

> Good wine needs no bush,
> And perhaps products that people really want need no hard-sell or soft-sell TV push.
>
> — Ogden Nash

Consumers rarely know with certainty how much utility they will derive from a product innovation before it is adopted. While most hope, of course, that the purchase will provide an enduring source of pleasure, there is always the risk that its benefits will prove disappointing, and the product will end up being relegated to a garage or attic. And therein lies the paradox of new-product adoption decisions: while consumers might ideally like to base their decisions about whether to purchase an innovation on the incremental benefits it offers, these benefits can often be observed only after it has been purchased. By paying for a new good or service the consumer is essentially acquiring a speculative option: the ability to begin a stream of consumption that will reveal whether or not it is something worth consuming in the future.

How skilled are consumers at making these speculative assessments of product value, and what implications does it hold for the new product management? In this paper we explore this issue by reviewing an emerging body of evidence describing biases that arise when consumers make intuitive forecasts of the future value of product and service innovations. One of the core conclusions is that consumers' intuitions are often biased, bearing little resemblance to the efficient forecasts of future product use presumed by normative economic theory. Consumers, for example, are prone to overvalue attribute embellishments that they make limited later use of, misconstrue future usage frequencies, and attach different valuations to the same product depending on whether they mentally frame its

core function as means for enhancing pleasure or preserving utility. When applied at a market level, these biases have the potential of distorting aggregate demand for innovations—allowing some objectively good innovations to fail while objectively inferior ones to prosper.

The rational basis of new product-adoption decisions

On March 24, 2005 managers at Sony anxiously awaited the first sales reports on the U.S. launch of its new entry to the consumer electronics market, the *Play Station Portable (PSP)* game console. By some perspectives the *PSP* was a sure winner; *PlayStation* was the world's most successful game-console franchise, and many predicted that consumers would race to adopt it with the same frenzy that accompanied the launch of the *Playsttaion-2 (PS-2)* console two years earlier. But the *PSP* differed from the *PS-2* in a critical way. Unlike the *PS-2,* with the *PSP* Sony was asking consumers to take a chance on a new-to-the-world technology, one that would replace their current collection of hand-held iPods, DVD players, and Nintendo game players with a single integrated entertainment device. And the risk to buyers was significant: while consumers might reasonably assume that the lack of games and movies that marked *PSP*'s initial launch would be remedied with time, less certain was whether their own preferences for consuming media—currently rooted around different devices--would evolve to conform to the architecture offered by the *PSP*.

The gamble faced by potential Sony customers was, of course, not unusual. Virtually all innovations pose consumers with the same dilemma of assessing whether it is worthwhile to pay to initiate of a stream of utility from a new product whose value can only be fully observed after the product has been adopted. How do consumers make these assessments? While the answer to this descriptive question may be uncertain, there is a clear answer to the

related normative question of how such assessments *should* be made. That is, how new-product adoption decisions should be made by rational consumers who are seeking to maximize the long-run utility of product ownership in a category.

A normative analysis would go something like this. Consider a consumer who possesses an incumbent device α (say an existing hand-held console) and is considering acquiring a new device δ (say a *PSP*) at a price *C*. The utility provided by δ is uncertain, but can be discovered through use. The consumer would be assumed to assess the value of δ by first imagining the different possible realizations of utility that he or she might observe given ownership, and then the pattern of usage that would rationally follow from these discoveries. For example, if he or she discovered that the device performed poorly relative to expectations, that pattern of usage would likely be a few trial uses of the new device followed by a return to usage of the incumbent. The value of the new device—its *option value*--would be the mathematical expectation of the long-term discounted utility implied by these different possible trial-and-usage sequences.

Formally, let $d_t \in \{0,1\}$ denote the consumer's decision whether or not to utilize the new device δ at a future time *t*, and let $x_t = u(\delta)_t - u(\alpha)$ be the net utility that is realized given a decision to utilize δ at *t*. Because utility is arbitrarily scaled it, for simplicity we set the utility of the current device to be zero, hence $x_t = u(\delta)_t$. Let z_t denote the consumer's beliefs about the probability distribution associated with x_t. To illustrate, z_t, might be the assessed probability at time *t* that the consumer will find the utility provided by the new device to be superior to that of the old[1]. Finally, let $\pi = d_0,..,d_T$ be a sequence of usage decisions defined over a T-period ownership horizon. Given these elements, the consumer

[1] In a standard analysis these beliefs would be assumed to evolve as a Markov process given decision to utilize δ; that is, associated with z_t is a first-order cumulative conditional distribution function $G(z',z)$.

could compute the total discounted expected utility implied by a given any usage sequence $\pi, V_0(\pi)$, as follows:

$$V_0(\pi) = E_0 \sum_{t=0}^{T} \beta^t v(x_t, z_t, d_t) \qquad (1)$$

The consumer's goal would be to find that sequential decision policy π^* that maximizes this expression, yielding an optimal ownership valuation $V^* = V_0(\pi^*)$. V^* is the rational option value of the device, and the consumer would be prescribed to adopt the new device if this value was greater than the purchase price.

Few would suggest, of course, that consumers would literally engage in such a complex calculation process when deciding whether to adopt an innovation. But note that expression (1) makes a number of quite reasonable predictions about the factors that should influence the relative success of different innovations—predictions that could allow (1) to serve as a good *as if* model of behavior. It predicts, for example, that consumers should be less likely to invest in learning about an innovation if: 1) they have short anticipated ownership horizons (smaller T) and/or high temporal discount rates (smaller values of β), 2) they see the incremental benefits of utility of the new device as being limited compared to their incumbent devices, and 3) they see themselves making only occasional use of these benefits (e.g., when the optimal decision sequence π^* describes an alternating pattern of usage).

On the other hand, while adoption decisions may be directionally consistent with normative theory, there is ample reason to suspect that individual decisions may often stray from optimality—and possibly dramatically so. Expression (1) identifies four core mechanisms by which actual adoption decisions may depart from normative benchmarks:

1. Incorrect forecasts of the product usage decisions that will be made in the future light of what has been learned about product quality (the future decisions d_t);
2. Incorrect forecasts of the utility that will be derived from these future decisions (the conditional valuation $v(x_{t,})$);
3. Incorrect assessments of the future flow of information about the innovation (the density z_t); and/or
4. Faulty construal of the cumulative value of (1) and (2) over time through misestimates of the rate of discounting β^t and the planning horizon T.

A large and growing body of empirical evidence suggests that errors in the intuitive computation of these quantities will be the norm rather than the exception and—more critically—that these errors will be systematic.

Where normative models of adoption go astray

Consider the following thought experiment. Your 4-year-old cell phone has been acting up so you travel to a phone store to purchase a replacement. You discover that while phones with the same functionality are available at a low price, state-of-the art alternatives are available that offer a rich array of new features—though none that you particularly thought you needed such as the ability to watch television shows. How likely would you be to leave the store with the originally-intended simple replacement rather than an enhanced model?

The evidence from recent work examining how people make forecasts of the future utility of uncertain product attributes suggests that the odds heavily favor your walking out with an upgraded phone—even if you ultimately make limited use of the advanced features you paid for (e.g., Kahn and Meyer 1991; Vianna Thompson, Hamilton, and Rust 2005;

Zhao, Meyer, and Han 2006). The reason is that prior assessments of new-product values tend to be distorted by four biases in how we make intertemporal decisions under uncertainty:

1. *Projection biases*: the tendency for intuitive forecasts about future preferences and emotions to be excessively anchored by what is felt and observed in the present;
2. *Telescoping:* a tendency to overestimate the long-run frequency of low-probability consumption opportunities;
3. *Emotional myopia:* a tendency to *fail* to consider future consequences at all when viewing goods that automatically trigger positive emotions of interest and pleasure; and
4. *Loss Framing*: a tendency to focus more on fears of future obsolescence than fears of overbuying.

Each of these biases leads to either incorrect forecast of future usage decisions (i.e., the decisions d_t in expression (1)) and/or incorrect forecasts of future utility from such usage decisions (i.e., the conditional value $v(x_{t,})$ in expression (1)). We will explore each of these biases—and their boundaries—in turn.

Projection biases: why we often overbuy technology

It is often anecdotally observed that we are prone to overbuying technology. Few of us, for example, make full use of the myriad of features offered by our digital cameras or cell phones, yet it was the availability of these features that was likely a major initial source of their attraction. Some evidence that this casual observation may have a real empirical basis has recently been offered by Vianna Thompson, Hamilton, and Rust (2005), who reported

data showing that when laboratory subjects are shown new products that vary in the number of features they offer, the more elaborate versions consistently receive the higher evaluations. But when these same subjects are then allowed to interact with the devices after the initial evaluations—simulating initial post-purchase usage—it was the simpler and easier-to-use devices that received the higher satisfaction scores. Likewise, a 2003 *Harris Poll*, for example, revealed that 45% of cell phones owners never use voice mail features, and 50% have never exercised the option of setting their phones to silent or vibrate[2].

What limits these examples, however, is that the mere fact that one rarely uses some features of technology or finds them hard to use *after the fact* does not imply that the initial purchase decision was a mistake. A key feature of normative adoption decisions is that a forward-thinking consumer *should* be willing to take chances on novel features that may later prove not to be worthwhile (perceive positive option values), and accept that new features will incur initial learning costs.

To provide a more rigorous test of the optimality of new-product adoption decisions, we designed an experiment that tested how consumers would value and then subsequently utilize a novel computer gaming device (Zhao, Meyer, and Han 2006). In the basic experimental paradigm subjects were trained to play one of two versions of an arcade game where icons were moved by mouse clicks in one of two ways: either click on buttons that discretely adjusted speed and direction, or click on scroll bars and a virtual steering wheel that continually adjusted movement. Subjects started off by playing a number of practice rounds of the game that allowed them to developed reasonably high—and nearly identical—levels of scoring competence using one of the controls. The primary difference between the

[2] http://biz.yahoo.com/prnews/030701/sftu019a_2.html

two controls was the experienced difficulty of learning; whereas most players of button controls can achieve asymptotically-high skill levels after only a couple of practice games, the scroll bars incurred a significant learning curve, with many subjects requiring up to 15 games to achieve the same competence displayed by players training on buttons.

The core experimental manipulation was introduced after these training rounds. Subjects were told that they would be playing another block of games for real money, and half were given the opportunity to bid to play these games with a new "combination" platform that had *two* sets of controls: buttons *and* scroll bars. The price of the new platform took the form of points that were deducted from players' final score in the money rounds, and was set by a random draw after bidding. All those players who bid more than the random price were provided with the new platform for play.

Did subjects make rational adoption decisions? Quite to the contrary, the data revealed two distinct biases:

1. A tendency to express levels of willingness-to-pay that grossly overvalued the enhanced performance benefits that would have been achievable playing the new platform; and
2. A tendency to make limited use of the new controls they paid for.

Specifically, 84% of subjects bid high enough to be able to use the new platform during the money rounds of play, and willingness-to-pay was indifferent to whether subjects previously experienced high or low learning costs. A consequence of this over-bidding was that adopters of the new platform realized significantly lower earnings in the money rounds relative to a control group of subjects who were never given the opportunity to play with a different platform.

A no-less intriguing feature of the data was that there was no evidence that subjects were simply placing overly optimistic bets on the potential value of the new controls. An analysis of the patterns of control usage over time indicated that after adopting the new platform few systematically invested in using the new control they paid for, even just to learn whether it was worthwhile. The modal usage rate in the task was 17%, a frequency too low to allow subjects to develop expertise in using the new control, but high enough to degrade the performance to a level lower than what they would have realized playing solely with the control they were familiar with.

Explaining the bias: projection and construal errors. Why did subjects in this—and other—experiments appear to overstate the value of innovations with enhanced features? Perhaps the simplest explanation is that this finding results from the well-documented *projection bias* (O'Donoghu, Loewenstein, and Rabin 2002) in intuitive forecasts of future preferences--a tendency for forecasts of future preferences to be overly influenced by current preferences and emotions. What seems to drive this bias is an effect that Wilson and Gilbert (2003) call *focalism:* when a decision maker is in one affective state it is difficult to imagine being in another, or project the preferences one will have at future points in time (see also Kahneman and Snell 1992). Gilbert, Gill, and Wilson (2002) and Read and van Leeuwen (1998) illustrate this effect by showing that there is real truth to the old adage that one should never shop on an empty stomach: shoppers who are hungry systematically buy more than those who are full, presumably due to inability to anticipate how they will feel in the future when they begin to consume the goods they are purchasing. The implications of the projection bias for new-product adoptions are straightforward: a consumer-electronics shopper who is intrigued by the many new features in top-of-the-line models at the point of

sale—or a subject who feels a sense of positive affect when viewing a new control—would tend to underestimate the possibility that he or she will become bored with them in the future, or never use them, resulting in a tendency to overbuy product innovations.

A somewhat more detailed account of how projection biases actually arise is provided by Trope and Lieberman (1997), who develop a hypothesis about how people make projective judgments known as *construal theory*. Construal theory argues that when people make decisions about immediate actions relative to temporally more distant ones comparative costs tend to loom larger than benefits—but when considering temporally distant actions the reverse holds true. DellaVigna and Malmendier (2002) and Gourville and Soman (1998) offer examples of this effect in the context of health-club and theater attendance patterns: subscribers pay large up-front fees to join gyms or theaters, implying high expectations of usage, but then underutilize them after joining. The explanation is that at the time of purchase subscribers fail to fully foresee the usage costs (and other negative factors) that will later suppress attendance. This same effect readily extends to new-product adoptions: when considering whether to buy a product innovation at the point of purchase consumers will tend to think of a distant future time when all the potential benefits are being consumed, overlooking the learning costs required to enjoy them. But once the product is actually acquired attention shifts to the short run displeasures of learning, and as a result novel features are under-utilized.

Note that this same bias can be used to explain a similar well-known bias in preferences for elaboration: that of exaggerated preferences for variety in retail assortments (e.g., Iyengar and Lepper 2000). Consumers tend to be lured to retail displays containing a rich assortment of offerings, even though they typically later conclude that wide assortments

make the process of choice difficult and less satisfying (e.g., Iyengar and Lepper 2000). The feeling of confusion that accompanies the actual act of make decisions from large sets is something that consumers, apparently, cannot anticipate before the fact.

. **Boundaries: is more always better?** It is important to emphasize that construal theory is not absolute in its prediction that the downsides of novel features—learning costs and risks—will always be undervalued at the time of purchase. It is easy to construct anecdotal counter-examples where laggard consumers are loath to adopt innovations out of fears about the costs of learning, only to become converts later when adoption is forced upon them. In this case consumers might still be succumbing to a projection bias, but of the reverse kind: feelings of negative affect triggered by an innovation that is being excessively projected into the future.

The pervasiveness of *non*-adoption errors are, of course, difficult to gauge by their very nature: one can never observe the counterfactual of whether a consumer would have been happier had they adopted a product. But both construal theory and the experimental findings we reported earlier, however, argue that such errors are likely to be far less frequent than those of over-adoption. Specifically, construal theory argues that at the time of purchase consumers will *under*- rather than over-estimate the future costs of using novel product features, biasing decisions toward overbuying. Consistent with this prediction, one of the major findings of the arcade-game experiments reported above was that adoption decisions were immune to high experienced learning costs; rather than fearing these costs might recur, subjects acted as if the new control platform would not be subject to them.

At the same time, this finding should not be taken to imply that consumers will *completely* ignore expected learning costs when making adoption decisions. Evidence in this

regard has been provided by Mukejee and Hoyer (2002), who report survey data showing that consumers' interest in product adoption can be diminished simply by providing them with complex-sounding names—a reluctance that might be traced to fears about high learning costs. They refrain, however, from suggesting that such heuristic responses are errors; it simply shows that the under-valuing of learning costs predicted by construal theory is not complete.

Telescoping and overestimation of low probabilities

Projection biases and construal theory offer a broad-brushed explanation for why consumers might appear, at least at times, to overvalue product-attribute enhancements relative to subsequent usage. Their weakness as a general account, however, is that they are based on a key assumption about how people view product innovations that may not apply to all settings: that exposure to novel product features triggers global feelings of positive affect that are either projected into the future (the projection bias) or are believed to dominate the future (construal theory). It is unclear whether such a bias would extend to more dispassionate adoption decisions, such as a manager considering whether to buy a full- versus basic-featured office machine. Likewise, neither would seem to apply to adoption decisions that do not involve horizons of future ownership (such as novel snack foods that are to be consumed immediately). We argue, however, that enhancement biases would still be observed in such contexts—though primarily driven by somewhat different mechanisms.

The first of these is that mental assessments of the frequency with which new features would be used tend to be upwardly biased by a general propensity to overestimate the probability of infrequent—but mentally salient—future events (e.g., Fischhoff et al. 2005). To illustrate this effect, imagine a consumer who enters an electronics store and considering

whether to buy an expensive high-definition television set versus an inexpensive standard model. The appeal of the high-definition television set is that he or she can imagine specific times when having the high-definition capability would be truly handy, such as being able to watch one's favorite team in a playoff game in high definition clarity, showing off the set to an impressed friend, and using the screen as a computer display. Should the consumer buy the more expensive set? What makes the decision difficult is not assessing whether the high definition feature would ever be desired—it would—but rather whether it would be desired *often enough* over the entire lifetime of ownership of the product to be deemed worthwhile—a lifetime dominated by occasions when a more traditional set would be perfectly satisfactory.

Would the consumer arrive at an unbiased assessment of this future frequency distribution? Odds are he or she would not, and that it will be overly optimistic. A pervasive finding of studies of intuitive probability estimates is that people consistently overestimate the likelihood of relatively infrequent but salient events, while underestimating the relative frequency of more mundane ones. For example, Lerner et al. (2003) report data showing that when a sample of 973 Americans were asked to provide an estimate of the probability that they will be harmed by violent crime in the course of the coming year, the mean estimate was 43%—an exaggerated estimate just slightly less than the perceived likelihood of getting the flu (47%). Likewise, the popularity of state lotteries is prima facie evidence that many feel that they will be selectively lucky.

The common explanation for these biases is that we tend to construct perceptions of likelihood based on the mental availability of instances (Folkes 1988; Kahneman and Tversky 1973; Lerrner et al. 2003). Hence, people overestimate the likelihood of death by

violent crime or gunshot accidents because examples of these things are easily brought to mind, perhaps fostered by their pervasive depiction in the media. By this same process one may overestimate the frequency with which one will find the merits of owning a high-definition television essential; the occasions on which one could imagine wanting to own the set (e.g., a playoff game) are simply much more salient than the much larger number of occasions when one would not find the feature worthwhile, such as watching the routine nightly news.

A close cousin to this overestimation bias is *telescoping,* which is the tendency to mentally condense both past and future events that are dispersed in time (e.g., Johnson and Schultz 2005). Telescoping has its roots in the well-documented finding in cognitive psychology that we are much better at storing and retrieving event information than duration information (e.g., Frederickson and Kahneman 1993). Hence, if we try to form a mental assessment of the future relative frequency with which our favorite team will appear in a televised game by recalling past frequencies, our assessments will likely be upwardly-biased. The reason is that we will be much better at remembering the events themselves than the long temporal intervals that divided them.

Simonson (1990) offers a nice demonstration of the purchasing consequences of telescoping in the context of consumer preferences for product variety. In that work laboratory subjects were given the opportunity to select an assortment of snacks that would be delivered to them on a weekly basis over the course of several weeks. The manipulation centered on *when* the product choices were to be made: one group had to make all of their selections in advance in the first week, while the other made a choice each week. The finding was that subjects who made all choices in the first week chose a wider selection of

snacks than those who made the choices on a week-by-week basis; that is, the former group forecast a greater need for variety than was the case. A consistent explanation for the finding was that subjects were envisioning future taste variation as if the consumption occasions were occurring back-to-back, when satiation effects would indeed have been salient. Subjects seemed unable to fully anticipate how the long interval between choices would affect preferences—in this case mollifying satiation.

Overvaluation without projection: hedonic intrusion

In some cases the real cause of errors in new-product adoption decisions may not be mistakes in forecasting future usage rates or utilities, but rather failures to make such forecasts at all. Initial exposure to innovations may trigger spontaneous emotional reactions that are the prime driver of buying decisions rather than forward-looking cost-benefit calculations. Hence, cell-phone buyers may be attracted to bells and whistles not because they envision they will be useful in the future, but rather simply because they look good; that is, they spontaneously trigger feelings of pleasure.

Are consumers hard-wired to find attraction in product designs that offer novel features? While we are not aware of work that has examined this question directly, indirect evidence exists in research examining the predictors of hedonic responses to novel aesthetic designs (e.g., Berlyne 1971; Silva 2005a, b). A consistent finding of this work is that increasing complexity in designs—akin to products with enhanced arrays of features--indeed typically leads to increasingly positive hedonic responses—but only up to a point. For example, people tend to prefer multi-faceted polygons compared to simple ones (Silva 2005a).

The classic explanation for the effect lies in arousal theory (Berlyne 1971): visual complexity and novelty triggers neurological arousal, which, in turn, triggers an emotional response. Arousal theory, however, does not predict the valence of this emotion; it could just as easily be negative as positive. A more precise theory of aesthetic response that makes such predictions has recently been provided by Silva (2005a, b). He theorizes that exposure to a novel pattern first induces an appraisal mechanism that determines whether the pattern is deemed interesting or merits further processing. If so, the pattern is then appraised for coherence and meaning. The necessary condition for a design to be seen as pleasing is that it be appraised as both interesting *and* meaningful. People enjoy complexity, but not if they can't make sense of it.

What is appealing about this interpretation is that it provides a theoretical reconciliation of the apparently conflicting findings about preferences for complexity in new product design reported by Vianna Thompson, Hamilton, Roland Rust (2005) and Zhao, Meyer, and Han (2006) and by Mukherjee and Hoyer (2001). The first group of studies found that consumers were attracted to complex products whereas the latter reported the opposite result. The reconciliation lies in the way the complexity was presented to respondents in these studies. In the former set of studies, product complexity took the form of physical innovations that respondents could both see and touch (such as added controls) and thus were more meaningful and understandable. In contrast, in Mukherjee and Hoyer (2001) innovations were described by verbal descriptions of enhanced attributes that may also have provoked interest, but whose meaning and functionality (which could include imagined ease of use) was much less transparent. Similarly, it also explains why one might like complex cell phones but simple watches: if the complexity degrades the visual coherence

of the object—such as making a watch look like a small computer—it will hurt rather than help preferences.

Sealing the sale: hedonics and impulsiveness. It is important to emphasize that the mere fact that a complex product design triggers a positive affective response does not imply that a purchase will necessarily follow. One might imagine, for example, that discovery that an intriguing new product comes withy a large purchase price might quickly throw cold water on positive initial emotions, inducing a more balanced consideration of long-run costs and benefits. Or would it? Here yet another well-known decision bias may enter that would induce consumers to act on positive visceral responses to innovations: the tendency to engage in *hyperbolic discounting*, or attach a disproportionately large disutility to small postponements in the receipt of rewards (Loewenstein and Prelec 1992). The effect is commonly illustrated by a thought experiment in time preferences for rewards: most would prefer $10 immediately to $11 tomorrow, but would wait a day for the extra dollar if the time frame was set for a year from now—a pattern now captured by the constant discounting hypotheses presumed in most normative analyses (such as expression (1)).

It has frequently been observed that hyperbolic discounting is most acute for rewards that trigger "hot" emotions of anticipated pleasure—such as food or the prospect of immediate monetary rewards (Loewenstein 1996; McClure et al. 2004). Hence, novel product designs that trigger deep-rooted feelings of positive affect—such as the sight of a sleekly-designed car or plasma television screen depicting an attractive image—may trigger desires for immediate possession that overwhelm more rational consideration of long-term usage and costs. Inducing such "gotta have it" desires, of course, has long been the goal of

new product designers; it is the surest way of boosting sales for goods whose real net benefits may be limited.

Enhancement Norms and Framing

A final potential driver of consumer response to novel product attributes is framing effects, or how features contrast with what is seen as the ideal or status-quo product configuration in a category. Following the asymmetric effects of monetary gains and losses in the Prospect Theory (e.g., Kahneman and Tversky 1979), Gourville (2005) argues that consumers may often see the marginal *dis*utility of *not* owning a novel feature when it is the norm to possess it as looming larger than the marginal utility of owning a feature that exceeds the norm (Gourville 2005). Hence, under this view a consumer who cannot resist buying a fully-loaded cell phone might well resist added features when buying a washing machine—the difference being that top-of-the-line models may define the status quo for consumer electronics but not for appliances.

An initial demonstration of this effect was provided by Kahn and Meyer (1991), who explored the question of how consumers form overall impressions of product innovations when there is uncertainty about the importance of different product features, such as whether having a "zoom-in" feature on a television enhances the real enjoyment of a set or not. As foreshadowed above, whether attribute-importance helps or hurts depended on whether an attribute was perceived to "enhance" or "preserve" the status-quo level of utility in a category. For attributes that served to deliver benefits beyond the status quo—such as extra-plush seats on an airline—increasing ambiguity suppressed willingness to pay. In contrast, increasing ambiguity about importance inflated willingness to pay for attributes that served to

preclude future losses—such as an elaborate electrical adapter sets for overseas travel that reduced the risk of being unable to use electrical appliances.

An explanation for why consumer electronics products might be particularly prone to loss framing—causing over buying—was provided in experimental work on drivers of product replacement decisions by Cripps and Meyer (1994). In that work consumers played the role of managers of a factory that produced high-definition televisions. As managers they were paid based on the number of units their factories produced, and they periodically had the opportunity to purchase new equipment to increase the rate of production. The key manipulation was how the motivation for equipment replacement was framed; in half the cases the motivation was to buy state-of-the-art equipment that had a higher base rate of production, and in the other half was to buy replacement equipment that would repair deterioration in the rate of production of incumbent equipment. Although replacement behavior should have been indifferent to this framing manipulation, subjects nevertheless displayed one: they were much more eager to buy replacement equipment when the motivation was to avoid future obsolescence—mimicking norms in consumer electronics—as opposed to repair performance—mimicking norms for home appliances.

Where do enhancement norms come from? In some cases they may have a social origin: some goods are valued not only by their ability to deliver hedonic utility, but also their ability to confer social status or impress others. In a world where ownership of "the top of the line" signals social status, one might buy a cell phone rich with features not because one anticipates future use but simply because one is unlikely to impress one's friends by buying a simple one. In this case the cell phone is being purchased more for its symbolic than hedonic value—a motivation long recognized by both marketers and economists (e.g.,

Frank 1985; Solomon 2001). One may speculate that the norm or aspiration level of complexity is more likely to be "the top of the line" for socially rather than privately-consumed goods—such as televisions and cell phones rather than home water heaters. But note that even in the first case aspiration points will not be unlimited; even the most hardened consumer technology maven may find some enhanced features, such as endowing one's home with gold-plated sinks or installing fine carpeting in an SUV, more a signal of wasteful excess than stature.

Discussion

Understanding the drivers of success for new products has long been a major focus of research on innovation management (e.g. Cooper 1999). Implicit in much of this work is the assumption that consumer markets for product innovations are, at their core, efficient, as observed by Nash in the beginning quote. It is commonly believed that if a product fails it is not because consumers make misguided choices, but because the firm itself has succumbed to inefficiencies, such as allocating inappropriate resources to projects or failing to listen to customers. The key to market success thus lies in avoiding resource-allocation errors: if the firm can consistently bring to market products that provide objective benefits to consumers, it will succeed in the long run.

But how certain is this promise? As reasonable as the notion of consumer rationality might seem, it overlooks the fact that in most new-product markets true product quality cannot be observed *ex-ante* by consumers. The success of an innovation thus depends less on whether it has objective benefits and more on whether consumers *forecast* that it will have objective benefits—forecasts that might well prove erroneous.

The goal of this paper was to review what we know about how consumers go about making projective assessments of the utility they will draw from product innovations. The central finding is that these intuitions are often far less rational than firms might wish to believe, marked by a series of quite systematic biases in how future pleasure is assessed. In particular, these forecasts are prone to distortions induced by:

1. *Projection biases*: a tendency to overly project initial reactions formed at the point of sale to future ownership (typically underestimating future learning and usage costs);
2. *Telescoping biases*: a tendency to over-estimate the chance of low-likelihood usage events;
3. *Short-term hedonics*: a tendency to be excessively influenced by design features that induce momentary positive (or negative) affect; and
4. *Loss Framing*: a tendency to excessively value uncertain new attributes that could form a future status quo (excessive fear of obsolescence).

Should knowledge of these biases be viewed as opportunities or threats by firms? The answer is that they clearly cut both ways. For example, casual observation suggests that many firms have an implicit awareness of the presence of many of these biases, and attempt to exploit them in both product design and approaches to advertising. Specifically, the biases would appear consistent with the following principles of persuasion:

1. *Aim for elaborate—but understandable—product designs.* Consumers' initial affective responses to innovations form the basis of forecasts of future ownership utility. What makes a design attractive? There is growing evidence that consumers are systematically attracted to new products that offer attribute

embellishments, bells and whistles that pique initial positive interest, even if they ultimately see little later use.

2. *Aid the availability bias in forecasts of future usage occasions.* Some forecasts of future product value center on subjective assessments of the probability of future use—such as how often one might make use of a high-powered zoom feature on a digital camera. Sellers can attempt to influence these judgments by aiding the mental availability of imagined usage contexts—such as encouraging consumers to recall times when a zoom lens would have allowed them to take a better picture.
3. *Control the status quo battle.* As discussed by Gourville (2005), consumer decisions about whether to adopt a new product often center on whether they view new features as means of gaining pleasure beyond a current status quo or a means of averting losses from the status quo. Successful products are often those that offer features that consumers perceive as the latter—and sellers can encourage this framing by urging consumers to see the status quo as the state-of-the-art in a product category rather than incumbent goods.

It is important to emphasize, however, that focusing a firm's resources on achieving these acts of persuasion at the expense of providing real product benefits can be a costly mistake in the long run. The reason is simple: intuition suggests that while a consumer might on one occasion be lured to buy a new product by feature enhancements that turn out to have limited value, the consumer would likely learn from his or her mistake and not repeat it a second time. Hence, unfairly exploiting consumers' tendencies to be optimistic in assessing

innovations could prove quite costly to a firm in the long run, as future offerings by the firm will now be viewed with skepticism (see, e.g., Kopalle and Lehmann 2006).

How adept are consumers at learning from product adoption mistakes? This is a question we know little about, and what evidence we have is surprisingly ambiguous. For example, Vianna Thompson, Hamilton, and Rust (2005) show that consumers' tendency to over-buy feature-rich technology products is accompanied by lower post-adoption product satisfaction. This finding is consistent with Iyengar and Lepper's (2000) data showing that shoppers prefer wide assortments *ex ante*, but become unhappy when engaged in the act of actually choosing from them. Indeed, Schwartz (2004), among others, has taken this a step further by arguing that the rampant proliferation of options in modern markets—in the form of superstores, the internet, and complex products—has worked to degrade the overall quality of life of consumers. All these results might suggest that people may learn from their over-buying mistakes and exhibit decreased appetite for subsequent generations of product innovations.

But the weakness of such arguments is that there is *no* evidence that consumers view such decisions as mistakes, or would prefer to undo them if given the chance. That is, trade in their complex device for a simple one, or revert to an age of limited retail selection. For example, in a second phase of the experiment on decisions to adopt enhanced game platforms that we described earlier (Zhao, Meyer, and Han 2006) we found that subjects were reluctant to trade in a complex game platform with unused features for a simpler one equipped only with essential features, even when they were given substantial financial incentive to trade down. This result parallels Shin and Ariely's (2004) finding of an aversion to close off options, even when options are never used. Likewise, we are aware of little evidence of

firms having luck selling new products that *reduce* the functionality of existing devices so that consumers have fewer choices.

It is important to emphasize, however, that while consumers indeed have an attraction toward products that offer bells and whistles, this attraction is *not* limitless. In particular, recall that consumers are more likely to be lured by "bells and whistles" when their point-of-reference for assessing product quality is the state-of-the-art in a product category; that is, a product endowed with bells and whistles. As successive generations of innovations are introduced into a market it will become more and more likely that the status quo will revert to the performance of incumbent products; that is, consumers will no longer feel a sense of loss at not owning the state-of-the art. This, of course, is a common characterization of the evolution of technology markets: consumers are rabid to scoop up initial improvements in product quality (such as earlier generations of Intel processors), but become less interested in adopting later generations.

For firms who are interested in attracting consumers to successive generations of innovations, the remedy for such satiation may thus be to periodically redefine the product itself, so as to minimize the ability of consumers to use the current-generation of a product as a point of reference for judging the comparative value of a new generation. Indeed, it could be said that this was exactly the strategy that Sony used when designing and launching the *PSP* game platform that we illustrated at the outset. As a late comer to the hand-held game market Sony felt its best chances for overcoming the considerable uncertainties that existed about the platform's viability (e.g., the future availability of games and movies) was to upset the standing definition of the status quo in the category. While consumers could not know with certainty whether the *PSP* would, in fact, define that future ownership standard, the

firm's hope was that consumers would see purchasing the *PSP* as a gamble they could not afford *not* to take.

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