OFFICE OF SCALE RESEARCH

Technical Report

#0602

GADGET LOVERS

by

Gordon C. Bruner II
Professor of Marketing at Southern Illinois University,
Carbondale, 62901-4629,
(618) 453-4341 (voice),
(618) 453-7747 (fax),
gcbii@siu.edu

&

Anand Kumar
Associate Professor of Marketing at University of South Florida,
4202 E. Fowler Avenue, BSN 3225, Tampa, FL 33620,
(813)-974-6224 (voice),
(813)-974-6175 (fax),
akumar@coba.usf.edu

This is a longer, more detailed version of an article that was published in the *Journal of the Academy of Marketing Science* (2007). The authors would like to express their appreciation to Clyde Heppner and *Sprint PCS* for their generous support of Studies 1-3. The second author would also like to thank Gary Gebhardt and participants of the USF Marketing Department Research Seminar Series for their feedback.

GADGET LOVERS

ABSTRACT

Managers in firms introducing new high-tech products have to decide which consumers should be targeted initially in order to ensure rapid adoption. Ideally, the target should be composed of people who adopt innovative technology relatively early as well as are influential sources of information used by others as a reference for their own behavior. A set of adopters who might meet these requirements but who have not been the focus of past scholarly research are *gadget lovers*. The paper provides insights into this segment, proposes a construct that describes key characteristics of this segment, and reports the results of a focus group and four studies that led to the development and validation of a scale to measure this construct. The findings indicate that the construct explained adoption-related behaviors above and beyond the variance accounted for by technological innovativeness and key demographic variables.

GADGET LOVERS

We live in a time when technology is taken for granted and high-tech gadgets have become part of our daily lives. Yet, marketers find that getting the majority of consumers to accept and adopt any particular technological innovation is not easy since many consumers are either skeptical of the additional benefits of new products or are just resistant to change.

Many firms launching high-tech gadgets aimed at the mass-market target the technological innovators, those who a company expects will be the first to adopt new products. However, some experts believe that, in general, most innovators are not the best opinion leaders with the consequence that even as many of them adopt new products, few others follow (e.g., Moore 2002; Rogers 2003). A similar point is made by other scholars who suggest that diffusion is likely to be fastest and most wide-spread when the opinion leader is also among the early adopters of the innovation (e.g., Valente and Davis 1999). Managers in firms introducing new high-tech gadgets have to decide what kind of consumers should be targeted initially to ensure rapid acceptance by the mass market and how to identify those consumers.

The position advanced here is that there is a type of adopter who might meet these requirements of influencing others' opinions as well as being relatively early adopters of innovations but they have not been the focus of scholarly research up until now. This group is called *gadget lovers*. The purpose of this paper is to a) provide insights into this segment, (b) propose a construct that captures key characteristics of this segment, (c) develop and validate a scale to measure the construct, and (d) examine the ability of the new construct to predict adoption-related behaviors above and beyond what can be

explained by most other predictor variables examined by prior research in this area. The results of a focus group, two national studies, and two supplementary studies are reported as they led to the development of a valid and reliable scale that can facilitate future research of the construct.

Background

Companies are so interested in those who adopt technology before the masses that the research firms they work with have been devoting a lot of attention to them in recent years. Firms like the Yankee Group and Forrester Research, who are leaders in this field, closely monitor behaviors of groups that they believe are more accepting of technology. Since the mid-1980s the Yankee Group has studied a group it calls the *Technologically Advanced Families*®. About 16% of the country's households are estimated to be in this group and, not surprisingly, they spend more annually on tech innovations than others (Yankee Group 2000). Forrester Research, which calls the results of its work in this area *Technographics*®, divides the U.S. population into ten segments (Yonish et al. 2001) and estimates that about 13% of the population are in the most lucrative segment (Fast-Forwards) based on their technology adoption behaviors. Similarly, a group called the Technology Elite was identified by the Pew Internet & American Life Project (Horrigan 2003). They were estimated to be 31% of the American market and it is argued that their adoption and usage of tech products influences what the majority eventually do. While the exact methods used by these firms to identify these consumers is not publicly available, it is clear that identifying adopters who buy early and influence others is important to the technology industry.

In spite of these efforts at identifying and targeting the technological innovators in the market place, most firms struggle to gain mass-market acceptance of the new devices that they introduce. Some scholars have suggested that this could be because all innovators are not necessarily good opinion leaders (Rogers 1983, p. 262). One reason for this could be that the mass market may not necessarily take its cues on adopting high technology gadgets from the tech innovators who are driven by the desire to be the first to own new products. Instead, the masses are more likely to focus on the risks involved in trying out new technological innovations and are less likely to accept these risks than the tech innovators. For many of these innovators, their behaviors towards adopting new products are motivated by social factors and hence, they may be limited in their ability to influence many non-innovators whose adoption behaviors are not driven by similar motivations.

It is our position that there exists a type of consumer whose adoption behaviors are driven more by non-social motivations and whose opinion is likely to be sought by the mass market before they accept and adopt new gadgets. These are likely to be consumers whose prime motivation for adoption and acceptance of new technological innovations is focused on the product itself. As the motivation for their adoption is intrinsic to the product, these consumers are likely to have more enduring involvement with the technology than those who are driven by extrinsic factors like being the first to own a product.

In addition to the names used by the research firms mentioned above, a variety of other colorful labels have been coined for these people such as *gizmoholics* (Tynan 2004), *prosumers* (Hamblen 2005), and *gadgeteers* (Higgina and Shanklin 1992). But,

probably the most popular term, *gadget lover*, is also the oldest having been around at least 40 years since Marshall McLuhan (1964) used it. We adopt that label in this paper and offer the following definition: *a gadget lover is a consumer with high intrinsic motivation to adopt and use a variety of leading edge technology-based goods, including the services that complement them*. (The symbol used in this paper for the construct itself will be GL while those consumers who score high on the construct are called gadget lovers.)

Although the term has been around for years, no explicit scholarly research of gadget lovers exists in the literature. Hence, the research process began with an exploratory focus group to gain insights into motivations underlying gadget lovers' adoption behaviors. This exploratory stage of the research process as well as the other stages that followed is outlined in Table 1.

[Place Table 1 about here]

Focus Group

In the Pew Internet & American Life Project (Horrigan 2003), the "young, tech elite" was one of the key segments identified as having a great appetite for technology. They were more likely to be college educated, were an average of 22 years old, and spent more than average on all sorts of technology goods and services. Six college students who fit this description and who the authors felt, based on previous discussions with them, had high intrinsic motivation to adopt and use high tech goods and services were invited to an hour-long focus group session.[1]

The discussion dealt with issues such as their purchase motivations, their interactions with gadgets and the nature of gadgets that interested them, their perceptions

of gadget lovers and innovators, and their current purchase intentions. One of the key points emerging from the discussion was that participants described their behavior with gadgets as being *play*. They also viewed their behavior as being motivated many times by curiosity, wanting to know how things worked and how products could be pushed to their limits, getting them to do things that others, including the manufacturers, may not have known they could do. They were asked to talk about their perceptions of gadget lovers and innovators and whether they considered themselves to be one or the other. Most admitted there was some innovativeness in them, i.e., they were often likely to get gadgets before most others but that more of their motivation was driven by curiosity and/or love of the object rather than being the first to own it. The participants expressed very clear purchase intentions for the next gadgets they wanted to get. In some cases, they had specific days in mind that were many weeks or months in the future, based on their knowledge of release dates for new models or expectations of when enough money or information would be available to make the final decision.

The focus group members also expressed some limited interest in older gadgets, with purchases of that type being a small part of their total gadget expenditures (10%-20%). Their interest in the older products was less to collect them than to tinker with them, break them apart to see how they worked, and generally to satisfy their curiosity about the technology. Unlike collectors (Belk et al. 1988, p. 548), their interest was in acquiring a few specific items rather than accumulating all members of a perceived set. Also, it appeared that their enjoyment came more from playing with the gadgets than merely owning them. Thus, we concluded that those high on GL were most fixated on

playing with new technology, and were not just wanting to be the first to own nor driven to build collections of older devices.

Gadget Lovers' Motivations and Behaviors

There were several interesting insights about gadget lovers' motivations and behaviors that emerged from the focus group discussions. It was very evident that these are consumers who enjoy playing with gadgets and like to surround themselves with these things. They like to figure out how the technology works and hence become very knowledgeable about their devices. In fact, very often, these consumers not only figure out how the gadget works but they also spend considerable time and effort to figure out what else the gadget can do, i.e., capabilities the manufacturer may not have advertised. This may be considered a variant of what Hirschman (1980) called *use innovativeness* but is more similar to Price and Ridgway's (1982; Ridgway and Price 1994) interpretation of the term. That is, they are not always trying to use a current product to solve new or existing problems but they are in a sense, trying to find the limits of a device. Also, gadget lovers have an inherent interest in technological innovations and hence engage in category-specific ongoing search, not just pre-purchase search (Bloch, Sherrell, and Ridgway 1986).

Theoretical Basis. As there was no prior scholarly work on gadget lovers, we examined two different streams of literature to see if the behaviors and motivations described by the focus group participants could be explained by research in other areas that may not have focused on technology. In particular, we examined the literature to find out (a) what aspects of a task, if any, led to people deriving enjoyment from intrinsically motivated activities and (b) whether innovative behavior could be explained by different

kinds of motivations. The former was important as it could help us view gadget lovers' interaction and play with gadgets from a broader theoretical perspective that is not focused on tech products alone but on intrinsically motivated activities in general. The latter was important as this was an assumption we had made about gadget lovers, i.e., they were a type of consumer whose prime motivation for adoption differed from those of others who adopted early, and the focus group participants had also made this comment. Hence, any prior research that suggested there could be different kinds of motivations driving innovativeness would make our assumption more credible.

The characteristics of gadget lovers revealed by the focus group paralleled the findings of Czikszentmihalyi (2000). His studies found that aspects like exploring new things, getting lost in play (experiencing *flow*), transcending set limits, or measuring one's self against an ideal were all factors that provided enjoyment from intrinsically motivated activities. A key finding was that across different kinds of activities, the main source of enjoyment was engaging in the activity itself. For gadget lovers, playing with gadgets and figuring out how they work appears to be the primary source of enjoyment.

A review of the wide body of literature on innate innovativeness (i.e., predisposition to adopt new products) shed some light on how different underlying motivations can drive adoption related behaviors. Roehrich (2004) points out that prior research has identified four different motivations: the need for uniqueness (Burns and Krampf 1992), novelty seeking (Hirschman 1980), need for stimulation (Mittelstaedt et al. 1976), and the desire to make innovation-related decisions independent of others (Midgley and Dowling 1978). The last of these four motivating factors has been found to have a very weak correlation with consumers' predisposition to adopt new products.

However, the possibility of at least three different underlying motivations that can drive adoption behaviors lends credence to our assumption that gadget lovers' motivations to adopt may be different from those of other consumers who adopt technology relatively early. For example, some consumers are driven by the need for uniqueness and want to acquire new products before anyone else they know gets it while other consumers are driven by novelty seeking and are drawn towards new products that are different from existing products. Those consumers who are motivated by the need for stimulation seek to gain this optimum level of stimulation from the new product and so, their prime motivation for adoption is related to the product itself. This suggests that our focus group participants' GL-related adoption behaviors were not driven by their need for uniqueness but more likely by their need for stimulation and/or novelty seeking. Thus, it seems to be theoretically plausible that gadget lovers have different adoption motivation(s) than do tech innovators.

To summarize, the prime motivation for gadget lovers to adopt and accept new technology is the sheer joy of amusing themselves with the devices. These insights are used later as we generate items for the GL scale. It is also seen that gadget lovers seem to adopt gadgets relatively early but they also exhibit unique behaviors that can make them intimately knowledgeable about gadgets' capabilities and, hence, enable them to become persuasive sources of information for others in their reference groups. These attributes can make them attractive to marketers of high tech innovations. The challenge for marketers is to identify this subset of innovators. That challenge is addressed in this paper by a series of studies with the goal of developing and validating a scale that can be used to measure the extent to which a person is a gadget lover. In the process of doing this, the

distinctive role of the GL construct in explaining consumers' adoption behaviors beyond that played by their technological innovativeness is emphasized.

Scale Development

Item Generation

Using insights gained from the focus group, our own observations, a review of the literature related to intrinsic motivation and enjoyment, and the construct definition provided above, a large set of items was generated to measure the extent to which consumers were gadget lovers. The items focused on the enjoyment derived from playing with tech products and discovering new things (i.e., figuring out how they work). In addition, it was considered desirable to differentiate GL from two related but distinct constructs: inherent novelty seeking and technological innovativeness. (See Table 2 for definitions.) In a recent study, Dabholkar and Bagozzi (2002) used the inherent novelty seeking construct to explain adoption behaviors with the items for measuring it being drawn from the arousal seeking scale by Mehrabian and Russell (1974). The rationale was that there might be a general personality trait that leads some people to adopt sooner than others because of their greater desire for psychological arousal. Thus, it is important to show that the GL construct is distinct from inherent novelty seeking.

[Place Table 2 about here]

GL should also be distinguished from technological innovativeness as both constructs are expected to have similar consequences, i.e., influence behaviors related to the relative time of adoption. No satisfactory scale for measuring technological innovativeness was available as most scales tapped into innate consumer innovativeness, which is a more general construct and more distant from the GL construct than the

technological innovativeness construct. This has led some researchers in the field to call for domain specific measures of this construct (Roehrich 2004; Goldsmith, Freiden, and Eastman 1995). Consequently, some items for the content validation stage were generated while others were adapted from previous measures (e.g., Darden and Perrault 1976; Goldsmith and Hofacker 1991; Lumpkin 1985).

Content Validation

A total of 82 items intended to represent one of the three constructs (novelty seeking, technological innovativeness, or GL) were examined in a content validation phase. Three judges (faculty in the Marketing Department) were given definitions of the three constructs and asked to categorize each of the 82 statements as a measure of one of the constructs. They were also told that they could indicate that an item did not fit well with any of the constructs. The results showed that for 17 of the items at least two of the judges agreed that they belonged with the GL construct. For eight of the items all three judges were in agreement. It was that set of eight items that were then examined more thoroughly in Study 1 as potential measures of GL.

Study 1

Study 1 was conducted to assess some basic psychometric properties of the GL scale. Exploratory factor analysis followed by confirmatory factor analysis was used to determine if the GL scale was unidimensional and had convergent and discriminant validity with respect to the inherent novelty seeking and technology innovativeness constructs. Further, the study examined the ability of the GL construct to uniquely explain technology adoption behaviors after controlling for technological innovativeness.

Methodology

Data were collected by NFO Worldgroup, an internationally known research firm. Sampling was conducted with the goals of obtaining a national sample and in which gadget lovers were well represented. Given these twin desires, two samples were collected: one online (7,700 people invited) and the other mail (1,600 questionnaires sent out). Data were gathered from a mail sample in addition to the online sample due to our concern that members of an online panel could be technologically more proficient than those who were not members of such a panel. Respondents to a mail sample were likely to include both tech-savvy and less tech-savvy respondents. Ultimately, there were 1,031 completed responses to the online survey and 624 usable mail surveys.[2] A comparison of the demographic characteristics of the two samples showed that, except for gender, there were no significant differences between the two groups in terms of key demographic characteristics, e.g., age ($t_{1653} = 1.762$, $p > .05$), income distribution ($\chi^2_4 = 6.987$, $p > .05$), and employment status ($\chi^2_4 = 6.901$, $p > .05$). In terms of the gender composition of the two groups, the online sample had a slightly higher proportion of males (53%) than the mail sample (47%, $\chi^2 = 12.33$, $p < .01$). This difference was not a surprise as prior research had found males to be more fascinated with technology than females (Horrigan 2003, pp. 13, 14; Parasuraman and Colby 2001, pp. 72-74; Yonish 2001, p. 22). To check for possible differences in the results due to gender effects, all the analyses performed in this study were first carried out separately with the male and female samples. As the pattern of results were very similar and identical conclusions drawn from both samples, the samples were not split along gender lines and the data from the mail and online samples were combined. The pooled sample's respondents had a median age in the mid-40s, median annual income between $55,000 and $84,999, evenly split between males

and females, mostly married (76%), worked full-time (66%), and about half (47%) had at least a bachelor's degree. (See Appendix for each study's sample characteristics.)

Procedure and Measures

Respondents were told that the questionnaire presented statements regarding technology and the purpose of the study was to learn their thoughts about it. The questionnaire included the eight GL items as well as eight items for novelty seeking and seven for technology innovativeness. The items from different scales were mixed and randomly rotated in an effort to minimize any order of presentation or halo effects (e.g., Parasuraman 2000, p. 311). In an effort to have a behavioral measure of technology adoption, respondents also answered 15 dichotomous questions (Yes/No responses) related to their ownership/usage of various technology products. The questions pertained to ownership of relatively new products at the time of the survey like flat screen LCD monitors and wirelessly networked homes to those with greater adoption (but far from 100%) like cell-phones, PCs, and Internet services. As we were interested in respondents' general adoption behaviors with respect to technology-related goods and services and not the adoption of any one specific good or service, answers to these items were summed to produce a criterion measure with scores ranging from 15-30. It has been argued that aggregated measures of consumer behavior should be used to study the relationships between personality/lifestyle constructs and overt behavior rather than depending upon just one behavior (Goldsmith, Freiden, and Eastman 1995; Lastovicka and Joachimsthaler 1988). Thus, in our case, the aggregated score was an index of consumers' adoption behaviors. Finally, respondents provided demographic information by answering

questions related to variables such as their age, gender, household income, and education level.

The total sample of 1655 respondents was randomly split into two almost equal sub-samples. Exploratory factor analysis was performed on the data obtained from the first sub-sample while data from the holdout sub-sample was examined using confirmatory factor analysis (Anderson and Gerbing 1988).

Results

The results of the exploratory factor analysis revealed that the 23 items loaded on three factors with each item having its highest loading on the construct it was supposed to measure. However, two items supposed to measure technological innovativeness (TI) also had fairly high loadings on the GL factor while two items intended for measuring novelty seeking (NS) had loadings less than 0.60 on the NS factor and moderate loadings on the other two factors. These four items were dropped and the remaining 19 items measuring the three constructs of GL, TI, and NS were subjected to a confirmatory factor analysis using EQS 5.7 (Bentler 1998) with the data from the hold-out sample. All three scales had good internal consistency as indicated by the high Cronbach alphas (GL, α = 0.93; TI, α = 0.91; NS, α = .86). As expected, the three constructs had moderately strong intercorrelations (Table 3) and they were allowed to correlate with each other in the CFA.

[Place Table 3 about here]

Overall Model Fit. The overall confirmatory model of the three constructs measured by the 19 items showed an excellent fit to the data. With one exception, the model met all the criteria based on both absolute and relative fit indices, which assessed how closely the model fit the data (e.g., SRMR < 0.04, RMSEA < 0.06, GFI = 0.94,

NNFI, CFI, IFI were all > 0.96). The chi-square statistic, known to be highly sensitive to sample size, was the sole exception as it was significant ($\chi^2_{149} = 512.66$, $p < 0.05$). As the sample size was 827 respondents, it was not surprising that the chi-square test rejected the measurement model. It is well known that as the sample size increases, the chi-square test will tend to reject a model (e.g., Bagozzi and Yi 1988; Hair et al. 1995) and in those cases additional weight should be considered for those indices that are less sensitive to sample size (McQuitty 2004).

Psychometric properties of the GL scale. Next, the factor loadings were examined along with the item reliabilities of each item and the average variance extracted (AVE) by all the items measuring the construct (Table 4). Seven of the eight items measuring GL had a loading of over 0.75 on the latent construct and one item had a loading of 0.64. Hence, one item had an item reliability of 0.41, which was below the desired value of 0.50 while all other items had item reliabilities of over 0.60. As recommended by Netemeyer, Bearden and Sharma (2003, pp. 126, 127), it is justifiable to test further those items that have face validity but do not quite meet accepted statistical standards. In addition, the composite reliability of the construct was well over 0.90 and the AVE by the items from the latent construct was well above the criterion of 0.50 suggesting good convergent validity (Fornell and Larcker 1981). Given all of this, it was decided to retain all eight items for the second round of testing.

[Place Table 4 about here]

To assess the discriminant validity of GL, we used a stringent criterion whereby the scale should discriminate between GL and two other similar constructs (TI and NS). Fornell and Larcker (1981) suggest that if the AVE of the items measuring two scales is

greater than the square of the correlation between the constructs, then there is good discriminant validity between the two constructs. The AVE by the items measuring the three constructs was 0.65 (GL), 0.67 (TI), and 0.53 (NS), respectively. The square of the correlations between any two of these three constructs did not exceed 0.35 (between GL and NS). This suggests good discriminant validity and shows that GL is distinct from technological innovativeness and inherent novelty seeking.

Further Analysis. Although the above results show the GL scale had excellent psychometric properties, there were two other issues of interest. Can the GL scale explain adoption behaviors above and beyond that explained by technological innovativeness and do gadget lovers adopt early like tech innovators but have greater technological opinion leadership? While issues related to technological opinion leadership are addressed in Study 2, a series of analyses related to adoption behaviors are now presented.

First, we examined whether the GL construct could make a significant, unique contribution in explaining consumers' adoption behaviors above and beyond the contribution of technological innovativeness. Respondents' technology adoption behaviors were captured by the 15-item criterion measure. It was found that both GL and TI had similar correlations with respondents' technology adoption behaviors ($r = 0.32$ and 0.31, respectively). However, after controlling for the effects of TI, it was found that GL had a significant partial correlation with adoption behaviors ($r_{\text{adoption-GL . TI}} = 0.20$, $p < 0.05$). Although the large sample size could lead to correlation coefficients being significant, it is important to note that over half of the moderate correlation between GL and adoption behaviors was unique and separate from the influence of TI, thus, making it a potentially useful construct for managers.

An even more stringent test of the GL construct was performed by examining its contribution in explaining adoption behaviors above and beyond the contributions made by a set of several variables identified in past research as significant predictors of such behaviors. Prior research (e.g., Midgley and Dowling 1993; Parasuraman and Colby 2001) has found that in addition to innate innovativeness, consumers' personal characteristics such as age, gender, education, and income also influenced their adoption behaviors. Hence, a hierarchical regression to predict adoption behaviors was carried out in which these demographic variables along with respondents' TI scores were entered as predictors in step 1 and their GL scores entered in step 2. To capture the effects of income and education, four dummy variables were used to represent each construct. The baseline category for income was households with income less than $20,000 per year and for education, it was respondents with education levels up to high school or less. The results are shown in Table 5. In step 1, 18.8% of the variance in the dependent measure was explained as all the variables except age and gender had a significant effect on adoption behaviors. With GL added as a predictor in step 2, an additional 2.5% of the variance in adoption behaviors was explained and this increase was significant ($\Delta F_{1,805} = 25.91$, $p < .001$). A comparison of the standardized beta coefficients of GL and TI showed the relative effect of GL on adoption behaviors was comparable to the effect of TI ($\beta = 0.19$ vs. 0.18). These results suggest the importance and relevance of this construct to practitioners. When the hierarchical regression was performed with data from the entire sample (instead of just the hold-out sample), similar results were obtained. The GL construct explained an additional 4.5% variance in adoption behaviors and the

relative effect of GL on behaviors compared favorably with the effect of TI on behaviors ($\beta = 0.27$ vs. 0.19).

[Place Table 5 about here]

Finally, we examined the extent to which gadget lovers are technological innovators. An examination of the frequency distribution of TI scores in the combined data set revealed that there were 87 respondents who scored at or above the 95th percentile of TI.[3] Similarly, 86 respondents scored at or above the 95th percentile of the GL scores. The two groups were not the same (χ^2=211.3, p<.01) but the overlap was such that 34 respondents were in both groups. Stated differently, 40% of the gadget lovers were tech innovators. This distribution indicates that while a large portion of gadget lovers are very innovative, it is too extreme to describe the group in total as being tech innovators. This test will be repeated in Study 2 along with others to further examine the relative innovativeness of gadget lovers and to measure to their opinion leadership compared to tech innovators.

Study 2

The purpose of the second study was not only to confirm key aspects of the previous study to ensure the findings were not sample specific but to further test the discriminant and nomological validity of the GL scale. The study also examined the extent to which the scale might be susceptible to response bias. Testing for such bias is recommended when it is possible that people might respond to scale items in a way they think would make them popular or as they think others would expect them to (Mick 1996; Netemeyer, Bearden, and Sharma 2003, p. 83). Because technical proficiency is viewed positively in our culture, the concern was to make sure that response to the GL

scale was not adversely affected by that desire. Finally, the study examined whether the extent to which one is a gadget lover was significantly correlated with being a tech opinion leader and if it did, then whether such a correlation existed after controlling for one's technological innovativeness.

Nomological Network

To test the GL scale's nomological validity, constructs were identified with which the construct was expected to have significant relationships. Since GL is conceptually distinct from each of these constructs it should also display good discriminant validity with them. The constructs and the rationale for their relationships with GL are given below. (Refer to Table 2 for construct definitions.)

Technological Opinion Leadership. Opinion leadership tends to be monomorphic in contemporary society (Rogers 2003, p. 314). This suggests that opinion leadership should be examined with respect to a specific domain rather than in general. Hence, we measured technology opinion leadership (TOL). As indicated by our focus group, gadget lovers are consumers who enjoy playing around with and learning about high tech products. It was felt that they are likely to know a lot about the category and be perceived as influential sources of information for others. Given this, GL and TOL are likely to be related but distinct constructs.

Optimism. A positive though moderate association was expected between GL and general optimism (OP) since gadget lovers would be expected to look forward to the future as it holds the promise for the introduction of more products to read about, play with, and buy (Parasuraman and Colby 2001, pp. 34-38; Yonish 2001, p. 9).

Materialism. The GL scale was expected to have a positive but moderate correlation with the happiness dimension of materialism (MH) because of the tendency for gadget lovers to enjoy buying and owning high tech products. However, the two scales should be distinct since GL should measure something other than just people desiring to own products in general.

Measures

Scales to measure technology opinion leadership (Flynn, Goldsmith, and Eastman 1996), optimism (Scheier, Carver, and Bridges 1994), and the happiness dimension of materialism (Richins and Dawson 1992) were adapted from prior research. These scales were used in Study 2 along with the same eight-item GL scale used in Study 1. Social desirability response bias has typically been measured using a scale by Crowne and Marlowe (1960; Bruner, James, and Hensel 2005, pp. 586-589). The lengthy instrument has taken several forms over time and an abbreviated version recommended by Ballard, Crino, and Reubenfeld (1988) was used in this study.

Methodology

As with the first study, data were collected by NFO. The sampling goal was to obtain a national sample that included a broad range of technology adopters. Unlike in Study 1 where the 15 product criterion measure was filled out by everyone as part of the survey, in this study, potential respondents filled out the index before being allowed to proceed further. Scores on the criterion scale were used as a screening device with the purpose of yielding a sample with a roughly flat distribution across the continuum of the criterion measure. Ultimately, seven hundred-eighty-nine people completed the online questionnaire. The sample was nearly evenly split on gender (51% male), 91% were

white, 80% were married, 63% worked full-time, 48% were college graduates, 52% lived in populous areas (CMSA of 2,000,000+), and over 61% reported household incomes greater than $60,000.

Results

Twenty-four items measuring five constructs (GL, TOL, TI, OP, MH) were subjected to a confirmatory factor analysis using EQS (Bentler 1998). The results are shown in Table 6. One of the items measuring TOL had an item reliability around 0.41 and was dropped from further analysis as it appeared to be tapping into the same domain as another item in the scale. All five scales had good reliability as indicated by the high Cronbach alphas (GL, α = .93; MH, α = .83; OP, α = .76; TOL, α = .88; TI, α= .92). The MH and OP constructs were allowed to correlate with each other as both related to positive feelings while TI and TOL constructs were allowed to correlate as they were expected to be more trait-like and positively related. GL was allowed to correlate with all the other constructs.

[Place Table 6 about here]

Overall Model Fit. The overall confirmatory model of the five constructs measured by the 24 items produced an excellent fit to the data. As in Study 1, with one exception the model met all the criteria based on both absolute and relative fit indices, which assessed how closely the model fit the data (e.g., SRMR = 0.07, RMSEA < 0.06, GFI = 0.91, NNFI, CFI and IFI = 0.95). Not surprisingly, the chi-square statistic was significant due to the very large sample size (χ^2_{246} = 844.20, p < 0.05).

Psychometric properties of the Gadget Lover scale. Next, the factor loadings, the item reliabilities, and AVEs were examined. Seven of the eight items measuring GL had loadings of over 0.75 on the latent construct and item reliabilities of over 0.56. One item

(the same item that performed least well in Study 1) had a loading of 0.68; hence, it had an item reliability of 0.46, slightly below the desired value of 0.50. Given the marginal quality of this item in two large studies it was a candidate to be dropped from the GL scale. A close examination of this item (#6 in Tables 4 and 6) revealed, however, that it was the only item in the scale that tapped into respondents' ongoing search activity. This was something that had been mentioned by our focus group participants, e.g., prior knowledge of release dates for new products. As the composite reliability of the eight item GL construct was well over 0.80 and the AVE by the items from the latent construct was well above the criterion of 0.50, suggesting good convergent validity (Fornell and Larcker 1981), it was decided to keep the item as part of the GL scale.[4] Further justification for retaining the item as well as ways to improve its quality are provided in the discussion section.

The Fornell and Larcker (1981) criterion was used to assess the discriminant validity of GL. The AVE by the items measuring the five constructs were 0.63 (GL), 0.60 (TOL), 0.69 (TI), 0.62 (MH), and 0.59 (O) respectively, thus suggesting good convergent validity for the GL scale as well as the other scales used in the study. The square of the correlations between any two of these five constructs did not exceed 0.49 (this was between GL and TOL scales). This suggests that the proposed GL scale again displayed good discriminant validity from related constructs.

As expected, GL had a very strong relationship with TOL ($r = .70$; $p < 0.01$) and a low but significant correlation with MH ($r = .17$; $p < 0.01$). (See Table 7.) The association with OP was significant but lower than expected ($r = .07$; $p < 0.05$). This may have been due to the fact that optimism was measured as feelings at a *general* level, i.e.,

optimism about life. Measuring feelings more specifically, such as optimism/pessimism related to technology's impact on one's life, would likely have shown a stronger relationship. This is examined in Study 4.

[Insert Table 7 about here]

Finally, with regard to social desirability bias, a very low and insignificant correlation between GL and the SDB scale was expected. Indeed, no correlation was found between the two (r = 0.02, ns) suggesting that the GL scale is not sensitive to the tendency for people to respond in a socially desirable manner.

Further Analysis. In Study 1, we showed that the extent to which consumers are gadget lovers can provide a significant incremental contribution to explaining their technology adoption behaviors above and beyond what is explained by technology innovativeness. That was examined again. As in Study 1, it was found that both GL and TI had similar correlations with adoption behaviors (r = 0.44 and 0.48, respectively). After controlling for the effects of TI, it was found that there was a significant partial correlation between GL and adoption behaviors ($r_{adoption\text{-}GL\ .\ TI} = 0.17$). Further, TOL, a behavior of considerable interest to marketers, was also significantly correlated with both GL and TI (r = .70 and .68, respectively). After controlling for the effects of TI, GL was found to have a significant partial correlation with TOL ($r_{TOL\text{-}GL.TI} = 0.44$).

As in Study 1, hierarchical regressions to predict adoption behaviors and TOL were carried out in which respondents' age, gender, income, education, and TI scores were entered as predictors in step 1 and their GL scores in step 2. The results are shown in Table 8. Again, income, education, and TI were found to significantly influence adoption behaviors and the addition of GL as a predictor significantly increased the

variance explained in the dependent measure from 31.3% to 33.1% ($\Delta F_{1,776} = 21.02$, ($p < .001$). The same variables had a significant effect on opinion leadership, however, the incremental effect of GL was much more than in the case of adoption behaviors. GL explained an additional 9.4% of the variance in opinion leadership ($\Delta F_{1,776} = 181.15$, $p < .001$) and all the predictors together explained 59.8% of the variance in TOL scores.

[Insert Table 8 about here]

Finally, we examined the degree to which gadget lovers were also innovators. The sample had 41 respondents with GL scores at or above the 95th percentile and 51 who scored at or above the 95th percentile on the TI scale. The two groups were not the same (χ^2=128.1, p<.01) although there were 20 individuals who were in both groups, i.e., 49% of the gadget lovers were also tech innovators. Next, we used the same cut-offs to examine the TOL scores of those tech innovators who were gadget lovers and compared their scores to innovators who were not gadget lovers. A one-way ANOVA revealed that innovators who were also gadget lovers had significantly higher technological opinion leadership scores (M=6.34) than those who were not gadget lovers (M=5.56, $F_{1, 49} = 8.34$, p<0.01).

Study 3

Although many of the major aspects of scale validation were addressed in the two main studies, two supplemental studies were conducted to examine some additional issues. With Study 3 the purpose was to assess the concurrent validity of the scale (Netemeyer, Bearden, and Sharma 2003, pp. 76, 77).

Data were gathered from customers of one of the nation's leading wireless telephone carriers. A market research firm collecting routine customer feedback about the

firm's goods and services gathered data for this study from 1366 customers of the firm. About 72% of the respondents were male, 43% were between the ages of 30 and 44 years of age, 76% were white, 56% were currently married, 82% had full-time employment, and 59% were college graduates. Respondents were asked to complete the GL scale and indicate whether they owned some gadgets or used some services (not offered by the firm) that were generally considered edgy and state-of-the-art at the time the survey was administered (e.g., Internet-enabled watches, wi-fi from hotspot providers).

Concurrent validity was first assessed by comparing the GL scores of those who owned/used these edgy gadgets/services with the scores of those who did not own them. It was expected that those who owned/used these gadgets would have significantly higher GL scores than the others. The data showed good support for the scale's concurrent validity as it was found that those who owned/used each one of these state-of-the-art gadgets/services had significantly higher GL scores than those who did not own/use them (Table 9). Specifically, it was found that those who owned Internet-enabled watches and those who subscribed to wi-fi services from hotspot providers were, as expected, greater gadget lovers than those who did not own/use such products, respectively.

[Place Table 9 about here]

Next, concurrent validity was assessed with something other than self-report data by focusing on customers whose adoption behaviors were known from company records: they were either an early owner of a PDA phone or they were an early user of both 2G and later 3G mobile phone services. ("Early" was defined by the company as adopting within the first three months of availability.) For comparison purposes, data were also collected from customers who were not in either of those groups. It was felt that those

customers who were early users of these products were likely to have high intrinsic motivation to use these services and the various technological gadgets that go with them. Thus, they were more likely to have higher GL scores compared to those who subscribed later or not at all. Again, Table 9 shows strong evidence of concurrent validity for the GL scale. Specifically, it was found that the early adopters of PDA phones had significantly higher GL scores compared to those who had not yet adopted such phones. Similarly, it was found that the early adopters of 2G/3G services had significantly higher GL scores than those who had not subscribed to such services. These results provided further evidence of the validity of the GL scale.

Study 4

To the extent that the GL construct is a trait-like characteristic, as suggested in the definition, then we would expect for it to be rather consistent over time. This scale attribute is called *temporal stability*, a more accurate term than test-retest reliability (Spector 1992). If one purpose of a scale is to make predictions that involve behavior several months in the future then a scale should not only have internal consistency but temporal stability as well (Nunnally and Bernstein 1994, p. 250).

Measuring temporal stability requires that the same set of respondents complete the measure at two points in time. To facilitate this process, the GL scale was completed by college students who could be conveniently tracked and recontacted later during the course of a semester. During the first administration (Study 4a), a sample of students from several courses (n = 260) completed the scale along with other measures (not discussed here). Consistent with the previous studies, the scale had high internal consistency [α = .90].

Three months later, the second stage of the study (Study 4b) was conducted. Of the 188 subjects who took part in this stage of the study, 71 had also participated in Study 4a. Subjects completed the GL scale (α = .89) and provided responses that allowed several other relationships to be examined too. As a further means of establishing the scale's nomological validity, the relationship between GL and *technophobia* was tested. This construct seemed to be especially useful to examine given GL's lower than expected relationship with general optimism as measured in Study 2. Technophobia is a much more relevant construct to the issue at hand and has to do with a person's aversion to technology (Rosen et al. 1987). The following items were adapted from Sinkovics et al. (2002) for measuring the construct: *I feel some anxiety when I use high technology products, high tech goods and services agitate me, I think most people know how to use high tech products better than I, I feel frustrated when I use high tech products, thinking about high tech products makes me nervous,* and *technological goods and services are intimidating* (α = .83). The scale was expected to have a negative relationship with GL.

It was also anticipated that gadget lovers could be distinguished by their purchase intentions. Specifically, it was predicted that those who scored high on the GL scale would have plans of buying more high tech products in the near future. To test this, respondents were asked to think about all of their planned purchases for the next month and to write down the number of purchases which were technology-related. In addition, at the end of the questionnaire, respondents were given a description of gadget lovers and asked to indicate on a five point scale (from *"no, I am not at all a gadget lover"* to *"yes, I am a gadget lover to an extreme degree"*) to what extent they viewed themselves as

being a gadget lover. Comparing respondents' self-categorization and their scores on the GL scale provided another test of convergent validity.

The test of the scale's three month stability was conducted with 71 respondents who completed the scale in both Studies 4a and 4b. The test-retest correlation was .74 which provides evidence of the scale's temporal stability over the short-to-moderate term. The expected relationships between the GL scale and the other constructs included in Study 4b were confirmed. Specifically, GL had significant relationships with technophobia ($r = -0.54$, $p < .01$)[5], the self-designating measure of GL ($r = .59$, $p < .01$), and tech purchase intentions ($r = .24$, $p < .01$).

Discussion

The purpose of this research was to shed light on gadget lovers, a subset of adopters who could play a critical role in a marketer's efforts to gain mass market acceptance of technologically innovative goods/services. Despite the popularity of the term in the media and the vernacular, no known scholarly research had been conducted until now of this important type of consumer. This study offered a definition of the GL construct and provided insights into underlying motivations that can explain gadget lovers' behaviors. The study, which systematically progressed through an item generation/content validation phase and four empirical surveys, developed and validated an eight-item Likert-type measurement scale that can be used to identify the extent to which consumers are gadget lovers.

The GL Scale

In multiple studies the GL scale was found to be unidimensional and internally consistent. The scale's convergent validity was established in multiple studies using

different samples and the construct was shown to be distinct from other similar constructs, e.g., technological innovativeness, inherent novelty seeking, et cetera. The studies also established the nomological validity of the GL construct as it was strongly related to consumers' technology adoption and technology opinion leadership behaviors. Likewise, as expected, the construct had a positive relationship with novelty seeking, material happiness, high tech purchase intentions, and actual ownership of high tech products. It had a negative relationship with technophobia and was not sensitive to socially desirable response bias. The scale also exhibited good concurrent validity as well as showing good temporal stability over the short-to-medium term (weeks to months).

The only concern about the scale was that the item regarding search behavior (#6 in Tables 4 and 6) did not perform better than it did. Although it was tempting to drop it, we felt its elimination would reduce the scale's content validity. Specifically, the feedback from the focus group indicated that part of the nature of being a gadget lover is to be continually gathering information about new technological products. The problem with the item could be that it refers to just one type of ongoing search, e.g., *leafing through catalogs*. Replacing the current statement with one or more items that broadly refer to continual search activity should be further explored (see below under future research).

Managerial Contributions

The GL construct is expected to be useful to marketers in different ways. As confirmed in our studies, there is a strong relationship between gadget lovers and technology opinion leadership. It makes sense that a consumer concerned about the risks involved in adopting a new technology good/service would seek the advice of someone known to play around

with technology for the sheer joy it gave him/her. Not only are gadget lovers likely to be seen as more knowledgeable about technology but they may also be perceived as more credible since their prime motivation for adopting gadgets is related to the products themselves. In Study 2, the scale explained an additional 9.4% variance in technology opinion leadership, above and beyond the variance explained by a set of commonly used predictors. The potential value of this scale to marketers can be gauged by examining its relative importance in predicting technological opinion leadership: the GL construct was as much or more important than any of the other variables in the set of predictors including technological innovativeness and nearly three times as important as any of the demographic factors (Table 8).

The GL scale can help marketers identify potential consumers who are likely to adopt the new product relatively early and who may also be helpful in communicating to others about the product because their opinion is likely to be sought by those who know them. It should be pointed out that the results of this study only provide the first steps in this direction by establishing the relevance of the construct and offering a psychometrically sound scale to measure the construct. To use the construct to facilitate segmentation and targeting, a firm needs to build as detailed a profile of their target customer as possible. This could be done by asking existing customers who are known to have adopted the firm's past innovations relatively early to complete the GL scale and also provide other information (e.g., media related behaviors, lifestyle information, shopping habits, etc.). These profiles could be used to segment the market and then more precisely tune the promotions for gadget lovers, get their attention, and persuade them to buy.

In a limited way, the GL scale can also be useful to marketers to enhance prediction of consumers' adoption behaviors. In two different studies with different samples of consumers, it was found that the GL scale could explain additional variance in consumers' technology adoption behaviors, above and beyond the variance explained by a set of commonly used predictors. Although in absolute terms, the incremental percentage of variance explained in adoption behaviors by GL could be viewed as small, the unique contribution of the GL construct was found in the presence of other predictors that had a significant effect. Specifically, in both Studies 1 and 2, a respondent's technological innovativeness and demographic factors such as their income and education levels (and gender in Study 1) had significant effects on new technology adoption behavior, a result that was consistent with findings from prior research; GL's effects were over and above the effects of these known influencers of technology adoption behaviors. This additional predictive power is likely to be valued by managers in the technology sector who operate in a world of fairly high levels of new product failures.

Scale Norms

An appropriate "final" step in the ideal scale development process involves the calculation of scale norms (Churchill 1979). They are particularly meaningful if the scale can be administered to a large, national sample and means can be calculated for key demographic groups (Netemeyer, Bearden, and Sharma 2003, p. 164-166). To do this for the GL scale, we used the data from Study 1. The resulting norms, shown in Table 10, show that males scored much higher on the GL scale than females did; younger adults scored slightly higher than older adults; those with greater education scored higher than those with less education; and, the major ethnic groups scored higher than white/non-

Hispanics. Sorting out why there are differences in these groups and which differences are meaningful from a practitioner's point of view are fruitful areas of examination. For scholars it may suggest some potential antecedents of the construct. For practitioners it could help in the refinement of target markets.

[Place Table 10 about here]

Limitations & Future Research

While these studies provided preliminary evidence of the potential value of the GL construct to marketers, the nomological network within which the construct operates is deserving of greater investigation. In addition to the role that some demographic variables play (as mentioned above), it would be useful for future research to test the ability of various theories of innovativeness to explain gadget lovers' motivations and behaviors. For example, prior research has identified different forms of innovativeness such as use innovativeness, vicarious innovativeness, etc. (Hirschman 1980). We believe it would be helpful to empirically determine if any of these forms of innovativeness are more characteristic of gadget lovers than tech innovators.

Although not the primary focus of this research, technological innovativeness has none-the-less been a major aspect of it. One of the purposes for which we used the TI scale was to classify subjects into groups (innovators vs. non-innovators) and note the overlap with gadget lovers who had also been divided into two groups. The process of choosing split points for these groups is problematic. Some idea of what percent of adopters are expected to be innovators can be drawn from the literature but that is based on knowing the population who have already adopted an innovation and then working backwards to identify those who were among the earliest to adopt. Thus, we suggest that

future research investigate the correctness of various scale split points when trying to identify innovators for purposes of understanding their future behavior.

We speculated that gadget lovers may be perceived as credible sources due to being more knowledgeable of technology. Future research can empirically test whether they are in fact more knowledgeable than other innovators or, instead, are viewed by others as more credible for other reasons, e.g., the infectious excitement they convey based on their joy of playing with the products. In other words, innovators (by definition) adopt first but their influence on others may be quite limited if an in-depth knowledge of products they adopted as well as a passion stemming from interaction with the innovation is not expressed to others. Research along these lines can improve our understanding of what makes gadget lovers better opinion leaders than other innovators.

Apart from innovativeness and opinion leadership, understanding the role played by the collection motivation is a fruitful area of investigation. Although we believe there are clear distinctions between the gadget lovers and collectors, they appear to share some behaviors as well. Exploring those similarities/differences would certainly be useful in order to distinguish between the two as well as to explain what factors lead to one behavior versus the other.

The relationship between the ongoing search activity and GL should also be examined in greater detail. Our understanding of the construct led us to expect ongoing search to be a facet of the construct and an item was included in the scale for that purpose. The analyses have indicated that item to be weak and one interpretation is that it was stated in terms of one medium, limiting its applicability to gadget lovers' broader ongoing search behavior. If true, then the solution would be to develop and test

statements that describe search activity that are not restricted to one medium. If several items are used in an analysis, however, it becomes quite possible that they will form a separate dimension. Thus, future research should investigate this issue more deeply.

Finally, future research could examine more deeply the economic role of gadget lovers. It seems possible that they have greater lifetime value than innovators not only because of their own purchases but also because of the role they play as references for others' behavior. If this can be confirmed, then the inordinate amount of attention paid historically to innovators in general should be reconsidered. While there is little doubt that innovators will continue to be viewed as playing an important role in the introduction of innovations, it could very well be that this subcategory of adopters, gadget lovers, play an even more important role and are worthy of greater attention from marketers in the future.

End Notes

1. The gadget-related interests and purchases of the students were known to the researchers based on conversations with them in and/or outside the classroom prior to the focus group session.
2. For Studies 1-3 we worked with a corporate partner to gather data who, in turn, hired a well-known research firm to collect the data. The client agreed to pay for a target number of complete questionnaires and when those were reached the data collection was halted. Thus, we have no way to determine the actual response rate. With regard to the mail survey portion of Study 1, 1,600 surveys were mailed out and 624 completed forms were returned yielding a response rate of 41.6%.
3. The groups were determined using percentages derived from the literature. The best known split is from Rogers' work where he has defined innovators as the top 2.5% of adopters (2003, p. 281). Using that exact figure, however, would have left us with very few respondents upon which to run tests and draw conclusions, especially for Study 2 since the total sample only had 789 respondents. So, instead, we decided to use the slightly larger 95^{th} percentile.
4. We used a seven-item GL scale and repeated all the analyses involving the GL scale in Studies 1 and 2. The same results were obtained as when we used an eight-item scale.
5. Using CFA, the discriminant validity of the technophobia and GL scale was established. The average variance extracted from the latent constructs by the items measuring each of the constructs (AVE_{GL}=.54 and AVE_{TP}=.49) was greater than the square of the disattenuated correlations between the two constructs (0.40).

Appendix

Samples for Studies 1, 2, & 3 (National samples)*

Demographic Variable	**Study 1** (n = 1655)	**Study 2** (n = 789)	**Study 3** (n = 1366)
Age			
< 30 years old	11.4%	9.3%	27.2%
30-44 years old	40.0%	41.2%	42.8%
45-59 years old	38.7%	40.3%	24.2%
≥ 60 years old	10.0%	9.3%	5.9%
Gender			
Male	50.0%	50.6%	71.6%
Female	50.0%	49.4%	28.4%
Marital Status			
Married	76.3%	80.0%	55.8%
Single	13.3%	10.7%	34.9%
Other	10.3%	9.2%	9.3%
Education			
High School or less	15.9%	15.9%	9.4%
Some college	31.6%	31.2%	27.6%
College degree	27.0%	29.3%	31.5%
Postgrad	20.1%	18.2%	27.6%
Tech/trade school	5.4%	5.4%	4.0%
Employment			
Full-time	66.0%	63.2%	81.9%
Part-time	11.8%	13.6%	8.4%
Not Employed	22.1%	23.1%	9.8%
Household Income*			
< $20,000	9.2%	10.5%	-
$20,000-$34,999	14.6%	12.8%	-
$35,000-$54,999	20.3%	15.1%	-
$55,000-$84,999	26.2%	25.2%	-
≥ $85,000	29.7%	36.4%	-
Ethnicity			
White (non-Hispanic)	92.9%	91.4%	76.1%
African-American	2.2%	1.9%	9.3%
Hispanic	1.6%	2.5%	5.4%
Asian	1.7%	3.3%	6.1%
Other	1.4%	0.9%	3.1%

* The categories used in Study 2 were slightly different than those in Study 1 as follows: < $22,500, $22,500-$39,999, $40,000-$59,999, $60,000-$89,999, and > $90,000. In Study 3, no income data were provided regarding the company's customers.

Samples for Studies 4a & 4b (Student samples)

Demographic Variable	Study 4a	Study 4b
Age		
≤ 25 years old	88.2%	91.4%
26-35 years old	7.8%	5.9%
≥ 36 years old	3.9%	2.7%
Gender		
Male	47.4%	57.0%
Female	52.6%	43.0%
Marital Status		
Single	94.3%	96.2%
Married	5.7%	3.8%

Table 1

Multi-Study Scale Development Process

Stage	Description
Literature Review	Examination of scholarly and industry literature relevant to consumer adoption of technology products
Focus group	Discussion of topic with small group of gadget lovers (n = 6)
Item Generation	GL items written by authors; items for NS and TI borrowed from previous studies or written by authors
Evaluation	Content validation assessed via 3 expert judges
Study 1	Large, national sample (n = 1655); dimensionality, internal consistency, and some aspects of validity examined
Study 2	Large, national sample (n = 789); tests of Survey 1 repeated plus further aspects of validity examined (nomological, response bias)
Study 3	Large sample of a company's customers (n = 1366) with known behaviors; examination of concurrent validity
Study 4a	Student sample used for initial measure of stability (n = 260).
Study 4b	Student sample (n = 188) used for second administration of scale for estimating stability plus further tests of validity (convergent and nomological) conducted

Table 2

Key Terms and Their Definitions

Term	Definition
Gadget Lover	A consumer with high intrinsic motivation to adopt and use a variety of leading edge technology-based goods, including the services that complement them.
Innate Innovativeness	The predisposition to adopt before others do.
Technological Innovativeness	The extent to which a consumer is motivated to be the first to adopt new technology-based goods and services.
Novelty Seeking	The degree to which an individual desires variation or stimulation in his/her life.
Technological Opinion Leadership	The degree to which an individual is able to informally influence other consumers' attitudes or behavior regarding technological products in a desired way with relative frequency.
Materialism (Happiness)	The belief that the number and quality of one's possessions are linked to the achievement of happiness in life.
Optimism (General)	The tendency to believe that one will generally experience good versus bad outcomes in life.
Social Desirability Bias	The tendency for people to describe themselves in socially acceptable terms in order to gain the approval of others.
Technophobia	The negative psychological reaction to personal use of technological products.

Table 3

Correlations, Means, and Standard Deviations (Study 1)*

	Gadget Lover	Tech Innovativeness	Novelty Seeking	Tech Adoption Behaviors
Gadget Lover	1			
Tech Innovativeness	.52	1		
Novelty Seeking	.59	.39	1	
Tech Adoption Behaviors	.32	.31	.21	1
Means**	4.71	3.36	4.59	21.87
Std. Dev.	1.34	1.52	1.14	2.61

* These results are based on the holdout sample (n = 827). All correlations were significant at the 0.01 level (two-tailed)
** GL, TI, and NS scores could range from 1 to 7 where higher scores meant greater degree of the constructs. Score on the Tech Adoption Behaviors scale could range from 15 to 30 where higher scores meant greater adoption of technology.

Table 4

Results of Study 1 Confirmatory Factor Analysis

Scale Items	Loadings*	t-values
Gadget Lover (alpha = .93, AVE = .65)		
1. Despite their age, I love to play around with technological gadgets.	.86	-
2. Even if they aren't the newest things on the market, learning how to operate technological products is interesting to me.	.79	27.87
3. Old or new, playing with technological products brings me a lot of enjoyment.	.89	34.38
4. Others may not understand it but it's kind of a thrill to play with products that have a high-tech component.	.85	32.09
5. If I was alone for several hours I could entertain myself easily if I had lots of gadgets to play with.	.76	26.23
6. Leafing through catalogs from high-tech vendors such as *Sharper Image* and *Dell* is something I like to do.	.64	20.72
7. It is easy for me to spend a lot of time playing around with almost any kind of technological device.	.85	31.52
8. Some people find it irritating but I enjoy figuring out how to get technological goods and services to work.	.78	27.69
Novelty Seeking (alpha = .86, AVE = .53)		
1. I prefer an unpredictable life that is full of change to a more routine one.	.71	-
2. I like surprises.	.57	15.18
3. I like continually changing activities.	.76	20.18
4. I like to experience novelty and change in my daily routine.	.82	21.73
5. When things get boring, I like to find some new and unfamiliar experience.	.77	20.44
6. I am continually seeking new ideas and experiences.	.71	18.99
Technological Innovativeness (alpha = .91, AVE = .67)		
1. I get a kick out of buying new high tech items before most other people know they exist.	.87	30.14
2. It is cool to be the first to own new high tech products.	.83	-
3. I get a thrill out of being the first to purchase a high technology item.	.88	30.80
4. Being the first to buy new technological devices is very important to me.	.78	25.76
5. I want to own the newest technological products.	.72	23.13

* Items whose loading was fixed to 1 indicated by - in t-values column.

Table 5

Results of Hierarchical Regression Predicting Adoption Behaviors – Study 1*

Independent Variables	Dependent Variables Adoption Behaviors			
	Step 1 (R^2=.188)		Step 2 (R^2=.213)	
	β	t	β	t
Constant	23.14	46.87	22.40	44.15
Age	.06	1.88	.05	1.55
Gender	.15	4.61*	.12	3.68*
$Dinc1_{20k < income < 35k}$	.03	0.53	.03	0.53
$Dinc2_{35k \leq income < 55k}$	.09	1.71	.07	1.51
$Dinc3_{55k \leq income < 85k}$	.15	3.08*	.14	2.91*
$Dinc4_{income > 85k}$	.23	4.71*	.27	4.99*
$Dedu1_{some\ college}$	.11	2.30*	.08	1.77
$Dedu2_{college\ graduate}$	.10	2.26*	.09	1.93
$Dedu3_{post\text{-}graduate}$	.09	1.96*	.08	1.91
$Dedu4_{tech/vocational\ school}$	.06	1.61	.05	1.26
Tech. innovativeness	.28	8.50*	.18	4.85*
Gadget lover	-	-	.19	5.09

* These results are based on the holdout sample (n = 827).

Table 6

Results of Study 2 Confirmatory Factor Analysis

Scale Items	Loadings*	t-values
Gadget Lover (alpha = .93, AVE = .63)**:**		
1. Despite their age, I love to play around with technological gadgets.	0.84	-
2. Even if they aren't the newest things on the market, learning how to operate technological products is interesting to me.	0.75	24.76
3. Old or new, playing with technological products brings me a lot of enjoyment.	0.88	31.69
4. Others may not understand it but it's kind of a thrill to play with products that have a high-tech component.	0.83	29.21
5. If I was alone for several hours I could entertain myself easily if I had lots of gadgets to play with.	0.75	24.69
6. Leafing through catalogs from high-tech vendors such as Sharper Image and Dell is something I like to do.	0.67	21.24
7. It is easy for me to spend a lot of time playing around with almost any kind of technological device.	0.84	29.65
8. Some people find it irritating but I enjoy figuring out how to get technological goods and services to work.	0.77	25.63
Technological Opinion Leadership (alpha = .88, AVE = .60)		
1. When they choose technological goods and services, other people do <u>not</u> come to me for advice. (r)	0.72	-
2. Other people rarely come to me for advice about choosing technological products. (r)	0.66	17.77
3. People that I know pick technological gadgets and services based on what I have told them.	0.88	23.61
4. I often persuade other people to buy the technology products that I like.	0.77	20.70
5. I often influence people's opinions about technological goods and services.	0.86	22.99
Optimism (alpha = .76, AVE = .59)		
1. If something can go wrong for me, it will. (r)	0.84	-
2. I hardly ever expect things to go my way. (r)	0.83	17.71
3. Overall, I expect more good things to happen to me than bad.	0.86	13.23
Materialism (Happiness dimension) (alpha = .83, AVE = .62)		
1. My life would be better if I owned certain things I don't have.	0.76	-
2. I'd be happier if I could afford to buy more things.	0.84	20.55
3. It sometimes bothers me quite a bit that I can't afford to buy all the things I'd like.	0.75	19.58

Technological Innovativeness (alpha = .92, AVE = .69)		
1. I get a kick out of buying new high tech items before most other people know they exist.	.87	-
2. It is cool to be the first to own new high tech products.	.84	30.54
3. I get a thrill out of being the first to purchase a high technology item.	.88	33.32
4. Being the first to buy new technological devices is very important to me.	.75	25.56
5. I want to own the newest technological products.	.80	28.41

* Items whose loading was fixed to 1 indicated by - in t-values column.

Table 7

Correlations, Means, and Standard Deviations (Study 2)

	GL	TI	TOL	OPT	MH	Tech Adoption Behaviors
Gadget Lover	1					
Tech Innovativeness	.69*	1				
Tech Opinion Leader	.70*	.68*	1			
Optimism	.07	-.03	.09*	1		
Material Happiness	.17*	.28*	.10*	-.36*	1	
Tech Adoption Behaviors	.44*	.48*	.56*	.07*	-.03	1
Means**	4.63	3.50	4.03	4.98	4.08	22.78
Std. Dev.	1.46	1.59	1.53	1.33	1.57	3.59

* Correlations were significant at the 0.05 level (two-tailed)
** All scale scores (except Tech Adoption Behaviors) could range from 1 to 7 where higher scores meant greater degree of the constructs. Scores on the Behaviors scale could range from 15 to 30 where higher scores meant greater adoption of technology.

Table 8

Results of Hierarchical Regression Predicting Adoption Behaviors – Study 2

Independent Variables	Dependent Variables							
	Adoption Behaviors				Technology Opinion Leadership			
	Step 1 (R^2=.313)		Step 2 (R^2=.331)		Step 1 (R^2=.504)		Step 2 (R^2=.598)	
	β	t	β	t	β	t	β	t
Constant	19.32	26.89	19.12	26.90	26.21	24.99	26.99	28.52
Age	-.02	-.73	-.01	-.41	.01	.43	-.01	.49
Gender	.09	2.71*	.05	1.65	.11	3.83*	.03	1.13
$Dinc1_{22.5k < income < 40k}$	<.01	.10	<.01	.03	.02	.59	.01	.27
$Dinc2_{40k \leq income < 60k}$	.11	2.52*	.11	2.54*	.03	.68	.02	.72
$Dinc3_{60k \leq income < 90k}$	.22	4.47*	.21	4.51*	.05	1.21	.05	1.29
$Dinc4_{income \geq 90k}$	.30	5.64*	.29	5.58*	.12	2.71*	.10	2.61*
$Dedu1_{some\ college}$	.09	2.15*	.08	1.90	.12	3.31*	.10	2.87*
$Dedu2_{college\ graduate}$	.12	2.79*	.12	2.66*	.17	4.54*	.15	4.55*
$Dedu3_{post\text{-}graduate}$	.11	2.69*	.10	2.52*	.16	4.37*	.14	4.25*
$Dedu4_{tech/vocational\ school}$	.05	1.39	.04	1.06	.06	2.15*	.04	1.37
Tech. innovativeness	.44	13.82*	.31	7.54*	.63	23.41*	.35	10.74*
Gadget lover	-	-	.19	4.58*	-	-	.44	13.46*

* $p < .05$.

Table 9

Results of Concurrent Validity Tests (Study 3)

Gadget	Groups	Mean GL scores	F	p
Internet watches	Owners	5.37	3.81	< .05
	Non-owners	4.93		
Hotspot Wi-fi subscription	Subscriber	5.62	15.35	< .01
	Non-subscriber	4.91		
PDA phones	Owners	5.40	67.00	< .01
	Non-owners	4.70		
2G/3G subscription	Subscriber	5.44	103.21	< .01
	Non-subscriber	4.61		

Table 10

Gadget Lover Norms (Study 1)

Demographic Variable	Group Means	Demographic Variable	Group Means
Gender	Males = 4.87 Females = 3.99	Marital*	Now Married = 4.42 Never Married = 4.65
Age*	20 years old = 4.88 40 years old = 4.65 60 years old = 4.11	Employed	Full-time = 4.56 Part-time = 4.07 Not employed = 4.28
Education*	Post-graduate = 4.52 College Graduate = 4.59 High School Graduate = 3.97 Some high school = 3.89	Ethnicity*	Asian = 5.46 African-American = 5.10 Hispanic = 4.92 Non-Hispanic White 4.39
Occupation*	Managerial = 4.43 Professional/technical = 4.79 Sales = 4.81 Clerical = 3.77 Production/service worker = 4.28	Income	Under $20,000 = 4.42 $20,000-$34,999 = 4.37 $35,000-$54,999 = 4.50 $55,000-$84,999 = 4.48 $85,000 & over = 4.38

* Not all values/groups are shown.

References

Anderson, James C. and David W. Gerbing. 1988. "Structural Equation Modeling in Practice: A Review and Recommended Two-Step Approach." *Psychological Bulletin* 103 (3): 411-423.

Bagozzi, Richard P. and Youjae Yi. 1988. "On the Evaluations of Structural Equations Models." *Journal of the Academy of Marketing Science* 16 (1): 74-94.

Ballard, Rebecca, Michael D. Crino, and Stephen Rubenfeld. 1988. "Social Desirability Response Bias and the Marlowe-Crowne Social Desirability Scale." *Psychological Reports* 63 (August): 227-237.

Belk, Russell W., Melanie Wallendorf, John F. Sherry, Jr., Morris B. Holbrook and Scott D. Roberts. 1988. "Collectors and Collecting." In *Advances in Consumer Research,* V. 15. Ed. Michael Houston. Provo, UT: Association for Consumer Research, 548-553.

Bentler, Peter M. 1998. *EQS for Windows* (Version 5.7). Encino, CA: Multivariate Software.

Bloch, Peter H., Daniel L. Sherrell, and Nancy M. Ridgway. 1986. "Consumer Search: An Extended Framework." *Journal of Consumer Research* 13 (June): 119-126.

Bruner II, Gordon C., Paul J. Hensel, and Karen E. James. 2005. *Marketing Scales Handbook: A Compilation of Multi-Item Measures for Consumer Behavior & Advertising,* V. IV. Mason, Ohio: Thomson.

Burns, David and Robert F. Krampf. 1992. Explaining Innovative Behavior: Uniqueness-Seeking and Sensation-Seeking." *International Journal of Advertising* 11 (3): 227-236.

Churchill, Gilbert A., Jr. 1979. "A Paradigm for Developing Better Measures of Marketing Constructs." *Journal of Marketing Research* 16 (February): 64-73.

Crowne, Douglas P. and David Marlowe. 1960. "A New Scale of Social Desirability Independent of Psychopathology." *Journal of Consulting Psychology* 24 (August): 349-354.

Czikszentmihalyi, Mihaly. 2000. *Beyond Boredom and Anxiety: Experiencing Flow in Work and Play.* San Francisco: Jossey-Bass, Inc.

Dabholkar, Pratibha A. and Richard P. Bagozzi. 2002. "An Attitudinal Model of Technology-Based Self-Service: Moderating Effects of Consumer Traits and Situational Factors." *Journal of the Academy of Marketing Science* 30 (3): 184-201.

Darden, William R. and William D. Perrault, Jr. 1976. "Identifying Interurban Shoppers: Multiproduct Purchase Patterns and Segmentation Profiles." *Journal of Marketing Research* 13 (February): 51-60.

Flynn, Leisa R., Ronald E. Goldsmith, Jacqueline K. Eastman. 1996. "Opinion Leaders and Opinion Seekers: Two New Measurement Scales." *Journal of the Academy of Marketing Science* 24 (Spring): 137-147.

Fornell, Claes and David F. Larcker. 1981. "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error." *Journal of Marketing Research* 18 (February): 39-50.

Goldsmith, Ronald E., Jon B. Freiden and Jacqueline K. Eastman. 1995. "The Generality/ Specificity Issue in Consumer Innovativeness Research." *Technovation* 15 (10), 601-613.

---- and Charles F. Hofacker. 1991. "Measuring Consumer Innovativeness." *Journal of the Academy of Marketing Science* 19 (3): 209-221.

Hamblen, Matt. 2005. "Managing 'Prosumers'." *ComputerWorld* 39 (32): 40, 41.

Hair, Joseph F. Jr., Rolph E. Anderson, Ronald L. Tatham, and William C. Black. 1995. *Multivariate Data Analysis.* Englewood Cliffs, New Jersey: Prentice-Hall.

Higgina, Susan H. and William L. Shanklin. 1992. "Seeking Mass Market Acceptance for *High*-technology Consumer Products." *Journal of Consumer Marketing* 9 (Winter): 5-14.

Hirschman, Elizabeth C. 1980. "Innovativeness, Novelty Seeking and Consumer Creativity." *Journal of Consumer Research* 7 (December): 283-295.

Horrigan, John B. 2003. *Consumption of Information Goods and Services in the United States.* Pew Internet & American Life Project, Washington, DC.

Lastovicka, John L. and Erich A. Joachimsthaler. 1988. "Improving the Detection of Personality-Behavior Relationships in Consumer Behavior." *Journal of Consumer Research* 14 (March), 583-587.

Lumpkin, James R. 1985. "Shopping Orientation Segmentation of the Elderly Consumer." *Journal of the Academy of Marketing Science* 13 (Spring): 271-289.

McQuitty, Shaun. 2004. "Statistical Power and Structural Equation Models in Business Research." *Journal of Business Research* 57 (2): 175– 183

Mehrabian, Albert and James A. Russell. 1974. *An Approach to Environmental Psychology.* Cambridge, MA: The MIT Press.

McLuhan, Marshall. 1964. *Understanding Media.* New York: McGraw-Hill Book Company.

Mick, David Glen. 1996. "Are Studies of Dark Side Variables Confounded by Socially Desirable Responding? The Case of Materialism." *Journal of Consumer Research* 23 (2): 106-121.

Midgley, David F. and Grahame R. Dowling. 1978. "Innovativeness: The Concept and Its Measurement." *Journal of Consumer Research* 4, 229-242.

---- and ----. 1993. "A Longitudinal Study of Product Form Innovation: The Interaction Between Predispositions and Social Messages." *Journal of Consumer Research* 19 (March): 611-625.

Mittelstaedt, Robert A., Sanford L.Grossbart, William W. Curtis, and Stephen P. Devere. 1976. "Optimal Stimulation level and the Adoption Decision Process." *Journal of Consumer Research* (September): 84-94.

Moore, Geoffrey A. 2002. *Crossing the Chasm.* New York: HarperBusiness.

Netemeyer, Richard G., William O. Bearden, and Subhash Sharma. 2003. *Scaling Procedures: Issues and Applications.* Newbury Park, CA: Sage Publications, Inc.

Nunnally, Jum C. and Ira H. Bernstein. 1994. *Psychometric Theory.* New York: McGraw-Hill.

Parasuraman, A. (2000), "Technology Readiness Index (TRI)." *Journal of Services Marketing* 2 (May): 307-320.

---- and Charles L. Colby. 2001. *Techno-Ready Marketing: How and Why Your Customers Adopt Technology.* New York: The Free Press.

Price, Linda L. and Nancy M. Ridgway. 1982. "Use Innovativeness, Vicarious Exporation and Purchase Exploration: Three Facets of Consumer Varied

Behavior." In *Proceedings of the AMA Educators' Conference.* Ed. Bruce W. Walker. Chicago: American Marketing Association, 56-60.

Richins, Marsha L. and Scott Dawson. 1992. "A Consumer Values Orientation for Materialism and Its Measurement: Scale Development and Validation." *Journal of Consumer Research* 19 (December): 303-316.

Ridgway, Nancy M. and Linda L. Price. 1994. "Exploration in Product Usage: A Model of Use Innovativeness." *Psychology & Marketing* 11 (1), 69-84.

Roehrich, Gilles. 2004. "Consumer Innovativeness Concepts and Measurements." *Journal of Business Research* 57 (6): 671-677.

Rogers, Everett M. 1983. *Diffusion of Innovations.* New York: The Free Press.

---- 2003. *Diffusion of Innovations.* New York: The Free Press.

Rosen, Larry D., Deborah C. Sears, and Michelle M. Weil. 1987. "Computerphobia." *Behavior Research Methods, Instruments, and Computers* 19 (2): 167-179.

Scheier, Michael F., Charles S. Carver, and Michael W. Bridges. 1994. "Distinguishing Optimism From Neuroticism (and Trait Anxiety, Self-Mastery, and Self-Esteem): A Reevaluation of the Life Orientation Test." *Journal of Personality and Social Psychology* 67 (6): 1063-1078.

Sinkovics, Rudolf R., Barbara Stottinger, Bodo B. Schlegelmilch, and Sundaresan Ram. 2002. "Reluctance to Use Technology-Related Products: Development of a Technophobia Scale." *Thunderbird International Business Review* 44 (4): 477-494.

Spector, Paul E. 1992. *Summated Rating Scale Construction: An Introduction.* Newbury Park, CA; SAGE Publications, Inc.

Tynan, Daniel. 2004. "Cool Your Gadget Fever." *PC World* 22 (January): 140.

Valente, Thomas W. and Rebecca L. Davis. 1999. “Accelerating the Diffusion of Innovations Using Opinion Leaders.” *Annals of the American Academy of Political and Social Science* 566 (*November*), 55-67.

Yankee Group. 2000. "The Technologically Advanced Family®: The Point of Convergence." *Yankee Group Report, Consumer Market Convergence* 17 (December).

Yonish, Steve, James L. McQuivey, Gillian DeMoulin, Jennifer Gordon, and Resa Broadbent. 2001. *Why Technographics Works: Consumer Technographics North America.* Cambridge, MA: Forrester Research, Inc.