Measuring Consumer Innovativeness

Ronald E. Goldsmith
Florida State University

Charles F. Hofacker
Florida State University

The development of a self-report scale to measure domain specific consumer innovativeness is described. A major problem faced by researchers interested in the diffusion of innovations has been the difficulty in measuring the innovativeness construct in a reliable and valid way. Several operationalizations have been proposed and are commonly used, yet none has received substantial evidence supporting its reliability and validity. A series of six studies describes the development and evaluation of a six-item, self-report scale to measure innovativeness within a specific domain of interest familiar to the consumer. The scale is shown to be easy to administer, highly reliable and valid, and adaptable across domains.

INTRODUCTION

Consumer researchers interested in the diffusion of innovations wish to measure innovativeness so that they can either assign consumers to a single adopter category (e.g., innovator, early adopter, early majority, late majority, or laggard) or examine the relationships between their measure of innovativeness and other variables. Diffusion research, however, has been hampered by the lack of a universally agreed-upon measure of the innovativeness construct, and the measures typically used have been criticized for their lack of reliability and validity (Hurt, Joseph, and Cook 1977; Kohn and Jacoby 1973; Midgley and Dowling 1978; Onkvisit and Shaw 1989). Likewise, marketing managers sometimes need to identify the potential of consumers in a target segment to adopt a new product. Hence, there is a

need for a method to measure consumer innovativeness that can be applied to a variety of product domains, is easy to administer and score, and can be evaluated for its reliability and validity. The purpose of the present study is to present a self-report measure of consumer innovativeness that meets these criteria. This short, flexible scale was modeled after the widely used King and Summers (1970) Opinion Leadership Scale and has been subjected to a variety of psychometric tests that demonstrate it is highly reliable and valid.

MEASURING CONSUMER INNOVATIVENESS

Researchers attempting to measure consumer innovativeness typically use one of three strategies: time-of-adoption, the cross-sectional method, or some form of self-report (Kohn and Jacoby 1973). Each has its theoretical and methodological strengths and weaknesses, and none is universally accepted as the best way to operationalize this construct. Our preference is to treat these as complementary methods.

Following Rogers's (1962) seminal work on diffusion, many consumer studies have measured innovativeness by the time-of-adoption method. Since Rogers defines innovativeness as the "degree to which an individual is relatively earlier in adopting an innovation than other members of his system " (Rogers and Shoemaker 1971, p. 27), researchers frequently take a measure of the time since introduction until adoption as an indicator of an individual's innovativeness or use time-of-adoption to assign consumers to the adopter categories based on some arbitrary categorization scheme. This approach has been strongly criticized for both theoretical and methodological reasons (Hurt et al. 1977; Midgley and Dowling 1978). The basic theoretical criticism is that time-of-adoption is a *temporal concept* that equates time-of-adoption with the construct "innovativeness," but bears no isomorphic relationship with this latent construct it is suppose to operationalize (Midgley and Dowling 1978). Because their criticism is far reaching and grounded in the

overall theory of innovativeness, the reader is referred to Midgley and Dowling's (1978) critique. A short quotation sums up the essential point.

> What is observable is the act and time of adoption or purchase of a new product. Innovativeness itself is a hypothetical construct postulated to explain and/or predict such observable phenomena, but existing only in the mind of the investigator and at a higher level of abstraction (Midgley and Dowling 1978, p. 230).

Some methodological consequences of using the time-of-adoption method are that there is no way to evaluate its reliability and validity, findings cannot be compared across studies, and generalizability is limited to the individuals in a single study. Time-of-adoption methods cannot be used to predict future behavior. Moreover, they depend on the faulty memory of respondents, and they may be biased by misconceptions of past events or interviewer biases. Finally, sample sizes may be restricted by time and cost constraints, and they are innovation-bound (Hurt et al. 1977).

In place of time-of-adoption, Midgley and Dowling (1978, p. 230) propose that a better, deeper way to measure innovativeness is the use of a cross-sectional method, "determining how many of a prespecified list of new products a particular individual has purchased at the time of the survey." This method, they argue, produces a better measure of the construct "innate innovativeness," a personality trait possessed more or less by everyone in a society that accounts in part for some observed innovative behavior through interactions with other personality traits, situational factors, and the characteristics of the innovation itself. This approach, however, would seem to suffer from many of the criticisms directed toward time-of-adoption and would be difficult to develop and cumbersome to administer. Which product categories would be selected, which products in these categories, and how the researcher determines which products are new would also present difficult problems for researchers and render the resulting measure of questionable value. Moreover, this method is intended by Midgley and Dowling (1978) to measure innate innovativeness, a global personality trait, and would be of little use in a research study of innovativeness in a specific domain.[1]

As a final difficulty, the cross-sectional method assumes there is a construct called "innate innovativeness" that is of interest to the researcher (Midgley and Dowling 1978). Of perhaps more interest to the researcher, however, is the identification of innovators within a specific domain or product category, a domain specific innovativeness existing independently of any global trait. Given the body of findings suggesting there is little if any innovativeness overlap across domains or product categories (Gatignon and Robertson 1985), measuring global, innate innovativeness may be of little value to researchers interested in innovativeness within a specific domain. Hirschman (1980) used a domain specific measure of fashion innovativeness, and other examples of *ad hoc* measures asking consumers to describe their own innovative behavior can be located (e.g., Price and Ridgway 1983; Tigert, Ring, and King 1976; Venkatraman 1988). But these scales are not consistent

across studies, nor is much evidence offered for their validity. We did, however, use these scales as examples of domain specific innovativeness, so they provided valuable guidelines for the development of our scale.

In summary, it would be desirable to have a simple, easily administered scale to measure consumer innovativeness that could be adapted to any domain of interest and used in surveys. The measure should also be reliable and valid. A review of the various operationalizations of the innovativeness construct discussed above suggested a self-report scale would have the desired characteristics. First, a multi-item, self-report scale allows consumers to sum up their behaviors and attitudes in a specific area of interest. Second, multiple items ensure the construct is accessed from a variety of perspectives, increasing the overall reliability of the scale (Burisch 1984; Churchill 1979; Epstein 1979; Lastovicka and Joachimsthaler 1988). We were inspired by the existing domain specific scales cited above and used them along with the King and Summers (1970) Opinion Leadership Scale as models. The modified form (Childers 1986; Goldsmith and Desborde 1990), of this scale has the features desired in an innovativeness measure, and since opinion leadership is conceptually associated with innovativeness, it makes sense to develop a similar self-report, domain specific measure for this construct.

PLAN OF THE STUDY

We followed the paradigm described by Churchill (1979) for the development of the self-report scale with two modifications. First, the effect of direction-of-item wording was a concern not addressed by Churchill. In light of the importance of this feature of questionnaire item response we felt that a systematic examination of differential responses to positive and negative items similar to that described by Falthzik and Jolson (1974) was needed. The second problem arose logically from the first. If we succeeded in showing that direction-of-item wording affected the intensity of item responses, could we construct a balanced scale (i.e., one with an equal number of positive and negative items) with high internal consistency and construct validity that provided a unidimensional measure unaffected by the direction in which its items were worded? In other words, we did not want a balanced scale in which the direction-of-item wording led to a multifactorial structure.

Thus we focused particular attention on the twin problems, direction-of-item wording and unidimensionality of the final scale. In the initial stage of item purification, positive and negative versions of each item were tested to assess the effects of direction-of-item wording, and each item was tested for criterion validity by correlating it with criterion measures (Burisch 1984; Churchill 1979; Guilford 1954) so that items were selected for the final scale only if they contributed to both the scale's internal consistency and validity simultaneously. Six separate studies were performed to develop the scale and evaluate its psychometric properties. Study One describes the scale's development and item analysis to yield a balanced, unidimensional, reliable scale. Study Two evaluated the scale's reliability, dimensionality, and criterion-related validity on a separate sample as pre-

scribed by Churchill (1979). Study Three reflected the concern that the scale be adaptable to a topic area other than that used in its initial development. The fourth study used a sample of "real consumers" to confirm that the scale was valid and reliable in the field. Study Five evaluated its test-retest reliability, predictive validity, and the possible effects of social desirability and yea-saying. The final study focused on convergent and discriminant validity using the multitrait-multimethod (MM) procedure (Campbell and Fiske 1959).

STUDY ONE: INITIAL SCALE DEVELOPMENT

Domain Specification and Item Generation

Following the suggested procedure for developing better measures in marketing research (Churchill 1979), the first step in the process was to define precisely the construct of interest, "product specific innovativeness," thereby specifying the construct domain. Product specific innovativeness is clearly described by Midgley and Dowling (1978) and by Gatignon and Robertson (1985). It is distinguished from the more abstract concept "innate innovativeness," a generalized personality trait reflecting " . . . the degree to which an individual makes innovative decisions independently of the communicated experience of others" (Midgley and Dowling 1978, p. 235) and from the highly specific, low-level construct "single product purchase." *Domain or product category specific innovativeness reflects the tendency to learn about and adopt innovations (new products) within a specific domain of interest.* Thus this construct mediates both conceptually and empirically the relationship between the generalized personality trait, innate innovativeness, and specific innovative behaviors (Midgley and Dowling 1978, p. 238).

The findings of empirical studies of innovativeness partially lack consistency because researchers either fail to specify the level of abstraction at which they measure innovativeness and thus compare findings at different levels; or findings at the domain specific level are expected to be similar when in fact we should *not* expect them to be similar across product categories. Gatignon and Robertson (1985, p. 861) state that, "The overriding conclusion is that innovators must be identified and characterized on a product category basis and that there is not a generalized innovator across product category or interest domains." This recommendation is congruent with current approaches to personality assessment. Personality research faces this problem in the effort to predict behavior based on trait measures—the more abstract the trait, the lower the predictive validity: "Narrowly defined traits have the advantage of being relatively homogeneous, virtually by definition. As such, they tend to be better predictors of a particular behavior, just as tennis performance is better predicted by tennis ability than by general athletic ability" (Buss 1989, pp. 1184–1185). Moreover, the concept of domain specific innovativeness, like most latent constructs in psychology, consists of both attitudinal and behavioral elements. The former are exemplified by positive feelings consumer innovators have toward new products in the category. The latter consists of

manifest behaviors resulting from their feelings. We focused our scale development upon "frequent and prototypical" behavioral characteristics of innovators because these behaviors are "central to the concept of the trait" (Buss 1989, p. 1384).

The product area chosen for the first study was rock music records and tapes. Two criteria led to this choice. First, a specific product area was needed rather than the general idea of purchasing innovativeness (Gatignon and Robertson 1985, p. 861). Second, since college students formed the chief population base for the scale's development, a topic area was needed that would be of interest to them, one about which they would be knowledgeable, and one that many of them could be realistically expected to purchase. Rock music met these criteria because it is an area of interest to students, many of them are quite knowledgeable about it, and, according to the *Wall Street Journal* (December 11, 1986), records and tapes are the third largest spending category of non-school items for the average college student. Studies showing the versatility of the scale in other product areas will be discussed shortly.

A reading of the diffusion literature, particularly descriptions of innovators given in discussions of consumer behavior (Engel, Blackwell, and Miniard 1986; Gatignon and Robertson 1985; Midgley and Dowling 1978; Wilkie 1986), suggested the following frequent and prototypical behaviors: innovators are the first to buy a new product, they are more interested in the product and have more knowledge of the product area than others, they are more exposed to information about the product area, they own more products typifying the product area, and they are likely to talk to others about the product area. Using the diffusion literature as a background, eleven items were written to reflect these characteristics. We wrote the items so that they would represent the construct as closely as possible, following a "deductive" approach to multi-item inventory development some argue is the most likely to yield valid scales because "choice and definition of constructs precede and govern the formulation of items" (Burisch 1984, p. 215). Thus, our items were written to fit the definition of the construct as closely as possible using simple language. According to the plan of the study, each item was also written to reflect an opposite polarity wording, either as a logical opposite or a reversed polarity. Table 1 contains the positive and negative wordings of the eleven items forming the initial item pool.

Scale Purification

Two versions of the questionnaire were prepared, each containing eleven scale items, alternating positive and negative, so that Item One of Version A read "In general, I am among the *first* in my circle of friends to buy a new rock album when it appears" and Item One of Version B was identical except for the substitution of the word "last." A seven-point agree–disagree scale was used. The scale items were preceded by four measures of criterion variables that we judged to reflect the behavior of interest in this study. The first was a list of four new rock record titles. Respondents were asked to indicate whether they were aware of the title and had purchased it (Yes, No, Don't Know). The titles were solicited from sales clerks at local music stores to

TABLE 1
Initial Item Pool with Reversal in Parentheses

1 & 12*	In general, I am among the first (last) in my circle of friends to buy a new rock album when it appears.
2 & 13*	If I heard that a new rock album was available in the store, I would (not) be interested enough to buy it.
3 & 14	I (do not) like to listen to newly released rock albums.
4* & 15	Compared to my friends I own few (a lot of) rock albums.
5 & 16	If a friend has a newly released rock album, I would (not) ask to hear it.
6* & 17	In general, I am the last (first) in my circle of friends to know the titles of the latest rock albums.
7 & 18	I usually (rarely) prefer new rock songs over classic, oldie rock songs.
8 & 19*	I will not buy a new rock album if I haven't heard it yet/I will buy a new rock album, even if I haven't heard it yet.
9 & 20	I (do not) like to buy rock albums put out by brand new groups.
10 & 21*	I (do not) know the names of new rock acts before other people do.
11 & 22	I (do not) like to buy albums that have a fresh, new, original sound.

*Indicates items chosen for the final innovativeness scale.

ensure that they would be both recent and available in the area. Summing the number of "Yes" responses yielded measures of rock music awareness and purchase. The third criterion item asked "whether the respondent regularly read or subscribed to *Rolling Stone* or another similar magazine devoted to the rock scene," and a four-point response format was given: Yes, Sometimes, Rarely, No. Then the respondents were asked "how often do you go to record stores," with the response format: almost never, less than once a week, about once a week, twice a week or more. These four criterion measures were designed to provide operationalizations of some of the conceivable behaviors that would reflect rock music innovativeness. Positive correlations between the scale items and these measures were taken as indicators of item validity as described by Burisch (1984) and Guilford (1954).

After pretesting the questionnaire with 27 students to ensure understandability of all the items, we gave ten copies of the questionnaire (five of Version A and five of B) to each of 31 students in marketing research at a large southeastern university. The students were instructed to administer the questionnaires as a personal interview (showcards with the seven-point agree–disagree response format were handed to respondents) to five male students and five female students located at the convenience of the interviewer. Although this convenience sampling procedure did not yield random samples of respondents, there is no evidence that sampling variation affected the development of the scale. Questionnaires were carefully edited prior to data entry to weed out obvious instances of interviewer cheating. The separate studies occurred many months apart and with different target samples so there was little chance for duplicate responses. Most importantly, the consistency of evidence across the many studies makes it highly unlikely that either sampling or non-sampling error contaminated the findings.

The interviews yielded 309 usable questionnaires from 151 men and 157 women (one subject did not report his/her

sex) with a mean age of 21.6 years. One hundred fifty-five copies of Version A were returned and 154 copies of Version B. We thus had a split sample to compare the two versions of the questionnaire, following Falthzik and Jolson (1974) and Nevin (1977).

Two procedures were followed to select the items in the final scale. First, an item analysis technique based upon the interitem correlations was performed (Churchill 1979; Larsen and LeRoux 1983). For each set of eleven items the interitem correlations were computed as well as the item-to-total correlations and coefficient alpha. The item with the lowest item to total correlation was deleted if deletion increased alpha. After the item was deleted, the process was repeated until a final scale was determined with an alpha coefficient of .80 (Churchill 1979, p. 68), and deletion of the next item would decrease alpha. This procedure yielded two seven-item scales from the two data sets with alphas of .82 and .80.

The second step in the purification procedure was to examine the correlation of each of the 14 items with the four criterion variables, product awareness, purchase, magazine readership, and record store visits. All four criterion measures were positively correlated (values ranged from .27 to .57 for Version A and from .21 to .53 for Version B), indicating they each tapped some aspect of the consumption-related behaviors of interest. Following the logic of multiple operationalism (Messick 1981), the average of the correlations between each item and the four criterion measures served as the critical value for item selection (see Table 2). Pearson correlation coefficients were used rather than a Fisher Z transformation because it was not felt that this procedure would affect the outcome of the analysis (Houts, Cook, and Shadish 1986, p. 81; Silver and Dunlap 1987).

Without the criterion measures, the normal item selection procedure is to factor analyze the items and select for the final scale only those that load on a single factor (Churchill 1979). While ensuring that all the items are intercorrelated, this analysis does not guarantee that the items are similarly related to the criterion variables the scale is suppose to measure. The item validity step, however, provides empirical evidence that the items in the scale are positively correlated with some aspects of the criterion (Smith 1974). Since this is the ultimate goal of the multi-item index, it seems that this would be a highly desirable characteristic, and Wiggins's (1973, p. 413) observation is pertinent: "Regardless of the theoretical considerations which guide scale construction or the mathematical elegance of item-analytic procedures, the practical utility of a test must be assessed in terms of the number and magnitude of its correlations with non-test criterion measures."

We chose six of the seven items that had passed the initial screening. These were the six items that had the largest average criterion validity (shown in Table 2) and contributed the most to the internal consistency of the scale. Recall that each of the items has a positive version and a negative version. In order to balance the scale we chose three negative items and three positive items. Because fewer negative items were strongly correlated with the criteria, we first picked the three negative items (4, 6, & 12) with the largest validity correlations. Then we picked the

TABLE 2
Correlations of Scale Item Candidates with Criterion Measures in Study One

Item Number	Item Polarity	Correlations With Criterion Measures				
		Awareness	Purchase	Magazine	Store	Average
1	+	.21	.23	.37	.49	.32
3	+	.11	.09	.16	.18	.13
4*	−	.30	.15	.36	.29	.27
5	+	.07	.10	.28	.32	.19
6*	−	.33	.17	.27	.32	.27
9	+	.15	.21	.11	.19	.16
10	−	.36	.13	.26	.34	.28
12*	−	.15	.19	.38	.56	.40
13*	+	.21	.27	.33	.41	.30
15	+	.14	.29	.42	.51	.33
17	+	.12	.25	.27	.46	.28
19*	+	.19	.24	.25	.37	.26
20	−	.07	.06	.11	.17	.10
21*	+	.24	.26	.44	.46	.34

Note: n1 = 155, n2 = 154. At this sample size, r's of .135 and greater are significant at $p = .05$, one tailed.
*Indicates items chosen for the final innovativeness scale.

three positive items (13, 19, & 21) with the largest validity correlations. If the negative version of the item was selected, we did not use its positive version, and vice versa. We might note at this point that all selected items were unimodal.

As recommended by Churchill (1979), new data was collected to assess the scale's internal consistency, dimensionality, and validity. This was also necessary because the scale was formed from items evaluated on two separate samples so the items could not be combined to form a single scale.

STUDY TWO: FURTHER SCALE ANALYSIS

The second study used the six-item record innovativeness scale with a five-point Likert-type response format because several respondents in the first study had complained about the excessive number of scale points when the seven-point format was used. No respondent complaints were noted in the second and subsequent studies. No other changes were made in the innovativeness scale.

Subjects

Twenty-eight students in a marketing research class recruited five male and five female respondents at their convenience from the university student population. The questionnaire was self-administered this time rather than a personal interview. The procedure yielded 275 complete questionnaires from 146 men and 129 women. The mean age was 21.5 years (SD = 3.2).

Criterion Variables

In addition to the six-item record innovativeness scale, the respondents were asked to indicate which of eight rock music album titles they were aware of and had purchased. These were four titles used in study one plus four new titles gathered in the same manner from the record store clerks.

Respondents indicated awareness and purchase as before so that awareness and purchase were the summed number of "yes" answers. Next, they answered the questions about reading or subscribing to rock music magazines and number of record store visits. Two new questions dealt with music behavior. The first asked: "How much time do you estimate that you spend listening to Top 40 rock and roll music in an average week?" The response format gave five categories from "less than one hour" to "five hours or more." The second new item asked: "How much do you like to watch MTV?" The responses were "a lot," "some," "not very much," and "hardly at all." The final criterion measure was the seven-item King and Summers (1970) opinion leadership scale adapted for Top 40 music following Childers (1986). All scores were coded so that higher values represented the behavior under question. We expected the scores on the music innovativeness scale would be positively correlated with the criterion measures: awareness and purchase of new albums, readership of music publications, record store visits, time spent listening to rock music, viewership of MTV, and self-designated opinion leadership for rock music records.

RESULTS

One respondent's innovativeness scale was incomplete, so scores on 274 uses of the scale were evaluated for its psychometric properties.

Reliability

Observed scores on the innovativeness scale in this study ranged from six to thirty, matching the theoretical range. The mean score was 15.8 (SD = 5.2), with a skewness of .08. A Kolmogorov-Smirnov sample test did not reject the null hypothesis that the scores were normally distributed about their mean ($p = .53$). The normality and unimodality of the items were confirmed by visual inspection. The mean

interitem correlation for the six innovativeness scale items was .46, and coefficient alpha for the summed scale was .83. The mean score for men was 16.4 and 15.1 for women ($t(272) = 2.12, p = .035$), suggesting that college men are more likely to be rock music innovators than coeds by a slight margin. The scores were normally distributed for men and women, and coefficient alpha was .82 for men and .84 for women. Thus the scale passed the test of reliability with .80 serving as the minimum cut-off score (Churchill 1979, p. 68).

The role of agreeing response to the six innovativeness items can be assess by correlating the two halves of the scale, the three positively keyed items and the three negatively keyed items; if the correlation is low, agreement may be influencing responses to the items (Ray 1985). In this study, the correlation between the two halves of the scale was $-.67$ ($p < .001$), suggesting that agreement response has little affect on responses.

Dimensionality

A major concern of this research project was the effect of direction-of-item wording on the dimensionality of multi-item scales. Consequently, scale items of both positive and negative valence were written to ameliorate the effects of agreeing response and at the same time provide high internal consistency and a unidimensional measure. To accomplish this aim we used item validity tests simultaneously with the scale purification procedures to ensure that scale items would be highly correlated with each other and simultaneously with external criterion measures. We hoped this procedure would yield a valid, unidimensional scale. To evaluate how well the procedure worked, the scale scores in study two were analyzed for dimensionality.

First, the scores were factor analyzed using the SPSS principal axis factor solution with squared multiple correlations on the main diagonal. This procedure yielded a single factor solution. All six items had loadings on the first factor of .50 or greater. The eigenvalue was 3.3 (the next highest was .78), and the factor accounted for 55.1% of the variance in the matrix. Separate factor analyses for men and women showed similar results. While the results of the principal axis factoring were heartening, principal factor analysis is essentially a descriptive technique not subject to formal hypotheses testing. Thus, we also performed confirmatory factor analysis.

In the second analysis the scores were tested using confirmatory factor analysis (CFA). Recent methodological studies have suggested that maximum likelihood methods are sensitive to violations of multivariate normality (Sharma, Durvasula, and Dillon 1989), and that such violations can easily occur with ordered categorical items of the sort investigated here (Babakus, Ferguson, and Joreskog 1987). In light of this, CFA for arbitrary distributions (Bentler 1984; Browne 1984) was employed. The resulting chi square was 25.423, which on 9 degrees of freedom leads to a probability level of .002. The Bentler and Bonett (1980) fit index was .966, exceeding the conservative .9 cut-off for a meaningful fit (Bagozzi and Yi 1988, p. 79). In summary, given the large sample used, the CFA was reasonably consistent

with what the principal axis factoring told us—the items were unidimensional.

Validity

Table 3 shows Pearson correlation coefficients for the summed record innovativeness scale, awareness and purchase of new albums, music magazine readership, record store visits, music listening time, watching MTV, and record opinion leadership. These values show convergent validity for the criterion measures. For instance, they provide strong evidence for the validity of the opinion leadership scale. They also provide evidence for the validity of the innovativeness scale. It was positively correlated ($p = .001$) with all seven criterion measures. Coefficients ranged from .31 with time spent listening to music to .78 with opinion leadership. Separate analyses by gender were highly similar, so the results for the entire sample are given.

In summary, then, the second study provides evidence for the internal consistency, unidimensionality, and validity of the six-item innovativeness scale. Because the scale was developed using rock music innovativeness as the primary topic, however, it must be shown that the scale will retain its positive psychometric characteristics when used with another topic. Thus a third study was conducted to test the scale on another topic.

STUDY THREE: VALIDATION ON ANOTHER TOPIC

Because students continued to provide our data, we chose a subject relevant to their buying. Designer fashions was selected because fashion innovativeness is often studied in consumer research, designer fashions are a high involvement topic about which many female students have well developed opinions and behaviors, and it simplified development of the criterion measures. Thus, the six innovativeness items were rewritten for new "designer fashions" by substituting that phrase for "record albums" in each statement.

TABLE 3
Correlations Between Record Innovativeness Scores and Criterion Measures in Study Two

Variable Name	X2	X3	X4	X5	X6	X7	X8
Innovativeness (X1)	.45	.38	.49	.54	.31	.40	.78
Awareness (X2)		.41	.35	.33	.20	.30	.39
Purchase (X3)			.19*	.22	.18	.20	.35
Magazine (X4)				.43	.08*	.24	.52
Shopping (X5)					.07*	.17*	.49
Listening (X6)						.25	.23
MTV (X7)							.26
Opinion Leadership (X8)							1.00

Note: n = 274, *p > .001

Subjects

Two male interviewers were each asked to chose 50 female respondents and interview them in a survey about new clothing and fashions. Ninety-seven questionnaires were usable and provide the data for this study. The average age of the women was 22.1 (SD = 4.17) and ranged from seventeen to forty-seven years.

Criterion Variables

The questionnaire began with a list of eight names of designer clothes suggested as representative of the latest fashions in this type of new clothing; three examples were "Guess," "Forenza," and "Outback Red."[2] Respondents were asked if they were aware of the names and had purchased or owned any of these clothes using a "yes," "no," and "don't know" response format. Questions similar to those used in the rock music studies measured readership of magazines devoted to fashion, frequency of clothes shopping, and watching fashion shows on television. Respondents were asked the modified innovativeness items and finally the seven King and Summers (1970) opinion leadership items modified for new fashions. All items were scored so that higher values represented greater levels of each construct. We expected the innovativeness scale to be positively correlated with the other six measures.

RESULTS

Reliability

Observed scores on the innovativeness scale in this study ranged from 6 to 30, matching the theoretical range. The mean score was 19.4 (SD = 4.64), with a skewness of −.499. A Kolmogorov-Smirnov sample test did not reject the null hypothesis that the scores were normally distributed about their mean ($p = .11$). All items again appeared to be unimodal. The mean interitem correlation was .44, and coefficient alpha was .82. To assess the influence of agreeing response, the positive and negative halves of the scale were correlated ($r = -.70, p < .001$). This value confirms the finding in Study Two that an agreeing response style scarcely affects responses to these items.

Dimensionality

The scale's dimensionality was again evaluated by an exploratory factor analysis. This procedure yielded a single factor solution. Five of the six items had loadings on the first factor of .50 or greater, and one item had a loading of .42. The eigenvalue was 3.2 (the next highest was .95) and the factor accounted for 53.9% of the variance in the matrix. A follow-up CFA, again using distribution free methods (Bentler 1984; Browne 1984), revealed an excellent fit of the unidimensional model: the chi square value was 14.894 on 9 degrees of freedom ($p = .09$), and the Bentler-Bonett fit index was .957.

TABLE 4
Correlations Between Fashion Innovativeness and Criterion Measures in Study Three

Variable Name	X2	X3	X4	X5	X6	X7
Innovativeness (X1)	.54	.63	.54	.48	.43	.80
Awareness (X2)		.68	.56	.32	.18*	.55
Purchase (X3)			.51	.58	.46	.67
Magazine (X4)				.33	.11*	.59
Store Visits (X5)					.57	.52
TV Viewing (X6)						.41
Opinion Leadership (X7)						1.00

Note: $n = 97$, $*p > .001$

Validity

Table 4 shows Pearson correlation coefficients for the fashion innovativeness scale, awareness and purchase of new designer fashions, fashion magazine readership, clothing store visits, watching fashion shows on TV, and fashion opinion leadership. These values show convergent validity for the criterion measures. For instance, they provide evidence for the validity of the opinion leadership scale. The values also provide evidence for the validity of the innovativeness scale, which was positively correlated ($p = .001$) with all six criterion measures. Coefficients ranged from .43 with frequency of viewing fashion shows on TV to .80 for fashion opinion leadership. The results suggest the innovativeness measure can be successfully adapted for use with a topic area other than records. Of course, only additional studies in other product areas can establish the extent to which the scale can be freely used in studies of consumer innovativeness.

STUDY FOUR: VALIDATION WITH A NON-STUDENT SAMPLE

To evaluate the robustness of the innovativeness scale when used in the field with "real" consumers, a mall intercept study was performed. Consumers were recruited by highly trained interviewers who obtained a high level of cooperation. The interview, which took only about five minutes, focused on consumer attitudes and behavior toward new clothing fashions and household electronic entertainment equipment. These product categories were selected because both men and women were eligible, the scale had already been used for fashion once, allowing comparison across samples, and a totally new topic was desired to see if the scale would "translate" to a different product category. In addition to administering the innovativeness scale for the two product categories, the interviewers also presented respondents with a list of current fashion items (six each for men and women) and a list of six electronic innovations, asking ownership of each product. Summed totals of owned products thus served as criterion variables.

Four hundred sixty-two interviews were completed with 225 men and 237 women between the ages of twenty-four and sixty. The respondents tended to be well-educated, with

about 44% having at least one college degree, and young; nearly half (48.7%) were under age 30. Almost 40% were married, and relatively few (13.4%) earned more than $50,000 yearly. About two-thirds (64.1%) were white.

The innovativeness scale performed in the same manner for this adult sample as it had with the student samples. For fashion innovativeness, the summed scores ranged from 6 to 29 with a mean of 16.5 (SD = 4.8). Factor analysis showed only one factor was needed to account for the lion's share of the variance (49.4%), and coefficient alpha was similar to the other values (.79). The correlation with the sum of the new fashions owned was .41 (p = .001). For electronic equipment, the values were similar. Summed scores ranged from 6 to 30, with a mean of 17.3 (SD = 4.8). Factor analysis showed the scale was unidimensional, and coefficient alpha was .81. The correlation with the sum of the new electronic products was .46. Neither set of innovativeness scale scores was affected by yea-saying response, and scores on the two innovativeness scales were virtually uncorrelated (r = .09, p = .065). These findings suggest first that the use of largely student samples to develop and refine the scale had no adverse effects on scale qualities, so that the scale can be used confidently with non-student consumers. Second, the scale again seemed to be robust across product categories. Finally, the scale has genuine utility in measuring differences in product specific innovativeness among consumers.

STUDY FIVE: TEST–RETEST RELIABILITY, PREDICTIVE VALIDITY, AND CONFOUNDS

The purpose of the fifth study was to evaluate three additional psychometric characteristics of the innovativeness scale: test–retest reliability, predictive validity, and its relationship with measures of yea-saying and social desirability. Test–retest reliability is essentially the correlation of a measure taken at one time with the same measure taken at a later time and indicates the stability of the measure (Brown 1976, p. 69). This evaluation assumes that the trait is stable over time, is not affected by practice or learning, and a long enough time period passes between test administrations so that subjects will not remember how they answered the first time. These assumptions seem quite reasonable for the domain specific innovativeness scale. Predictive validity is the ability of scores on a test or measure to predict future behavior and is a form of criterion-related validity (Brown 1976, p. 98). Self-report measures ought to be free from two types of systematic response bias: yea-saying, or the tendency to agree with statements regardless of item content; and social desirability, the tendency to respond to statements in so as to present oneself in a favorable light.

In this study, test–retest validity is measured by correlating scores on the innovativeness scale administered to the same sample of subjects approximately fifteen weeks apart. Predictive validity is measured by correlating scores on the innovativeness scale with a self-report measure of behavior fifteen weeks after the original administration of the scale. To assess the effects of yea-saying and social desirability, independent self-report measures of these two confounds are correlated with scores on the innovativeness scale.

Subjects and Design

At the beginning of the semester 75 students in a marketing research class (32 men and 43 women) completed a questionnaire containing the record version of the innovativeness scale. Fifteen weeks later 70 of these students completed a second questionnaire containing the record version of the innovativeness scale, measures of yea-saying and social desirability, and three measures of rock music behavior assessing behaviors that took place between the first and the second administration of the questionnaires.

Instruments

The first questionnaire contained demographic items and the record innovativeness scale. The second, completed fifteen weeks later, listed ten new record titles that had appeared since the start of the semester. The students indicated which of these they were aware of and had purchased in the same manner as in earlier studies. In addition, a new campus FM radio station featuring only rock and roll began broadcasting during the semester. A ten-point scale asked the students how often they listened to the new station.

To measure yea-saying, we used the YN-2 scale developed by Wells (1961, 1963). This consists of 20 items selected to measure the tendency to "stimulus acceptance" thought to underlie a portion of the tendency to agree with questionnaire items regardless of their content. Alpha for the YN-2 scale was .72. Social desirability was measured by two scales. First was the 10-item short form of the Marlowe-Crowne Social Desirability Scale selected by Strahan and Gerbasi (1972) as a short reliable measure. Alpha was .60. The second measure was the 9-item Lie Scale of Eysenck (1958). These two scales were positively correlated (r = .57, p = .001) indicating convergence.

RESULTS

Reliability

Scores on the innovativeness scale ranged from 6 to 30 and from 6 to 29 for the first and second administrations of the scale, respectively. The means were 16.0 and 14.8, with standard deviations of 5.7 and 6.0. Coefficient alpha was .88 for the first use, and .90 for the second. The scale's scores in both instances were normally distributed about their respective means and unimodal. Correlations between the positive and negative halves of the scale were −.77 for each administration, replicating previous results. Table 5 presents the correlations of the measures used in the study. The large positive correlation (.86) between the two administrations of the innovativeness scale provides good evidence for its test–retest reliability.

Dimensionality

Both uses of the record innovativeness scale were evaluated for scale dimensionality by factor analysis. The com-

TABLE 5
Intercorrelations of Record Innovativeness and Criterion Measures in Study Four

	Record 2[b]	Aware	Purch	FM	YN-2	LIE	MCSD
Record 1[a]	.86	.52	.46	.52	.11*	−.14*	.01*
Record 2[b]		.56	.51	.54	.06*	−.10*	−.02*
Aware			.65	.58	.14*	.04*	.12*
Purch				.42	.10*	.09*	−.00*
FM					.21	−.08*	−.12*
YN-2						−.28	−.13*
LIE							.57

Note: $n = 70$, $*p > .10$.

[a]First administration of the record innovativeness scale.
[b]Second administration of the record innovativeness scale.

mon factor analysis extracted only a single factor each time, confirming previous findings. The CFA (Bentler 1984; Browne 1984) for the first administration of the scale ($n = 75$) showed a chi square of 30.068 ($p < .001$). Despite this somewhat low probability, the Bentler-Bonett fit index was .942, again implying that the unidimensional model accounts for most of the variation and covariation amongst the items.

Validity

The large correlations shown in Table 5 between the first administration of the scale and record awareness (.52), record purchase (.46), and FM listening (.52) are all evidence for predictive validity. The correlations of the second administration of the scale with these same three variables (.56, .51, and .54) are further evidence for criterion-related (concurrent) validity. The lack of significant correlations between either administration of the record innovativeness scale and any of the three confound measures is positive evidence that responses to the innovativeness scale are free of either yea-saying or social desirability response bias. The final validation study addressed the key issues of convergent and discriminant validity.

STUDY SIX: CONVERGENT AND DISCRIMINANT VALIDITY

Originally formulated by Campbell and Fiske (1959), convergent validity assesses the extent to which a measure correlates highly with other measures of the same construct, and discriminant validity is the extent to which a measure is not correlated with measures of other, different constructs. Convergent and discriminant validity are examined via a multitrait-multimethod matrix (MM), that is, the intercorrelations of more than one measure of more than one trait. High correlations are expected between different measures of the same trait, low correlations are expected between measures of different traits. Several examples of MM studies appear in the marketing literature, and the procedure is a standard component of the validation process (Churchill 1979; Peter 1981). In this study, the three traits were rock music innovativeness, fashion innovativeness, and cologne or scent innovativeness. They were operationalized by three

methods, the innovativeness scale, a rating scale, and a question for each trait regarding innovative behavior.

Subjects

Students in two marketing research classes were each given four questionnaires and asked to collect completed responses from two men and two women similar in age to themselves. They gathering usable responses from 306 respondents, 152 men and 154 women, with a mean age of 21.3 years (SD = 1.8).

Instrument

The questionnaire contained the six-item record innovativeness scale identical to its use in Study Two. The scale was repeated two more times. Once, it was adapted so that it referred to self-reported innovative behavior for new fashions, identical to the usage in study three, and then it was adapted to refer to new scents such as cologne, perfume, aftershave, etc. Again, the subject pool of students led to the choice of topic areas of product innovative behavior relevant to these consumers. Clothing, health and beauty aids, and records and tapes form the top three non-school spending categories for this consumer segment (*Wall Street Journal*, December 11, 1986).

To provide the second operationalization of the three innovativeness traits, three similar descriptions called "Self-Reports" of the "Rock Music Innovator," "Fashion Innovator," and "Cologne or Scent Innovator," appeared. The fashion innovator was described as "a consumer who is very interested in new designer fashions so that they form an important part of his/her life. This person knows a lot about new designer fashions and shops for and owns many of them. They also like to talk with others about new designer fashions." The statement was followed by a 25-point rating scale anchored at one end by "I am like this," and at the other by "I am not like this at all," with "neutral" at the middle. The third operationalization was a single item asking for a report of store visits in each product area. These questions asked how often respondents visited stores or shopped for records, clothes, and scents using a five-point response format: "never," "almost never," "less than once a week," "about once a week," and "twice a week or more."

RESULTS

Reliability

The internal consistency of the innovativeness scale was evaluated by computing coefficient alpha for each product class use of the scale. The alphas were .85, .83, and .83, for records, fashion, and scent, respectively. These values compare well with those of the other uses of the scale.

Dimensionality

Factor analysis was performed separately for scores on the three uses of the innovativeness scale. Each time a single factor alone was extracted indicating that the innovativeness scale was unidimensional for each of the three traits it measured, replicating the results of the previous studies.

Convergent and Discriminant Validity

The MM approach compares correlation coefficients to evaluate convergent and discriminant validity and can be implemented as a special case of confirmatory factor analysis (Bagozzi 1980). In our case, we have three innovativeness traits (i.e., innovativeness in three product areas, music, fashion, and scent) each operationalized by three methods or indicators (our innovativeness scale, the single item self-description, and reported store visits). There are thus nine variables that should be related to each other in a manner dictated by the requirements of convergent and discriminant validity. Convergent validity requires that different indicators for a trait be highly correlated with each other; discriminant validity requires that methods for measuring traits be uncorrelated with the same methods used to measure other traits. The pattern of correlations shown in Table 6 meet these criteria. The three measures of each trait converged, and the diagonal validity correlations were large and substantially larger than the off-diagonal correlations, with the exception that fashion innovativeness overlaps with scent innovativeness. The pattern of correlations was the same in all three heterotrait–heteromethod blocks. This pattern can be described by a confirmatory factor model with a factor for each trait and a factor for each method. Further,

TABLE 6
Multitrait-Multimethod Matrix from Study Five

	Scale			Report			Visits		
	M	F	S	M	F	S	M	F	S
Scale									
Music	(85)[a]								
Fashion	.18	(83)[a]							
Scent	.21	.59	(83)[a]						
Report									
Music	.76	.13	.11	—					
Fashion	.20	.72	.46	.19	—				
Scent	.10	.49	.74	.14	.57	—			
Visits									
Scent	.59	.00	.08	.59	.03	.07	—		
Fashion	.04	.50	.40	.04	.56	.36	.08	—	
Scent	.16	.34	.60	.06	.34	.58	.09	.46	—

Note: $n = 296$. At this sample size, r's of .095 and greater are significant at $p = .05$, one-tailed.

[a]Internal consistency (alpha) coefficients.

the trait factors and the methods factors should be mutually orthogonal, although both might well be correlated amongst themselves.

We tested the model using the asymptotic distribution free methods used for the tests of unidimensionality (Bentler 1984; Browne 1984) cited for Study 2 because the measures violated the multidimensional normality assumption. Parameter estimates for the model appear in Tables 7 and 8 where the innovativeness scale is called "Scale," and the self-report measure is called "Report." The unique factor variances for each variable are not shown though all were non-negative. The model fit quite well since chi square was 14.038 on 12 degrees of freedom ($p = .298$). The Bentler-Bonett fit index was .978. Overall, the evidence for discriminant and convergent validity is compelling.

Table 7 shows factor loadings for the MM factor analysis. Each row represents one of the nine observed variables that is a function of one trait factor and one method factor. Thus each row shows two regression slopes or factor loadings for each variable. Table 8 shows correlations between the fac-

TABLE 7
Factor Loadings for MM Factor Analysis[a]

	Traits			Methods		
	Music	Fashion	Scent	Scale	Report	Visits
Music Scale	.537			.902		
Fashion Scale		.431		1.279		
Scent Scale			.567	1.787		
Music Report	4.299				4.830	
Fashion Report		6.406			1.828	
Scent Report			6.33		1.042	
Music Visits	.838					.078
Fashion Visits		.471				.663
Scent Visits			.439			.188

[a]Parameters fixed to zero a priori not printed.

TABLE 8
Factor Correlations for MM Factor Analysis

| | Traits | | | Methods | | |
	Music	Fashion	Scent	Scale	Report	Visits
Music	1[a]					
Fashion	−.031	1[a]				
Scent	−.062	.556	1[a]			
Scale	0[a]	0[a]	0[a]	1[a]		
Report	0[a]	0[a]	0[a]	.172	1[a]	
Visits	0[a]	0[a]	0[a]	.143	−.070	1[a]

[a]Parameters fixed a priori.

tors. The finding that fashion and scent innovativeness are clearly correlated, especially when compared to music innovativeness, is important because it agrees with the body of research (Gatignon and Robertson 1985) showing some innovativeness overlap between related products, but little overall. Also of interest is the lack of correlation across the methods, implying that, holding scores on the trait factors constant, the methods are independent, consistent with the original justification of the MM.

DISCUSSION

We developed a self-report measure of innovativeness conceptualized as the predisposition to learn about and adopt new products in a specific domain of consumer behavior. Such a measurement method avoids the theoretical and methodological problems associated with both the time-of-adoption measure and the cross-sectional approach and complements these techniques. In addition, by focusing on the conceptual and behavioral nature of the construct, which those two methods do not, we developed a scale that directly taps the latent construct itself, rather than some secondary variable. Finally, in actual practice, many researchers have constructed ad hoc self-reports of domain specific innovativeness for particular research topics. Using a standardized scale is preferred to this practice because its reliability and validity are established and its use makes possible comparisons across studies.

The scale development process focused on selecting items saturated with content that would also be unaffected by direction-of-item wording. Factor analysis showed the scale to be unidimensional as it should be. Reliability analysis found the scale highly reliable (both internally consistent and stable over time) across several samples of students and adults. Correlations with other constructs demonstrated criterion-related (concurrent and predictive), convergent, and discriminant validity. The scale seems not to be affected by social desirability response style or agreeing response set.

The self-report scale is most suitable for product areas where consumers purchase often and can thus report on their actual or anticipated behavior. Rarely purchased products may not be predicted as well because there is no behavioral and attitudinal repertoire for consumers to draw upon

and report. Within these limits, however, the innovativeness scale should prove to be a useful tool for researchers desiring a self-report measure of domain specific innovativeness. For practical or managerial purposes, the scale can be used to identify potential customers for new brands in a product category. Their demographic or life style characteristics, media habits, attitudes, brand preferences, and shopping behaviors could then be profiled.

For theoretically-oriented research, the innovativeness scale can be used to measure the extent of domain specific innovativeness across a sample of consumers wherever the interest is in assessing relationships between this variable of interest and other theoretically relevant variables (Price and Ridgway 1983; Venkatraman 1988). Researchers can now make use of a short, valid, reliable measure that is adaptable to many product categories. This scale will make easier and more precise the study of innovativeness overlap across product categories as well as the relationships between "innate innovativeness," domain specific innovativeness, and individual innovative behaviors, as suggested by Midgley and Dowling (1978).

This study used a combination of factor analytic item analysis and item criterion validity tests to contribute to the scale development process in consumer research. Systematic testing for the effects of direction-of-item wording shows that this potential problem can be solved and that balanced, unidimensional scales can be developed. The chief limitation of the study was its reliance on student subjects for scale development and testing. While the results of the third and fourth studies with their adult samples suggest that the scale is applicable to other populations, more study in needed to verify this point. More tests of the scale are needed to explore its psychometric properties, such as differences between known groups. Finally, substantive research is needed to demonstrate the scale's value in diffusion research.

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NOTES

1. Some attempts to measure global or innate innovativeness that are free from reference to specific products or brands can be described as the self-report type. Respondents are simply asked to indicate whether they are innovators or not, thus providing a global measure of innovativeness not limited to any product category. Examples are provided by Kohn and Jacoby (1973) and Kotler and Zaltman (1976), and a life-style approach is labeled by Wells and Tigert (1971) as the "New Brand Tryer."

2. It can be objected that the brand names used in this instance are not truly designer fashions, but instead are store labels for brand names of clothing. While this is true, the brand names were suggested by secretaries and students we consulted. Such names do seem to be considered "designer" or brand labels for ordinary shoppers. See also Susan Kaiser, The Social Psychology of Clothing, Second edition, New York: Macmillan, 1990, where such brand names are discussed as designer labels.

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ABOUT THE AUTHORS

Ronald E. Goldsmith received a Ph.D. in Marketing from the University of Alabama. His research interests are in the consumer behavior and marketing research areas. His articles have appeared in the *Journal of Services Marketing*, *Journal of Social Psychology* and the *Journal of Business*

Research. Dr. Goldsmith is currently Professor of Marketing at Florida State University.

Charles F. Hofacker received a Ph.D. in Psychology from the University of California at Los Angeles. His research has been published in *Psychometrika* and *Management Science* as well as at numerous conferences. Dr. Hofacker is currently an Associate Professor of Marketing at Florida State University.