

# Predictors of Audience Interest in Adopting Digital Television

David J. Atkin, Kim Neuendorf, and Leo W. Jeffres

*Department of Communication  
Cleveland State University*

Paul Skalski

*Department of Communication  
Michigan State University*

Although the deadline for mandated digital transmission for broadcast television (DTV) is fast approaching, we still know relatively little about viewer knowledge about and interest in adopting the new, higher resolution television receivers. This study profiles likely DTV adopters in terms of social locators, media adoption, orientation toward adopting new media, and affective measures. The relative success of the latter in distinguishing between likely DTV adopters and nonadopters underscores the utility of a new set of attitudinal variables to supplement demographics and technology adoption measures. These elements were less successful in explaining DTV awareness levels, which were relatively low.

With a 2006 deadline for mandated digital conversion of broadcast television (DTV) fast approaching, an understanding of audience adoption intentions and willingness to pay for the new format becomes critical. Preliminary research uncovers viewer interest in higher quality DTV images, with the sale of the one-millionth DTV product being announced in May of 2001 (Consumer Electronics Association [CEA], 2001). However, with estimates for new DTV receivers running from \$2,000 to \$5,000 plus, viewers' marginal utility for the new format remains a mystery. Industry sources forecast a 30% penetration rate for digital receivers by 2006, while nay sayers question the perceived utility of HDTV, even suggesting that it could become a new age "Edsel" (see Dupagne, 2002). With global receiver replacement costs ranging as high as \$500 billion (Schaefer & Atkin, 1991), the economic stakes with high definition television (HDTV) adoption are quite high.

In the meantime, conventional analyses of audience demand—focusing on social locators as well as audience use motivations—are providing diminished returns (Clancy & Shulman, 1993). For instance, the few audience studies that address academic as well as industry issues for television (e.g., Lin, 1994) typically account for under one third of the variance in exposure.

Given the past success of similar work on psychological influences on media use (Detenber & Reeves, 1996), including the role of sensation-seeking in DTV adoption (Dupagne, 1999), this study investigates whether a wide-ranging set of motivational factors can explain adoption intentions for DTV applications. In particular, we consider the role of affective sensations (e.g., sense of humor) and mood states (e.g., depression) on audience interest in adopting DTV service. These effective measures are expected to capture people's orientations toward the future and thus influence their perceived utility for new technologies. Because we can examine demand in terms of adoption intentions (LaRose & Atkin, 1991), even before a product has been widely launched, we explore whether audiences seeking greater stimulation from TV indicate higher levels of interest in and perceived utility for DTV (Dupagne, 1999).

## LITERATURE REVIEW

### Diffusion Theory

Dupagne and Seel (1998) underscored the utility of examining DTV adoption in light of diffusion theory. According to that perspective, adoption of new services is a function of one's innovativeness, or willingness to try new things (see Rogers, 1995, 2002).

### The Innovation

DTV has been positioned for over a decade as the next generation of TV in the United States (Brinkley, 1998; Dupagne & Seel, 1998; Lin & Atkin, 2002; Seel & Dupagne, 1998). As Dupagne (1999, p. 35) noted, DTV will offer three main improvements over the existing National Television Standards Committee New Media Adopters (NTSC) system: (a) higher resolution, (b) wider pictures, and (c) compact-disc quality sound. The Federal Communications Commission (FCC) is expected to phase out conventional (NTSC) broadcasting in 2006, unless it determines that 15% or more of TV homes in local markets have not subscribed to a multiple video programming distributor providing terrestrial DTV programming and have not installed a DTV receiver or a digital-to-analog converter box by then (Balanced Budget Act, 1997; Dupagne, 2002).

In building a theory of DTV adoption, the dearth of research necessitates consideration of a wider literature addressing new media adoption. For instance, DTV

shares attributes with cable and the VCR, insofar as it engenders added expense while making use of a functionally continuous, low technology appliance, the TV; even so, it represents a discontinuous innovation insofar as viewers must purchase a costly new receiver for the incompatible DTV format. The first DTV receivers, introduced during December 1998, sold at prices ranging from \$5,000 to \$11,000 (Dupagne, 1999). Prices have steadily declined since that time, falling in the \$2,500 range some 2 years later (CEA, 2001).

By way of classifying the innovation, Dupagne and Seel (1998) noted that the acronym DTV is an umbrella term that encompasses several digital techniques. Because the term has been synonymous with HDTV in the literature, and 86% of DTV sets sold have HD capability (CEA, 2001), we equate DTV and HDTV for the purposes of this discussion. To better understand consumer utility for DTV, it's important to consider audience awareness of DTV features.

***Awareness of HDTV.*** Levels of awareness of HDTV among the American public have slowly risen in recent years, from less than 25% in February 1987 to 55% by decade's end (Dupagne, 2002). In one of the first externally valid survey designs, Dupagne (1999) found HDTV awareness was positively related to income, education, gender (male), newspaper use, and importance of picture sharpness. A related HDTV interest measure was negatively related to age and positively related to income, adoption of home entertainment products, movie-going, and importance of picture sharpness. HDTV purchase intention was positively related to screen size and sports viewing.

Focusing on willingness to pay, Lupker, Allen, and Hearty (1988) found that 11% of the Seattle respondents reported that they definitely or probably would buy an HDTV set at \$2,500 within the next 2 years. Some price elasticity was noted, however, as that number rose to 20% when the price was set at \$1,500. In their predictive models—encompassing five purchase options with HDTV—the researchers found that technology ownership (CD-ROM) was the only consistent predictor across all equations. Contrary to sociodemographic profiles derived from diffusion theory, education was a negative predictor of adoption intentions, as was employment in a TV-related industry; number of TV devices owned, however, was a positive predictor.

In another early study, Neuman (1988) discovered that 57% of experimental subjects in an HDTV viewing condition indicated a willingness to pay an additional \$100 for a (then) current set on display, but only 6% would do so for an extra \$500; comparable figures were 41% and 3%, respectively, for an NTSC set. Dupagne (1999) found that 15.5% of his respondents indicated that they would be likely to purchase an HDTV receiver at \$3,000. By comparison, a scant 6% of respondents to a Harris survey indicated a readiness to pay \$1,000 or more beyond the price of their current television set for an HDTV set (Harris Corporation,

1997). Taken together, these preliminary results suggest that consumer receptivity to HDTV is only lukewarm (Dupagne, 1999). As Lupker et al. (1988) summarized, a key target market for DTV marketers would be individuals who have a strong orientation towards technology.

*New media adopters.* In addition to characteristics of the innovation, diffusion research addresses the characteristics of individuals who are relatively earlier to adopt them (i.e., early adopters). Because DTV sets have enjoyed the same visibility as other media innovations in the U.S. market, we consider work on new media adoption generally, which finds adopters tend to be wealthier, better educated, and younger than nonadopters (e.g., Dutton, Rogers, & Jun, 1987a, 1987b; Rogers, 2002).

Research suggests that the adoption of a new media channel is also related to the adoption of other innovations (Ettema, 1984; Jeffres & Atkin, 1996; Lin, 1994), as experience with technology encourages adoption of cable and information media (e.g., LaRose & Atkin, 1988, 1992; Reagan, 1989). Reagan (1987) found that the adoption of telecommunication innovations—including videotext, PCs, CDs, and cable—was most powerfully related to adoption of other such technologies. Related work rooted in the economic notion of niche theory by Dimmick and associates (e.g., Dimmick & Albarran, 1994; Dimmick, Kline, & Stafford, 1999) outlined the interrelationships between media adoption predictors, although their significance is more complex than often assumed because they vary by technology type.

Rogers' (1995) notion of technology clusters has proven useful in explaining adoption patterns for several technologies, ranging from cable to videotext (e.g., LaRose & Atkin, 1992; Lin, 1998; Neuendorf, Atkin, & Jeffres, 1998; Reagan, 1987). According to this perspective, adoption of one technology (VCR) is related to functionally similar entertainment services (cable) that fulfill similar underlying needs (Atkin, 1993; Perse & Courtright, 1993). This dynamic has been applied to information media (Lin, 1998; Perse & Dunn, 1998), which emulate the high acquisition costs of DTV.

Reagan, Pinkleton, Chen, and Aaronson (1995) broadened the conception of technology clusters to encompass functionally similar technology repertoires. Although others (Dozier, Valente, & Severin, 1996) noted that such a collection might be stimulated by acquisition of a "trigger" innovation, Jeffres and Atkin (1996) maintained that scholars should shift their focus away from technological hardware and toward psychological drives satisfied by new media.

## THEORETICAL ASSUMPTIONS

In their critique of Diffusion research, scholars (Midgley & Dowling, 1978) noted that it doesn't provide the predictive power of other frameworks because scholars

have yet to account fully for the psychological dynamic driving technology adoption. General work on the diffusion of innovations (Rogers, 1995) suggests that adopters tend to be more venturesome as consumers, less dogmatic, and more likely to engage in risk-taking behaviors to satisfy their intrinsic needs. In that regard, DTV adopters may express higher levels of adoption needs, just as uses and gratifications theory finds that heavier media users express higher levels of motivation to use new media (e.g., Lin, 1994, 1998; Rubin & Bantz, 1987; Rubin & Eyal, 2002).

### Attitudinal Factors

Because the pioneer phase of DTV development does not afford the opportunity to study actual utility or gratifications obtained with technology (Albarran & Dimmick, 1993; Dimmick, 1993), we extend the study of those psychological motives by applying deeper personality measures to the problem of DTV adoption; they include use of media for mood management—via depression and humor—that can help inform the study of media use. Kiesler (1997) suggested that the Web may serve as a depressant for heavy users. Work on audiotext adoption also finds that measures of satisfaction concerning one's quality of life are among the strongest predictors of adoption (Neuendorf et al., 1998). DuPagne (1999) posited that viewers of more exotic settings (e.g., outdoors shows) would express a greater demand for HDTV. Based on that work, one might expect that interest in adopting emerging DTV would be related to higher levels of interest in using media for mood management or stimulation.

We thus propose an adoption model that considers a broader range of factors linked to media adoption. Dupagne (2002, p. 281) maintained that diffusion is an appropriate framework for studying DTV adoption even though the sets are not yet widely available—suggesting people evaluate an innovation in terms of key attributes (relative advantage, complexity, compatibility, trialability, and observability) that account for 49%–87% of the variance in rate of adoption. We suggest HDTV's sharper pictures, crisper sound, and wider screen size give it a relative advantage over the NTSC system, as consumers' perceived importance of these HDTV attributes should thus influence purchase intentions.

We assess key elements of diffusion (Rogers, 1995), including the process through which “an individual ... passes from first knowledge of an innovation to forming an attitude toward the innovation...” (p. 20). As Atkin, Jeffres, and Neuendorf (1998) suggested, social background variables may be more significant inhibitors or initiators of adoption at earlier stages of adoption. This will likely involve attributes related to the chief barrier to DTV adoption—income—to the extent that adoption of the new media receivers is resource driven. Thus, we expect:

**H1:** Likely DTV adopters will be younger and occupy higher social status than their less interested counterparts.

As differences between adopters and nonadopters leveled for cable and VCRs, Jeffres and Atkin (1996) concluded that those communication needs were more explanatory than social categories. This echoes recent work on cable and VCR adoption, which shows that new media adopters are less satisfied with traditional TV and spend less time with it than nonadopters (Jacobs, 1995; LaRose & Atkin, 1988; Lin, 1994). Of particular relevance to DTV, this article suggests adoption is driven by higher levels of internal psychological need which may drive individuals to enhance their viewing utility via DTV adoption. Thus,

H2: DTV adoption will be positively related to psychological factors.

Because DTV remains in a nascent phase, there is little evidence upon which to posit a relation with traditional media use. If we assume DTV's an extension of the relatively passive, user-friendly and entertainment-oriented TV medium, then we would expect adoption intentions would be related to uses of entertainment media (film, TV) and less so with information/news-oriented media (news-papers). Drawing from studies that find adoption of telecommunication services to be interrelated, we expect that DTV adoption intentions will be related to use of other media. This should be especially true for media that fall within the same technology cluster or are otherwise functional complements to TV, such as DVDs. Thus,

H3: DTV adoption intentions will be positively related to time spent with entertainment media.

H4: DTV adoption will be positively related to adoption of other new media technologies

Given the exploratory nature of our queries about corollary issues of audience awareness of DTV properties, policies, and costs, we pose the following research question:

RQ: What is the relative influence of social locators, media use, technology adoption, and affective variables on knowledge about DTV, intentions to adopt DTV, and willingness to pay for DTV?

## METHOD

In the spring of 1999, a probability sample of residents of a major metropolitan area in the U.S. midwest responded to a computer-aided telephone survey. The sample of 321 adults was 60% women, with a median household income of \$20,000 to \$30,000 and a mean age of 41.6 years, and was composed of 32.3% college graduates.

## Measures

Included in the instrument were measures for a wide variety of social categories: age (in years), marital status, level of education achieved, racial or ethnic background (dummy coded for non-white status), political affiliation (a 5-point scale ranging from 4 [*strong Democrat*] to 0 [*strong Republican*]), liberalism/conservatism (a 5-point scale ranging from 0 [*strongly conservative*] to 4 [*strongly liberal*]), household income, and gender (dummy coded for women).

The survey instrument also included 6 quality of life indicators based on past research in that area (Atkinson, 1982; Campbell, 1981; Diener & Suh, 1997), with each item measured on an 11-point scale ranging from 0–10: 1 (*Assessment of the [metropolitan] area*) and 2 (*the neighborhood you live in*)—(with 0 being the worst place to live and 10 being the best place to live); and using a scale in which 0 means you are completely dissatisfied and 10 means you are completely satisfied—3 (*how things are going in your job*), 4 (*how things are going in your family*), 5 (*how things are going in your personal life*), and 6 (*how things are going in the nation today*).

To measure respondents' levels of state depression, the 20-item Center for Epidemiologic Studies Depression Scale (CESD; Robinson, Shaver, & Wrightsman, 1991) was utilized. The standard technique of straight additive index construction was employed, with a resultant Cronbach's alpha of .85.

A set of 11-point Likert-type items tapped the respondents' multifaceted senses of humor. These items were culled from earlier work (Neuendorf, Skalski, Jeffres, & Atkin, 1999), with several items added specifically to tap social humor functions not well measured in previous attempts. In the process of factor analytic index construction, one item—'Something is funny to me only if I find the situation realistic'—was dropped from the set due to its failure to load with other items in the analysis, a statistical performance identical to that discovered in earlier data collection (Neuendorf et al., 1999). The final 16 sense of humor items were submitted to a principal components factor analysis with orthogonal rotation (oblique rotation resulted in very similar findings, and so a judgment was made to retain the orthogonal solution for the sake of parsimony). Five factors resulted, capturing 63% of the total variance of the pooled items. Indexes of relatively independent dimensions, or 'senses of humor,' were constructed via factor scores. The five resultant indexes were as follows:

1. Mean-spirited humor, with primary loadings for measures of appreciation for sexist, racist, sexual, and sick humor.
2. Visual/verbal humor, an index tapping appreciation for humor in symbolic (nonverbal and verbal) stimuli, with primary loadings for measures of affinity for sight gags, slapstick, bloopers, and jokes that involve wordplay.

3. Stupid/absurd humor, with primary loadings for measures of appreciation for the humor in absurdity, stupidity, and accidental events.
4. Social humor, with primary loadings for the items "I use humor to lighten things up" and "I use humor to get to know people better."
5. Satire/death humor, with primary loadings for items measuring liking of satire and humor about death.

Standard measures of media exposure were also included in the survey—hours of TV watched yesterday, hours of radio listening yesterday, newspaper readership during the last week (in days), number of magazines read regularly, number of books read in the past 6 months, number of videos viewed in the past month, and number of movies watched at the theater in the past month. Measures of adoption of a number of newer media technologies were also included—frequency of e-mail usage in the last week, hours of Internet use in the last week, and home access to any of the following: a VCR, a CD player, a DVD player, a laserdisc player, a camcorder, cable TV, a satellite dish, a cell phone, and a computer.

Four questions tapped the respondents' orientations toward Digital TV: (a) "In your own words, can you tell me—what do you know about DTV, that is, Digital Television?" Responses to this open-ended query were coded in the following manner: 0 (*does not know*), 1 (*knows at least some correct information*), -1 (*reports incorrect information*); (b) "On a scale from 0 to 10, where 0 means not at all, and 10 means a great deal, how eager are you to get DTV?"; (c) "The first digital TV sets will probably cost at least five thousand dollars. How willing are you to pay this amount to get DTV, if 0 means not at all and 10 means very willing?"; (d) "All homes may be forced to switch to DTV within the next 10 years. What do you think of this, if 0 means a very bad idea and 10 means a very good idea?"

## RESULTS

Focusing on overall frequencies, our 3-level knowledge measure reveals that nearly two thirds (62%) of respondents profess to know nothing about DTV, 30.2% know at least something about DTV, and 7.8% reported wrong information about DTV. Focusing on means for our 11-point scale measures, we see relatively low levels of agreement with items addressing DTV knowledge ( $M = 3.7$ ;  $SD = 1.5$ ) and eagerness to get DTV ( $M = 2.36$ ;  $SD = 3.12$ ). The same is true of our measure tapping the advisability that all homes be forced to switch to DTV ( $M = 2.12$ ;  $SD = 2.9$ ) and, most particularly, willingness to pay at least \$5,000 for DTV ( $M = .86$ ;  $SD = 2.1$ ).

A hierarchical multiple regression analysis predicting level of knowledge about DTV (not shown) was not significant ( $R^2 = 24.4\%$ ; adj.  $R^2 = 5.7\%$ ;  $F = 1.3$ ;  $p \leq .13$ ). Social categories emerged as the only significant predictor block (8.6% vari-



ance explained), with liberal political affiliation being the sole predictor of DTV knowledge levels to survive the controlling influence of other variables in the regression model.

The equation predicting eagerness to adopt DTV (Table 1) was significant ( $R^2 = 35.1\%$ ; adj.  $R^2 = 18.6\%$ ;  $F = 2.2$ ;  $p = .001$ ). An insignificant amount of variance was explained by the first block, encompassing social categories. The media use block was, however, significantly related to DTV adoption intentions. In particular, newspaper readership was inversely related to adoption intentions, while magazine readership emerged as a positive predictor. Although the new technology adoption and depression blocks did not explain a significant amount of variance, the block addressing humor interests explained a significant (2.1%) proportion of variance. In particular, a desire for satire/death humor—a content not widely accessible in traditional broadcast media—was positively related to DTV intentions.

Although we found some support for the youthful adopter profile posited in H1, with the inverse correlation ( $r = -.16$ ) between age and eagerness to adopt DTV, the absence of any significant predictors in our regression model leaves the hypothesis with little support. The same is true of the posited relations with media use (H3), despite a positive correlation in the latter block involving magazine readership and DTV adoption intentions. The significant relation between the humor motivation measure and DTV adoption does, however, partially support H2's prediction of an influence for affective orientation variables. However, the same could not be said concerning the expected linkages with technology adoption variables that—despite receiving some support in our correlation analyses—did not survive the controlling influence of other variables in the regression model. This leaves H4 without support.

Focusing on willingness to pay \$5,000+ for DTV, a hierarchical regression (not shown) was not significant ( $R^2 = 25.9\%$ ; adj.  $R^2 = 7.6\%$ ;  $F = 1.4$ ;  $p = .07$ ). Social categories emerged as the only block to explain a significant proportion (9.7%) of variance, although no unique predictors survived the controlling influence of other variables in the model, as did the QOL block.

Finally, the equation predicting respondent sentiment on the advisability of forcing all homes to switch to DTV (not shown) was insignificant ( $R^2 = 25.9\%$ ; adj.  $R^2 = 7.6\%$ ;  $F = 1.4$ ;  $p = .07$ ). As with the previous model, social locators emerged as the only block that explained a significant proportion (9.6%) of variance in the model. Unique individual predictors from other blocks included magazine readership ( $\beta = .18$ ) and ratings of one's neighborhood ( $\beta = .20$ ).

## DISCUSSION

This study addresses DTV adoption intentions by incorporating mood states (e.g., depression) and affective variables alongside more conventional measures of audi-

TABLE 1  
Hierarchical Multiple Regression Predicting Eagerness to Adopt DTV

<i>Variable</i>	<i>r</i>	<i>Final Beta</i>	<i>R<sup>2</sup> Inc</i>	<i>F</i>	<i>p</i>
1 Social categories			.064	1.535	.148
Age	-.159**	-.010			
Education	-.044	-.097			
Gender (female)	-.150**	-.157			
Income	.002	-.171			
Marital status(married)	.080	.047			
Political ideology (liberal)	.085	.015			
Political party—Republican	-.020	.085			
Race or ethnicity—Nonwhite	.108	.110			
2 Media use			.081	2.317	.028
Television	.045	.011			
Radio	.030	-.100			
Newspaper	-.125*	-.186*			
Magazines	.089	.248**			
Books	-.012	.024			
Videos	.058	-.117			
Movies	.077	-.035			
3 New technology adoption			.080	1.513	.131
Email	.009	-.095			
Internet	.184**	.076			
VCR	.112	.055			
CD player	.125*	.080			
DVD player	.185**	.079			
Laserdisc player	.149*	.039			
Camcorder	.060	-.091			
Cable TV	.025	-.107			
Satellite dish	.184**	.129			
Cellular phone	.081	-.081			
Computer	.189**	.160			
4 Senses of humor			.059	2.549	.030
Mean spirited	.228**	.124			
Visual-verbal	.098	.105			
Absurd-stupid	.059	.118			
Social humor	.037	-.076			
Satire-death	.032	.185*			
5 20-item depression index	.060	.035	.002	0.328	.567
6 Quality of life indicators			.066	2.541	.023
Rating of area	-.121	-.289			
Rating of neighborhood	-.023	.144			
How things are going (job)	.042	.026			
How things are going (family)	-.103	-.137			
How things are going in personal life	-.136	.088			
How things are going in nation today	.093	.190*			

Note. Total equation:  $R^2 = .351$ , Adj  $R^2 = .186$ ,  $F(38, 149) = 2.124$ ,  $p = .001$  DTV = digital transmission for broadcast television

\* $p < .05$  \*\* $p < .01$

ence media use. In this way, we can better understand consumer demand for DTV by gaining a clearer picture of their perceived marginal utility for the innovation. Because the literature provides little indication about the sufficiency level for audience adoption of DTV, the dynamics identified here should help programmers understand the role of picture quality fulfilling the origins of gratification macro dimensions (Dimmick, 1993) that may drive DTV adoption. This study can help serve as a foundation for later analyses of actual DTV uses and niche influences, which should become more feasible as the technology moves beyond its nascent phase of diffusion.

For the present, though, the fact that fewer than a third of respondents feel even "somewhat educated" about DTV—only a few years before its mandated adoption in the United States—is remarkable. This may help explain why levels of interest in adopting DTV, particularly in its more expensive forms, are also low (as is awareness about the mandated transition to DTV). More interesting, the awareness measures were most strongly related to social locators. However, actual adoption intention was more powerfully predicted by our psychological measures. It seems, then, that demographics "propose" DTV adoption, but it is psychological variables that may actually "dispose," in terms of audience demand for the innovation.

Our findings also offer modest support for the early adopter profiles derived from diffusion theory, in terms of demographics and uses of other media (e.g., magazines). Although several media exposure measures were linked to both criterion measures in the bivariate analyses, it's interesting that few such relations survived the controlling influence of other variables in the regression analysis. The relatively weak explanatory role played by traditional media use and new technology adoption highlights a need to continue refining notions of functional similarity (Atkin, 1993; Reagan et al., 1995). As DTV penetration increases, an understanding of how it might influence the competitive niche of television (Dimmick, 1993) should become clearer.

The inability of technology adoption measures to predict DTV adoption variables contradicts functional similarity conceptions in past work (e.g., Atkin & LaRose, 1994). Perhaps DTV is so new that (likely) adopters don't yet know how to assimilate it into their technology repertoires (Reagan et al., 1995). As consumer familiarity with DTV increases, technology's role in larger media repertoires will become evident.

Given that DTV adoption intentions can be statistically differentiated across a broad range of measures, the technology provides a useful application of the diffusion dynamic for a relatively hybrid innovation; that is, one that is relatively continuous from the standpoint of technology and operational complexity, yet discontinuous from the standpoint of potential adoption cost. The limited range of social locators related to DTV adoption intentions—outlining an educated adopter profile—contradicts past work with HDTV (Lupker et al., 1988). This upscale profile does, however, parallel more recent findings noted for HDTV (Dupagne,

1999) as well as information technologies (e.g., Atkin et al., 1998; Lin, 1998; Neuendorf et al., 1998; Perse & Dunn, 1998).

As for price elasticity, it remains to be seen whether audiences are willing to pay the extra money for premium HDTV sets. Parallel research with a lower cost innovation—cable—suggests that patronage of the product continued to grow through the late 1980s, even as prices increased at four times the rate of inflation; this suggests consumers prefer the improved product at a higher rate (e.g., Jacobs, 1995; Lin, 1994).

Our findings concerning willingness to pay for DTV present a less optimistic picture of consumer demand for DTV. In that regard, these results confirm past work documenting public reluctance to pay a high premium for HDTV (Dupagne, 1999). Fewer than one fifth are willing to pay \$5,000—a medium-high cost estimate—for first generation DTV sets. Although such prices were not uncommon at the time of the 1999 survey, the cost gauge presents an unwitting bias against DTV when measured against today's prices. The fact that prices for DTV sets have dropped 50% since that time may increase consumer receptivity to the technology. Even so, our cost variable provides a viable measure of demand dynamics for higher end sets, for which our data present a rather dim prognostication.

This consumer hesitancy seems consistent with the innovation's poor showing in Japan. As Dupagne's (2002) review indicated, despite positive attitudes toward the technology and the availability of a full-time programming schedule, sales of their Hi-Vision were sluggish well into the medium's first decade (649,000 sets by August 1998). In that regard, no matter how deep one's DTV knowledge might be, price trumps all other considerations in the final adoption analysis. Although DTV manufacturing costs will likely decline if demand can stimulate scale economies, lukewarm levels of marginal utility for DTV uncovered here bodes ill for the FCC's timetable. Yet, as Dupagne (2002) concluded, long-term economic fortunes for DTV are bolstered by the fact that consumers will have no choice but to adopt the technology. This, combined with stronger demand noted in other DTV adoption work and lack of competitive relations with other media, bodes well for DTV's longer term diffusion prospects.

The most promising approach in defining such audience demand involves the identification of awareness and attitudinal measures concerning adoption of DTV. Although the levels of variance explained across our dependent measures was incomplete, they compare favorably with those of other preliminary adoption studies. Generally, the poor showing of sociodemographics underscores a need to move beyond resource-driven conceptions of technology adoption to focus on underlying psychological needs or utilities served by the media (e.g., Lin, 1998; Perse & Dunn, 1998).

These nonfindings involving traditional measures also echo the limitations noted in regard to the larger marketing and diffusion literature, whose measures fail to stimulate consumers' somatic markers or "hot buttons" (Clancy & Shulman, 1993,

p. 25). As Dimmick, Kline, and Stafford (1999) noted, our understanding of evolving economic niche dimensions for new media will be enhanced when we can more precisely pinpoint underlying origins of media uses and gratifications. Clearly, perceived increases in visual stimulation anticipated with the arrival of HDTV are of great interest to those seeking a wider range of psychological stimulation from the medium. The relatively stronger role played by variables relating to mood management with humor and depression, particularly for DTV adoption intentions, reaffirms the utility of expanding the range of variables in adoption research.

In sum, as scholars (Atkin et al., 1998; Lin, 1998; Rogers, 2002) have noted in conjunction with the Internet and other information technologies, HDTV is not likely to reach the status of a household necessity until it can exploit a key application more attractively or conveniently than other communication alternatives. For this particular case, audiences have a fairly good idea of the marginal utility offered by DTV over conventional sets, even if they lack the precise picture that only direct experience with the technology can provide. As Dupagne and Seel (1998) suggested, such awareness is an important first step in the adoption process, as consumers must first understand DTV utilities before they can determine areas of relative advantage (Rogers, 1995).

These findings are limited insofar as the distribution of DTV sets was focused at the time of the survey on higher end models. Dupagne (1999) further noted that relative advantage may be difficult to establish, because respondent experience with DTV is likely insufficient to enable discrimination between it and the NTSC format. Yet, while this low level of consumer knowledge of DTV presents a validity threat in theoretical terms, it also provides a painfully accurate picture of the confusion in consumer's minds. As Dupagne (2002) noted, the low levels of DTV awareness uncovered in such work should be troubling for those touting DTV as the next video revolution; it underscores the need for manufacturers to redouble their marketing efforts as part of a wide-scale push that encourages consumers to replace the incumbent NTSC receivers in 2006. This, combined with the fact that consumers will have very little choice after 2006, points to the need to continue refining approaches to studying consumer demand for DTV.

## REFERENCES

- Albarran, A., & Dimmick, J. (1993) An assessment of utility and competitive superiority in the video entertainment industries. *Journal of Media Economics*, 6(2), 45-51.
- Atkin, D. (1993) Uses of cable TV amidst a multimedia environment. *Telematics & Informatics*, 10, 51-60
- Atkin, D., Jeffres, L., & Neuendorf, K. (1998). Understanding Internet adoption as telecommunications behavior. *Journal of Broadcasting & Electronic Media*, 42, 475-490.
- Atkin, D., & LaRose, R. (1994) An analysis of the information services adoption literature. In J. Hanson (Ed.), *Advances in telematics* (Vol 2, pp 91-110) New York: Ablex

- Atkinson, T (1982) The stability and validity of quality of life measures *Social Indicators Research*, 10, 113–132
- Balanced Budget Act of 1997, Pub. L. No 105–33, § 3003, 111 Stat 251, 265 (1997)
- Brinkley, J. (1998, October 15) HDTV's mixed signals *The New York Times*, pp. D1, D3
- Campbell, A (1981) *The sense of well-being in America Recent patterns and trends*. New York McGraw-Hill
- Clancy, K J , & Shulman, R.S (1993) *Marketing revolution A radical manifesto for dominating the marketplace* New York Harper Business
- Consumer Electronics Association (2001) Market penetration Retrieved November 20, 2001 from Web <http://www.cemacity.org/digital/files/penetrat.htm>
- Detenber, B H , & Reeves, B (1996) A bio-informational theory of emotion. Motion and image size effects on viewers *Journal of Communication*, 46(3), 66–84
- Diener, E., & Suh, E (1997) Measuring quality of life Economic, social and subjective indicators *Social Indicators Research*, 40, 189–216
- Dimmick, J (1993) Ecology, economics and gratification utilities In A Alexander, J Owers, & R Carveth (Eds ), *Media economics* (pp. 135–156) Hillsdale, NJ Lawrence Erlbaum Associates, Inc
- Dimmick, J , & Albarran, A (1994) The role of gratification opportunities in determining media preference *Mass Comm Review*, 21, 223–235
- Dimmick, J , Kline, S , & Stafford, L (1999, May). *The gratification niches of personal e-mail and the telephone Competition, displacement and complementarity* Paper presented to the International Communication Association Conference, San Francisco.
- Dimmick, J , Patterson, J , & Sikand, J (1996) Personal telephone networks A typology and two empirical studies *Journal of Broadcasting & Electronic Media*, 40, 45–59
- Dozier, D M , Valente, T M , & Severn, J H (1986, May) *The impact of interconcept networks on perceived attributes and projected adoption of discontinuous innovation* Paper presented at the International Communication Association annual conference, Chicago
- Dupagne, M (1999) Exploring the characteristics of potential high-definition television adopters *The Journal of Media Economics*, 12, 35–50
- Dupagne, M (2002) Adoption of high definition television in the United States: The Edsel of the 1990s? In C A Lin & D J Atkin (Eds ), *Communication technology and society Audience adoption and uses of the new media* (pp 279–305) Cresskill, NJ. Hampton
- Dupagne, M . & Seel, P B (1998) *High-definition television A global perspective* Ames Iowa State University Press
- Dutton, W H , Rogers, E M , & Jun, S H. (1987a) The diffusion and impacts of information technology in households In P I Zorkoczy (Ed ), *Oxford surveys in information technology* (Vol 4, pp 133–193) New York Oxford University Press
- Dutton, W H , Rogers, E M , & Jun, S H (1987b) Diffusion and social impacts of personal computers *Communication Research*, 14, 219–250
- Ettema, J S (1984) Three phases in the creation of information inequities. An assessment of a prototype videotext system *Journal of Broadcasting*, 28, 383–395
- Harris Corporation (1997) *Consumer DTV screening survey* Melbourne, FL Author
- Jacobs, R (1995) Exploring the determinants of cable television subscriber satisfaction *Journal of Broadcasting & Electronic Media*, 39, 262–274
- Jeffres, L , & Atkin, D (1996) Predicting use of technologies for communication and consumer needs *Journal of Broadcasting & Electronic Media*, 40, 318–330
- Kiesler, S (1997) *Cultures of the Internet* Mahwah, NJ Lawrence Erlbaum Associates, Inc
- LaRose, R , & Atkin, D (1988) Satisfaction, demographic and media environment predictors of cable subscription *Journal of Broadcasting & Electronic Media*, 32, 403–413
- LaRose, R , & Atkin, D (1991). Movie distribution modalities and consumer choice. *Journal of Media Economics*, 4, 3–17

- LaRose, R., & Atkin, D. (1992) Audiotext and the re-invention of the telephone as a mass medium. *Journalism Quarterly*, 69, 413-421
- Lin, C. A. (1994) Audience fragmentation in a competitive video marketplace. *Journal of Advertising Research*, 34(6), 1-17.
- Lin, C.A. (1998). Exploring the personal computer adoption dynamics *Journal of Broadcasting & Electronic Media*, 41, 95-112
- Lin, C. A., & Atkin, D J. (2002). *Communication technology and society. Audience adoption and uses of the new media*. Cresskill, NJ: Hampton
- Lupker, S J , Allen, N J., & Hearty, P. J. (1988). *The North American high definition television demonstrations to the public The detailed survey results*. Montreal, Canada: Committee for the North American High Definition Television Demonstrations to the Public.
- Midgley, D. F., & Dowling, G R. (1978) Innovativeness. The concept and its measurement. *Journal of Consumer Research*, 4, 229-242
- Neuendorf, K., Atkin, D , & Jeffres, L (1998) Understanding adopters of audio information services. *Journal of Broadcasting & Electronic Media*, 41, 80-94
- Neuendorf, K., Skalski, P. D., Jeffres, L W , & Atkin, D (1999, November). *Public opinion and the senses of humor*. Paper presented at the annual meeting of the Midwest Association for Public Opinion Research, Chicago
- Neuman, W. R. (1988, April). *The mass audience looks at HDTV: An early experiment* Paper presented at the annual convention of the National Association of Broadcasters, Las Vegas, NV
- Perse, E., & Courtright, J (1993) Normative images of communication media. Mass and interpersonal channels in the new media environment. *Human Communication Research*, 19, 485-503
- Perse, E., & Dunn, D. G (1998) The utility of home computers and media use: Implications of multimedia and connectivity *Journal of Broadcasting & Electronic Media*, 42, 437-456.
- Reagan, J (1987). Classifying adopters and nonadopters for technologies using political activity, media use and demographic variables. *Telematics and Informatics*, 4, 3-16
- Reagan, J (1989, November) *Technology adoption: Is satisfaction the best predictor?* Paper presented at the annual meeting of the Midwest Association of Public Opinion Research, Chicago.
- Reagan, J , Pinkleton, B., Chen, C. F , & Aaronson, D. (1995). How do technologies relate to the repertoire of information sources? *Telematics & Informatics*, 12, 21-27.
- Robinson, J P., Shaver, P R., & Wrightsman, L S (1991) *Measures of personality and social psychological attitudes*. San Diego, CA. Academic
- Rogers, E. M (2002) Information society in the next millennium. Captain's log 2001. In C. A. Lin & D J. Atkin (Eds ), *Communication technology and society: Audience adoption and uses of the new media* (pp 46-64). Cresskill, NJ Hampton
- Rogers, E M (1995) *Diffusion of innovations* (4th ed ) New York Free Press
- Rubin, A M , & Bantz, C. R (1987) Utility of videocassette recorders. *American Behavioral Scientist*, 30, 417-425
- Rubin, A , & Eyal, K (2002). The videocassette recorder in the home media environment. In C. A. Lin & D Atkin (Eds.), *Communication technology and society Audience adoption and uses of the new media* (pp 329-349) Cresskill, NJ: Hampton
- Schaefer, D , & Atkin, D (1991). An analysis of policy options for high-definition television *Telecommunications Policy*, 15, 411-428.
- Seel, P B , & Dupagne, M. (1998). Advanced television. In A E Grant & J. H. Meadows (Eds ), *Communication technology update*(6th ed., pp 64-78). Boston Focal.

