Enhanced Television Viewing with Digital Video Recorders (DVRs):

Audience Satisfaction in an Asynchronous Television Environment

Douglas A. Ferguson
Department of Communication
College of Charleston
Charleston, SC 29424
843.953.7854
fergusond@cofc.edu

Elizabeth M. Perse
Department of Communication
University of Delaware
Newark, DE 19716
302.831.8029
eperse@udel.edu

Paper presented to the Communication Technology Division of the
Association for Education in Journalism and Mass Communication
August 2001

Enhanced Television Viewing with Digital Video Recorders (DVRs): Audience Satisfaction in an Asynchronous Television Environment

This paper explores how early adopters of DVRs are using them as functional replacements for VCRs and as tools for enhanced viewing of live television. A national sample of 121 users completed an online survey that measured TV uses and gratifications, viewing satisfaction, and attitudes toward DVR functions. DVR owners reported watching television, live and recorded, with more enjoyment and greater control. All but one of the DVR functions was linked to a measure of viewing satisfaction.

Enhanced Television Viewing with Digital Video Recorders (DVRs):

Audience Satisfaction in an Asynchronous Television Environment

From a functional point of view, the evolution of the television viewing experience has been slow. Since the first fundamental design of the television set, there have been few enhancements to actual use that go beyond the basic functions (on/off, channel change, volume control, etc.). This paper examines the features of the digital video recorder (DVR), a recent revolution in TV functionality that may forever change the way most people watch television.

Such a bold claim has surfaced before, notably when the analog VCR promised viewers the ability to time-shift the program schedule. In reality, the VCR's other main function (playing/pausing/fast-searching recorded tapes) took precedence, thanks to the widespread availability of inexpensive tape rentals. Klopfenstein (1989) found that most VCR users found the time-shifting function only occasionally useful. Anyone who has tried to keep track of unlabeled VHS tapes knows that programming the VCR requires a good deal of dedication and precision.

Other attempts to enhance the functionality of the television set have been studied. The remote control device (RCD) moved the usual functions of the VCR and TV closer to the user and greatly sped up the selection process, a momentuous change for viewers, but did not add new functionality beyond the last-channel button and the mute button (Eastman and Newton, 1995) . Picture-in-picture capability allowed the viewer to watch two or more shows at once, but the remote control could often flip between shows just as easily. After the advent of digital capabilities like the Internet and two-way cable, interactive features have permitted the user to select different streams "on demand" and create an asynchronous viewing experience in real-time.

The key to understanding the added functionality of the DVR is the asynchronous nature of the recordings (Negroponte, 1995). Unlike the ordinary VCR that uses videocassette tape, the DVR uses a hard-disk to store compressed video, thus allowing simultaneous recording and playback of the same program without regard to linear time. For example, the DVR allows a viewer to record an hour-long program while watching live a half-hour program, and then *immediately* begin watching the recorded show from the beginning, even while the remaining minutes of the show are still being recorded. Many DVR owners have reported being able to watch the same number of shows in less time, because they can watch any archived program while other shows are being recorded. The concept of "real time" is controlled by the user.

Even when not instructed to make a recording, the DVR is always recording the current channel onto its hard-drive buffer. Thus, the user can pause live TV or ask for instant-replays. The pause feature on recorded programs has been particularly useful when the viewing experience is interrupted by a phone call or some other intrusion, but now the pause can take place during live shows in progress.

Another key distinction between the VCR and the DVR is the hassle-free selection of shows. DVRs feature a choice of two menu systems: (1) an IPG (interactive program guide), which is a searchable menu of programs, alphabetized or sorted by time and genre, and (2) an EPG (electronic program guide), which is an overlay program schedule to consult during live TV (much like that found on digital cable systems). Every DVR is connected to a centralized computer database via a telephone connection over which the program schedules are downloaded or updated daily.

Either system of program menus is available to the viewer who decides the following: (1) which shows to record, (2) how long to store recordings, (3) what picture quality is needed (lower quality increases storage capability), and (4) how often to record (a "season pass" records all programs of a given title without regard to fluctuations in scheduling). If a viewer decides not to watch an archived show, there is no need to rewind the tape because the show is automatically deleted after a certain interval (usually two days).

The DISHplayer has the most units in use, but it is only available to subscribers of the satellite service owned by Echostar. Similarly, the UltimateTV DVR introduced in early 2001 by Microsoft is bundled with WebTV and DirecTV satellite services. This study focused on the two commonly available "standalone" DVRs made by TiVo and ReplayTV.[1] Both devices have exclusive arrangements with equipment manufacturers: TiVo has Sony and Philips models; Replay is made by Panasonic and Sharp. TiVo does not include a lifetime subscription fee in its price as the more-expensive Replay does, leading some to think that Replay has a "free" membership for the downloading of program schedules. Without the membership, both units have the same base price and the lifetime membership is effectively $199 for both. In 1999, the first DVRs debuted at well over $500. By September 2000, DVRs were discounted after rebates at close to $99 (not including membership). The device is expected to penetrate 25 percent of all television homes by 2002 (Dickson, 2000a).

TiVo has some unique features, such as thumbs-up/thumbs down buttons that interact with network promos or build a "suggestions" file of upcoming shows. TiVo users can "teach" their DVR about their preferences. The users can thus rely on the TiVo DVR, if they choose, to be a "robotic VCR" that records programs that it "thinks" the viewers will like. The TiVo remote

identify any significant differences among the use of those features. We used descriptive statistics to explore if the DVR is being used in ways that might displace use of the VCR. Finally, we used descriptive statistics to explore how satisfied DVR owners were with their television viewing. Then, we used Pearson correlations to explore how the use of different DVR features was linked to enjoyment of watching television, satisfaction with television viewing, and specific benefits derived from watching television.

Results

Functions of the DVR

Our first research question asked about DVR owners' use of DVR functions. Means for each function are presented in Table 1.

Table 1 about here

The most widely used DVR functions were using it to fast-forward past commercials (M = 7.27, SD = 1.11) and to record and watch programs scheduled at inconvenient times (M = 7.17, SD = 1.1). Use of these two functions were not significantly different from each other, but they were significantly more commonly used than any of the other eight functions. The next most used DVR function was the on-screen schedule for choosing programs to record (M = 6.73, SD = 1.72). It was significantly more used than the remaining seven functions. The next most used functions were the use of the on-screen program guides (M = 6.18, SD = 2.23) and using the DVR to skip over unappealing program segments (M = 6.07, SD = 2.02). Use of these two functions did not differ significantly, but both were used significantly more often than the remaining five. Using the DVR to pause live programming (M = 5.57, SD = 2.22), to teach

program preferences (M = 5.40, SD = 2.72), and replay program segments (M = 5.25, SD = 2.31) were the next most widely used functions. The amount of their use was not significantly different. Next, owners reported to use the DVR to fast-forward past unappealing people (M = 5.00, SD = 2.69). This use was significantly lower than the use of the DVR for pausing live programs, but was not significantly different than using the teach or replay functions. The slow-motion function was the least used function (M = 3.37, SD = 2.24). Its mean was significantly lower than all the other functions.

Of the brand-specific features, ReplayTv's Skip30 was used quite often (See Table 2, M = 7.46, SD = 0.99). TiVo suggestions was also somewhat widely used (M = 5.45, SD = 2.23) as was the TiVo Thumbs feature (M = 5.07, SD = 2.12). The TiVo Showcase, however, was not particularly well used (M = 3.16, SD = 2.36). TiVo owners used the Showcase feature significantly less than the Suggestions feature ($t[73] = 6.99$, $p < .001$) and the Thumbs feature ($t[73] = 5.40$, $p < .001$).

Table 2 about here

DVR and VCR

The most endorsed function according to DVR owners was using the devices to record and watch programs scheduled at inconvenient times (see above and Table 1). This suggests that, for DVR owners, the DVR might replace the VCR. In order to explore VCR displacement, we explored DVR owners perceptions about using the DVR for recording. Consistent with the prime use of DVRs to record and watch programs, our sample reported to record programs with the DVR quite often (M = 7.35, SD = 2.31). In general, DVR owners believe that it is easier to

record programs with the DVR. They report that they record more with the DVR (M = 7.35, SD = 1.64). Moreover, they rarely transfer programs to the VCR for more permanent storage (M = 2.31, SD = 2.23).

Perceptions about Television Viewing

There is some indication that the DVR has the potential to change people's feelings about television. Our sample reports feeling more in control with their DVR (M = 7.48, SD = 1.34); They report to do less channel surfing now that they own a DVR (M = 6.26, SD = 2.49), and they believe that they are less likely to watch commercials with the DVR (M = 6.93, SD = 1.92).

Our sample does believe that the DVR makes television viewing more enjoyable (M = 7.34, SD = 1.45). But, as they report only moderate satisfaction with television viewing (M = 14.37, SD = 4.18), we explored which DVR functions are linked to greater enjoyment, satisfaction, and benefits of television viewing.

DVRs ability to allow owners to record and watch programs aired at inconvenient times is a feature that is linked to greater satisfaction (see Table 1). This feature is linked to reporting greater enjoyment from watching television (r = .52 p < .01), to television viewing satisfaction (r = .41, p < .01), and to all benefits of watching television: learning (r = .20, p < .05), pastime (r = .24, p < .01), relaxation (r = .28, p < .01), entertainment (r = .35, p < .01), and arousal (r = .18, p < .05). Using the on-screen program schedule select programs to record is also linked to greater satisfaction. Use of this feature is positively related to greater enjoyment from television viewing (r = .35, p < .01), greater televison viewing satisfaction (r = .27, p < .01), and receiving greater learning (r = .23, p < .05), pastime (r = .32, p < .01), and arousal benefits (r = .29, p < .01). Using the DVR to pause live programming is also linked to satisfaction. This feature is positively correlated with reporting greater enjoyment with television viewing (r = .30, p < .01), higher television viewing satisfaction (r = .31, p < .01), and greater learning (r = .22,

$p < .05$), entertainment ($r = .20$, $p < .05$), and arousal benefits ($r = .29$, $p < .01$). Using the teaching function to instruct the DVR to recognize programs preferred by the viewer is also related to greater satisfaction. This feature is linked positively to enjoyment of television viewing ($r = .27$, $p < .01$), viewing satisfaction ($r = .31$, $p < .01$), and receiving relaxation ($r = .32$, $p < .01$) and entertainment benefits ($r = .24$, $p < .01$). Other features were linked only modestly to viewing satisfaction. Being able to avoid commercials was linked to greater television viewing enjoyment ($r = .29$, $p < .01$), greater television viewing satisfaction ($r = .23$, $p < .05$), and receiving entertainment benefits from watching televison ($r = .19$, $p < .05$). The on-screen program guide feature was linked to greater television viewing satisfaction ($r = .24$, $p < .01$) and receiving pastime benefits from watching television ($r = .22$, $p < .05$). The ability to fast-forward past unwanted program segments was related positively to enjoyment of television ($r = .31$, $p < .01$) and television viewing satisfaction ($r = .19$, $p < .05$). Being able to fast-forward past unwanted people was positively related to enjoyment of television ($r = .20$, $p < .05$) and relaxation benefits ($r = .19$, $p < .05$). The instant-replay function was linked only to greater enjoyment of television ($r = .34$, $p < .01$). The slow-motion function was unrelated to any measures of satisfaction.

Discussion

From these exploratory findings, it appears that early adopters of DVRs are quite fond of using them. DVR owners reported watching typical amounts of television, but with more enjoyment and greater control. Even though respondents in this study do not time shift very much, it seems that they really appreciate being able to do it more easily with the DVR than with their VCRs. Timeshifting is the feature that was linked to most measures of satisfaction.

The data show a positive relationship between use of the DVR and enjoyment with television. All the features except for slow motion are linked to some measure of satisfaction. Perhaps taking longer to watch video segments with slow-motion is not viewed as a satisfying

way to watch television. Future research should explore how effort and activity are linked to enjoyment of technology.

These DVR owners are clearly early adopters (Rogers, 1995), so they are not typical of the population as a whole. They are probably better educated, make more money, and perhaps might not even be opinion-leaders, although these variables were not measured in this study. Future research should explore DVR owners over time to explore how the demographics, social characteristics, and even attitudes about television change.

The increased time-shifting functionality of TiVo and ReplayTV suggests that the DVR will eventually displace the VCR (especially as DVDs costing $99 become as plentiful as VCRs costing $99). Among the most valued features of the DVR is the ability to record programs that are aired at inconvenient times. Availability of menu-driven program schedules helps explain the appreciation for features that allow easier "one-button" recording, especially the TiVo thumbs-up button. It is clear that DVR owners find their new machines much easier to use than the VCR. Although other technologies have been developed to help consumers program their VCRs (e.g., VCR+ Plus), none of them has enabled easy playback and keeping track of recorded materials.

Perhaps the real significance of studying DVRs now is that many observers expect these standalone devices to quickly evolve into integrated solutions for delivering multichannel services to set-top boxes (STBs). The direct-to-home satellite services already offer the DISHplayer and the DirectTV-TiVo receivers, with cable system operators presently exploring alliances with DVR services. It makes sense for a cable operator to move some of its video-on-demand program content to secure home-based storage, away from centralized disk space. When all 80 million cable and satellite million homes eventually have DVR capability built into their STBs in the not-too-distant future, the changes in viewing/recording behavior studied here will become even more important to the study of television viewing behavior.

This study is, of course, limited by the nature of the self-selected samples. Familiarity with web surfing in a sample recruited on the Internet may have biased the amount of reported channel use on television. The mostly-male forum participants likely reflect viewpoints of the afficionado rather than the causal user. Lindstrom (1989) noted that early adopters of the VCR were heavy TV viewers. He observed, "In general, recording activity follows TV activity, with lighter television usage roughly translating into lighter VCR recording activity" (p. 44).

The ultimate importance of studying DVRs may lie in the threat these devices pose to advertisers whose messages will become easier to avoid as viewers learn to manipulate real-time. Prognostications on the future of television advertising in a DVR world have speculated that empowered viewers may see fewer commercials (e.g., Brown, 2000). Future research should look at the economic impact of altered viewer behavior, if only to track the rate of diffusion, changing uses over time, and whether the novelty will wear off. Whether DVRs themselves will remain viable standalone devices or not, we cannot predict. But it is clear that the added functions are here to stay, in some form or another.

Notes

[1]As this study was being finished, ReplayTV announced on November 28, 2000, that it was abandoning the standalone DVR business.

[2]We cannot assess if this imbalance reflects a male-dominated ownership and use of DVRs or our method of data collection. Gender differences in use of DVRs should clearly be an area for future research.

[3]ReplayTV's Skip30 function moves the program ahead 30 seconds. TiVo Suggestions is a menu option that displays a personalized list of the programs that might be interesting to the viewer, based on their use of the Thumbs feature. TiVo Thumbs feature is a teaching function that displays programs and lets the viewer rate it "Thumbs up" or "Thumbs Down." TiVo Showcase is a menu option that includes network promotions for their programs.

[4]Satisfaction items were: "How valuable did you find your television viewing in the past week," "How pleasing was your television viewing during the past week," and "How satisfied were you with your television viewing during the past week." All items used nine-point response options.

References

Brown, Peter J., (2000, July 10). PVRs: Content control. Broadcasting & Cable, 38-42.

Dickson, G. (2000a, June 26) KPMG: Rosy future for PVRs. Broadcasting & Cable, p. 50.

Dickson, G. (2000b, July). Forrester foresees "smart TV" Broadcasting & Cable [online news at www.broadcastingcable.com]

Eastman, S. E., and Newton, G. D. (1995). Delineating grazing: Observations of remote control use. Journal of Communication, 45(1), 77-95.

Greenberg, Daniel, (2000, June 2). Now showing: TV on your own time," Washington Post, E01.

Klopfenstein, B. C. (1989). The diffusion of the VCR in the United States (pp. 21-39). In M. R. Levy (Ed.), The VCR Age: Home Video and Mass Communication. Newbury Park, CA: Sage.

Levy, M. R. (1981). Home video recorders and time shifting. Journalism Quarterly, 58, 401-405.

Levy, M. R. (1983). Time-shifting use of home video recorders. Journal of Broadcasting, 27(3), 263-268.

Lindstrom, P. B. (1989). Home video: The consumer impact (pp. 40-49). In M. R. Levy (Ed.), The VCR Age: Home Video and Mass Communication. Newbury Park, CA: Sage.

Negroponte, N. (1995). Being digital. New York: Knopf.

Nielsen Media Research (2000). Weekly viewing by daypart (p. 14). 2000 Report on Television. New York: Nielsen.

Perse, E. M., & Courtright, J. A. (1993). Normative images of communication media: Mass and interpersonal channels in the new media environment. Human Communication Research, 19, 485-503.

Perse, E. M., & Ferguson, D. A. (1993). The impact of newer television technologies on television satisfaction. Journalism Quarterly, 70, 843-853.

Perse, E. M., & Ferguson, D. A. (2000, November). Web surfing satisfaction. Paper presented to the annual meeting of the National Communication Association, Seattle.

Perse, E. M., & Rubin, A. M. (1988). Audience activity and satisfaction with favorite television soap opera. Journalism Quarterly, 65, 368-375.

Rogers, E. M. (1995). Diffusion of innovations (4th ed.). New York: Free Press.

Rubin, A. M. (1984). Ritualized and instrumental television viewing. Journal of Communication, 34(4), 67-77.

Table 1: Features of DVRs. Means and Correlations with Television Viewing Satisfaction

	DVR Features									
Benefits	Zip	Record Inconvenient Show	IPG	EPG	FF Program	Pause	Teach	Replay	FF People	SlowMo
Enjoyable	.29**	.52**	.07	.35**	.31**	.30**	.27**	.34**	.20*	.13
Satisfaction	.23*	.41**	.24**	.27**	.19*	.31**	.31**	.15	.13	.06
Learn	.01	.20*	.10	.23*	.08	.22*	.18	.11	.16	.11
Pastime	.00	.24**	.22*	.32**	.04	.08	.17	-.04	.04	-.11
Relax	.06	.28**	.16	.15	.17	.17	.32**	.13	.19*	-.09
Entertain	.19*	.35**	-.03	.15	.14	.20*	.24*	.14	.13	-.13
Arousal	.12	.18*	.16	.29**	.12	.29**	.16	.11	.16	-.07
M	7.27_{a}	7.17_{a}	6.73	6.18_{b}	6.07_{b}	5.57_{c}	5.40_{cd}	5.25_{cde}	5.00_{de}	3.37
SD	1.11	1.10	1.72	2.23	2.02	2.22	2.72	2.31	2.69	2.24

Note. Means with common subscripts do not differ significantly by paired t-tests. ** $p < .01$, * $p < .05$.

Table 2: Specific Brand Features. Means and Correlations with Viewing Satisfaction

	Brand Features			
Benefits	ReplayTV Skip30	TiVo Suggestions	TiVo Thumbs	TiVo Showcase
Enjoyable	-.05	.29*	-.14	.24*
Satisfaction	-.13	.38**	.22	.18
Learn	-.16	.06	.10	.10
Pastime	.14	.21	.06	.23
Relax	-.09	.35**	.25*	.15
Entertainment	-.04	.33**	.02	.23*
Arousal	-.08	.20	.12	.33**
M	7.46	5.45	5.07	3.16
SD	0.99	2.23_a	2.12_a	2.36

Note. For TiVo features only, means with common subscripts do not differ significantly, $p < .001$. ** $p < .01$, $p < .05$.