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AUTHOR Napoli, Philip M.
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ABSTRACT

Retrospective technology assessment (RTA) is the use of historical research to assess current and future technology issues. This paper uses the introduction of the videocassette recorder (VCR) as an RTA case study, focusing on the broadcasting and advertising trade presses and their forecasts of the VCR's potential impact on broadcasting. Trade press forecasts are compared with forecasts in academic journals in order to have a comparative basis for judging accuracy; analysis is conducted from the perspective of technology forecasting theory and methodology. Evaluation of this material led to the following conclusions: (1) analysis of the forecasts supports existing forecasting theory, demonstrating that an integrated analysis of technological capabilities with social factors such as economics and consumer preferences improves forecasting accuracy; (2) the advertising trade press was much more active and accurate than the broadcasting trade press in forecasting the impact of the VCR; and (3) the academic community appeared more accurate than either the broadcasting or advertising trade press in forecasting the future of the VCR. (Contains 77 references.) (Author/AEF)

Forecasting the VCR: A Retrospective Assessment of Media Trade Press and Academic Forecasts of its Impact on Broadcasting

by

Philip M. Napoli

Northwestern University
Department of Communication Studies
Harris Hall, Rm. 35
1881 Sheridan Rd.
Evanston, IL 60208
708-491-5839
pmn480@lulu.acns.nwu.edu

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Introduction

As new technologies raise the possibility of revolutionary changes in our mass media system we see the inevitable avalanche of predictions regarding how these technologies will affect the existing media industries. For those with an interest or stake in the outcome it is important to be able to both construct and identify accurate technology forecasts.

Retrospective technology assessment (RTA) is useful in this regard. RTA is the use of historical research to assess current and future technology issues. One important objective of RTA has been "to illuminate the expectations and options of technologists . . . at the critical time when technologies are first introduced" (Segal, 1982, p. 232). Thus, studying past forecasts and determining the characteristics of accurate and inaccurate predictions can improve our present forecasting ability (Pool, 1983, p. 5).

Previous research has found communications industry sources to be both the earliest (Kim & Robinson, 1994) and the most accurate (Pool, 1983) forecasters of new media technologies. Such conclusions lead us to focus on the media industry trade press, which has traditionally been a valuable and influential resource, not only within the industry, but within government and academia as well (Cole & Oettinger, 1977).

This paper uses the introduction of the VCR as an RTA case study. Previous research has examined the technology forecasting

process in terms of the VCR (Klopfenstein, 1989b); however, the focus here is on the broadcasting and advertising trade press and their forecasts of the future of the VCR and its possible impact on broadcasting. The VCR's potential effect on broadcasting was considered by some to be the single most important issue surrounding its development (Gross, 1983, p. 94). The VCR had the potential to directly affect television viewing and television advertising effectiveness, perhaps drastically altering the existing media landscape. How well did the media trade press inform the industry about this issue? Who were the most vocal or well-informed sources? How accurate were they? What forecasting methods did they use? Answering these questions will provide a clearer picture of the media trade press as technology forecaster and offer insights into the characteristics of accurate forecasts.

These questions will be addressed from the perspective of technology forecasting theory and methodology. This body of literature provides an evolving framework for constructing and identifying accurate forecasts. In addition, this analysis compares trade press forecasts with forecasts in academic journals (another area in which well-informed and accurate forecasts could be anticipated) in order to have a comparative basis for judging accuracy.

The analysis of this material has led to the following conclusions: First, an analysis of the forecasts supports

existing forecasting theory, demonstrating that an integrated analysis of technological capabilities with social factors such as economics and consumer preferences improves forecasting accuracy. Second, the advertising trade press was much more active and accurate than the broadcasting trade press in forecasting the impact of the VCR. The broadcasting trade press tended to echo the forecasts of the three networks, engaging in very little independent analysis. These points lead to my final argument, that the academic community appeared more accurate than either the broadcasting or advertising trade press in forecasting the future of the VCR. Perhaps only in this setting were forecasters consistently sensitive to both the social and technological factors affecting the diffusion and use of the VCR *and also* relatively free of institutional biases.

Technology Forecasting

Forecasting Theory

In recent years, technology forecasting has become an established scientific endeavor (Klopfenstein, 1989a; Rogers, 1995; Slack, 1984), and its theory and methods underlay many of the VCR forecasts found in the media trade press. Pool (1983) has argued that by studying past forecasts of media technologies we can improve our present forecasting ability (p. 5). Thus, through retrospective technology assessment we can test and develop technology forecasting theory. Current theory is best represented by this passage from Robinson (1972):

> It seems to me illusory to imagine that technological progress can be viewed purely as a technological process. One must go beyond this to look at the demands of society, or, more precisely, at the interaction between social needs and the present and future states of technology . . . The technological forecaster seems to me destined to remain a mere statistical fiddler unless he can take into account the economic and social factors which help to govern the rate of application of scientific knowledge. (pp. 18-19)

Here Robinson stresses that the technology forecaster must reside in the middle of the continuum ranging from technological determinism (in which the capabilities of the technology determine its use and even affect social structures and behavior) to social determinism (in which technology remains subservient to societal needs and constraints).

This perspective is echoed in the literature focusing specifically on media technology forecasting (Coates, et al., 1979, p. xi; Klopfenstein, 1989b; Pool, 1983). For instance, the Office of Technology Assessment's (OTA) (1990) model for the diffusion of new media technologies stresses the integration of technological determinism with the perspective that social systems structure technological developments (pp. 34-35). Similarly, Winston's (1986) model describes the need for a "supervening necessity" (like the OTA's, rejecting absolute technological determinism) and also asserts a "law of the

suppression of radical potential" (p. 18). By this Winston is referring to the situation "wherein general social constraints operate to limit the potential of the device to radically disrupt pre-existing social formations" (p. 23). According to Winston, new media technologies never radically affect the existing institutional relationships within the mass media; are not adopted with the revolutionary speed often believed; and do not radically affect cultural institutions.

Methodologies of Technology Forecasting

Clearly, forecasting theory poses serious methodological challenges for quantitative approaches. When forecasting a technology in its infancy, little or no data are available for trend analysis or other quantitative methods. As a result, "technical forecasting defies complete capture by the mathematical model" (Sullivan & Claycombe, 1977, p. 192). Less precise methods attempt to compensate for this problem. Two that recur in the trade press' VCR forecasts are historical analogy and market research. Historical analogy involves analyzing the introduction and development of a new technology using the development patterns of an older technology as a predictive model. Chambers, et al. (1971) conducted such an analysis on color television, using adoption data for black-and-white television as a framework (see also Carey & Moss (1985) for a broader survey of various media technologies). Market research is a common tool in many types of forecasting (Chambers, et al.,

1971, p. 43), and is often used for predicting consumer demand for new technologies, thereby helping the researcher integrate social and technological determinism.

Of course there is the possibility of bias in any forecasting methodology. Slack (1984) demonstrates that the scope of many technology forecasts and the issues they address are often limited by institutional and economic biases (pp. 25-26). The questions forecasters seek to answer may often represent only their own interests or values (or those of a particular organization or institution) and may neglect other important considerations about the technology (Dickson & Bowers, 1973, p. 4). In addition, the information used by technology forecasters may itself come from biased sources (Coates, et al., 1979, p. 193). As Klopfenstein (1989) points out, "In the case of new technologies, the developers (both the engineers and the corporate sponsors) begin with a near monopoly on knowledge They are inherently optimistic about the technology's future or they would not be developing it" (p. 36). These issues become important issue as we examine trade press forecasts of the future of the VCR.

Method

To retrospectively assess media trade press and academic forecasts of the VCR's impact on broadcasting, a census was conducted of articles published in the media trade press, as well as in academic business and media journals, between 1969, when

there arose the possibility of an affordable (for some) home video recorder, and 1987, when VCR penetration exceeded 50 percent. NEXIS, ABI Inform, ERIC, and other indexes were used to locate these articles. In addition, issue-by-issue searches were conducted of trade publications not indexed on these databases (i.e. Television/Radio Age). References in Julia Dobrow's (1990) edited volume Social and Cultural Aspects of VCR Use also provided a number of academic and trade press sources. Only articles that included a forecast of the VCR's prospects for success or its effect on broadcasting were included in the analysis. A total of 40 articles were located. The primary sources for these articles were Broadcasting, Television/Radio Age, Advertising Age, and Marketing & Media Decisions

Findings

Broadcasting Trade Press

The possibility of a reasonably priced home video recorder became a technological reality around 1970; however, within the broadcasting trade press, there was initially only ignorance to the VCR's consumer potential. Most of the relatively few articles published in the early days of the VCR's development discussed only its potential for industry applications, completely ignoring the possibility of a consumer market ("One-inch tape," 1971; "Tape's state-of-the-art," 1969; Taylor, 1974). However, in the few instances in which the broadcasting trade press did discuss the possibility of a home VCR, the prognosis

was mostly negative (Donnelly, 1976). A 1971 issue of Broadcasting cited two factors preventing the diffusion of VCRs: (1) "The multiplicity of systems under development" and (2) costs (Crater, 1971, p. 60). The article pointed out that in the early 1970s, a VCR carried a price tag of approximately $800-$900 and that there were incompatibilities among the numerous systems under development (p. 61). These factors lead Broadcasting to discount the possibility of VCRs ever gaining wide acceptance. This obviously did not turn out to be the case. Forecasting theory helps explain the inaccuracy of this analysis, for in this case Broadcasting clearly focused on social factors such as economic limitations and consumer uncertainty, and completely discounted any degree of technological determinism.

The Broadcasting article also utilized a historical analogy to further argue its position, citing the nine years it took for color television sales to reach a mere one million units (Crater, 1971, p. 61). Broadcasting was correct to the extent that the time span for reaching one million units was almost identical for the VCR; however, the article effectively abandoned the analogy, never anticipating the VCR reaching levels of diffusion approaching that of color TV (p. 61), as it had by the end of the 1980s (Nmungwun, 1989, p. 166).

Broadcasting executives voiced similarly negative prognoses. An NBC study predicted VCR penetration of only 15% by 1988 ("The coming television," 1979, p. 160). An executive for Warner

Communications (a major program supplier) attacked the feasibility of the VCR's "narrowcasting" abilities: "Narrowcasting overlooks a fact of retail called 'distribution' . . . the percentage of wonton fanatics and students of ladies' ground strokes who will even browse your video outlets may well be too small to make narrowcasting . . . anything more than a squeak-it-out, mail-order phenomenon" (Poe, 1981, p. 17). Obviously, any visit to one of the large video chains demonstrates the inaccuracy of this analysis. In the Warner executive's statement we again see a failure to account for any degree of technological determinism when forecasting.

The broadcasting trade press was also off the mark when forecasting the VCR's potential effect on broadcast viewing. While some articles completely ignored the issue ("Industry experts," 1981; "Soon the home," 1970), one Broadcasting column scoffed, "a machine used to record broadcast signals off the air is hardly a threat to existing media" (Donnelly, 1976, p. 12). The trade press primarily espoused the position advocated by the networks, that VCR use would be "additive" to television viewing ("Cartridge tv," 1970, p. 25; Crater, 1971, p. 64). According to Julian Goodman, then-president of NBC, the network saw "other forms of home entertainment and information, like cable and cassette video, developing to fill roles that are quite different from television. . . . We do not see these specialized-audience services significantly detracting from television's enormous mass

appeal" (Crater, 1971, p. 64). According to ABC president, Elton Rule, "We view this entire area of producing software for new technologies as similar to, yet separate from the broadcasting industry" ("Television's fragmented," 1979, p. 66). Both NBC and CBS cited detailed market research studies in support of this conclusion (Crater, 1971, p. 64; "The coming television," 1979, p. 160). CBS's Robert Brockway claimed their results indicated that cassettes would extend the viewing time of those who already watched TV and would also serve those who didn't watch TV but would watch specialized videos (Crater, 1971, p. 64).

Given that the networks based their conclusions entirely on audience research, it is not surprising that their forecasts were inaccurate. Krugman and Rust (1993) show that cable and VCR penetration have had a significant negative effect on network audience shares, while Henke and Donohue (1989) demonstrate significant displacement of traditional television viewing by the VCR (p. 22). Though there is research that offers contrary results (Metzger, 1986), Klopfenstein (1990) convincingly demonstrates methodological biases within these analyses (pp. 48-49). Further, Auletta (1992, p. 293) and others have documented that network programming strategies have been altered in response to the loss of viewers to the VCR (Gelman, 1987; Rosenthal, 1987). While the networks do appear correct that there will always remain a need for a truly mass medium (Auletta, 1995, p. 79; Gelman, et al., 1984, p. 50; Neuman, 1991), declining

audience shares (Krugman & Rust, 1992, p. 69) and stable average viewing hours (Klopfenstein, 1990, p. 45) indicate that the VCR has not been additive. The results here thus appear to affirm Auletta's (1992) assertion that the networks underestimated the effects new technologies would have on their audience share, and it would appear that the broadcasting trade press unquestioningly passed these conclusions on to its readers.

It is interesting to note that while Klopfenstein's (1989b) analysis of formal government and industry forecasts attributed inaccuracies to excessive technological determinism, the broadcasting trade press forecasts discussed thus far have demonstrated the opposite extreme. Clearly, an overreliance on social determinism of media technology use can also yield inaccurate conclusions. Perhaps we can attribute this methodological flaw to unconscious institutional biases affecting the forecasting process (Linstone, 1975, p. 582). Forecasters within broadcasting may not have been likely to conceive of the VCR affecting users in a way that might jeopardize their interests. (The lone Broadcasting forecast predicting declining network audiences was authored by an advertising executive [Pinkham, 1976].) Ang (1991) takes a similar position, arguing that "the networks furiously attempt to interpret the new situation caused by the VCR in manageable terms. They make every effort, at least rhetorically, to render the entrance of the VCR compatible with their own programming and scheduling strategies"

(pp. 74-75). This statement also hints at a second possibility, that these forecasts were not intended primarily as meaningful discussions of the future of a technology, but were rather primarily intended to affect the attitudes of stakeholders and maintain confidence in the vitality of the broadcast industry.. It is interesting that only in the mid-80s, when the networks were already enduring a financial crisis as a result of competing media technologies (Auletta, 1992), do we see thorough broadcasting trade press analyses of the effects of the VCR and cable on broadcast viewing (Beville, 1984a, 1984b; "Moment of truth," 1984). Whether this is because it took the broadcast industry that long to recognize the threat or because any public relations efforts against the VCR had been abandoned at that point is difficult to determine from the data examined here.

Advertising Trade Press

The advertising trade press proved to be much more active and, for the most part, much more accurate than the broadcasting trade press when forecasting the effects of the VCR. In 1978, one advertising executive noted, "curiously, the coming boom in home vtr [video tape recorder] has been virtually ignored by the broadcasting . . . fraternities" ("How vtr will," 1978, p. 101). The advertising trade press, on the other hand, devoted considerable attention to the questions posed by the VCR ("First look," 1979; "Get ready," 1984; Porter & Lipton, 1981; Sommer, 1980; Sternberg, 1987; "Suddenly, it's a booming," 1978; "The

coming television," 1979; Veraska, 1980).

Regarding the success or failure of the VCR as a consumer product, Advertising Age cited trends such as the growth of single-person households, the increasing divorce rate, and non-traditional living arrangements as conducive to the adoption of the new technology. The article concluded, "The consumer home entertainment markets of the future will be shaped not only by the availability of the new technologies, but also by inherent demographic receptivity to them" (Weilbacher, 1982, p. M-56). Within this statement we see the necessary theoretical integration of technological and social determinism.

Regarding the VCR's effect on broadcast viewing, the advertising trade press reflected the activity and interest of the advertising industry (for a good example of the advertising industry's interest, see Nielsen, 1982/83). As early as 1971, a task force commissioned by the American Association of Advertising Agencies investigated the issue, concluding that the VCR would "ultimately . . . erode television network audience sizes" (Crater, 1971, p. 64). One advertising executive saw programming flaws, increasingly educated viewers, the maturation of the TV industry, and new technologies such as VCRs and cable as combining to erode network viewership (Pinkham, 1976, p. 12). The prevalence of this perception within the advertising industry is evident in a 1987 survey of advertising executives, which found that 71 percent shifted budgets away from network TV in the

1980s and that 75 percent blamed the VCR either significantly or partially for network audience erosion ("Survey: Ad $," 1988, p. 92).

Similarly, a number of advertising trade press articles accurately predicted an erosion of audience share ("Cartridge tv," 1970, p. 25; Chew, 1977, p. 3; "The coming television," 1979, p. 160; Langbort, 1983, p. 112). One analysis provides an excellent example of integrating social and technological factors:

> The media segmentation that has occurred up until now and which will continue to occur, fueled by the new media, has been possible because of the changes in our society. So it is not only an electronic revolution we are facing, but also a social evolution. I don't believe our society was different enough up through the fifties to have responded to the new electronic media with the zeal we are witnessing now . . . We have witnessed the start of the erosion of network television. We believe that this trend will continue based on our belief that the penetration of the new media will continue and accelerate. However, in spite of this erosion, it is safe to assume that network television will remain the primary advertising vehicle for the foreseeable future for the great majority of national advertisers. Most products and services need to reach mass audiences if they are to generate sufficient business to keep them in the

marketplace. (Langbort, 1983, p. 113)

This passage demonstrates how an understanding of the technology as well as the consumers can generate accurate forecasts. In this case, not only were the audience members as consumers of programming taken into consideration, but the advertisers as consumers of audiences were taken into account as well. This analysis also strongly echoes Winston's model, in which there must be an intervening necessity and in which the needs of all institutions involved can have a significant effect on the media landscape. In this case, the author identified the social evolution as the intervening necessity providing the impetus for the VCRs rapid diffusion and the unchanging need of national advertisers for mass audiences as a maintaining factor for network television.

Historical analogy also proved effective in the advertising trade press' efforts to forecast the effect of the VCR on television viewership (see Veraska, 1980, p. S-1). Here, the emergence of the VCR is compared to that of audio cassettes:

> the cassette market was limited demographically to the younger audience . . .. Second, radio broadcasters quickly diversified their program formats to accommodate the expanded musical awareness of their listeners. . . . These circumstances . . . prevented any dramatic shift of the radio audience. I don't think you can translate this phenomenon to the VCR business because the potential

> audience affected will be far broader than the relatively narrow demographic touched by the audio cassette technology. ("The coming television," 1979, p. 160)

In this case, *differences* in the characteristics of two media technologies are analyzed in order to reach an accurate conclusion.

The advertising industry's record for accuracy is tarnished somewhat when it comes to predictions about the VCR's effect on television advertising. These forecasts demonstrate once again the importance of accounting for social as well as technological factors when making predictions. Forecasters within the advertising industry who failed to do this predicted that the diffusion of the VCR would result in a boon for videocassette advertising ("Advertisers should," 1984, p. 4; Gage, 1981, p. S-8; Marich, 1980, p. 68; Miller, 1980, p. 63; Papazian, 1986, p. 103; "What's its future," 1980, p. 75). These forecasts are well-characterized by this statement about videodiscs: "The implications of the videodisc to the direct marketing industry are breathtaking. There is little question, if we do our jobs right, that it will mean another $500 million to $1 billion dollars in mail order sales annually" ("What's it's future," 1980, pp. 75, 104). Other than the occasional commercial on pre-recorded tapes, cassette advertising has not blossomed as predicted. This time the inaccuracy can be attributed to a focus on the capabilities of the technology and a failure to take into

consideration the audience and the question of whether viewers would be receptive to receiving and viewing advertisements via videotape. The inaccuracy of these forecasts is not surprising, given not only that they were not properly grounded in forecasting theory, but that these are probably again instances of an industry attempting to promote its best interests in the trade press through the use of technology forecasts.

In sum, an analysis of the advertising trade press indicates that it was generally more active and more accurate in forecasting the impact of the VCR, reflecting the greater activity and interest on the part of the advertising industry. However, like the broadcasting trade press, the advertising trade press proved less accurate when it came time to forecast the *direct* effect the new technology would have on their industry. Forecaster biases and the use of the trade press to disseminate self-serving forecasts are possible explanations for this phenomenon.

Academic Forecasts

Academic forecasts on the subject proved more accurate than those found in either the broadcasting or the advertising trade press. As early as the mid 1960s, communication theorists foresaw the rise of specialized media and the decline of mass media (Maisel, 1973). In 1973, we see perhaps the most thorough and insightful forecast of the future of the VCR in a Journal of Broadcasting article by Cliff Christians (1973). Through an

analysis of social and technological factors, as well historical analogies to older media technologies, he concluded that "Home video systems are traveling the same path as earlier mass media and they will end up in much the same economic and social mold as contemporary broadcasting . . . even when a home video system reaches its potential, it will only be one more element in America's mass media system" (p. 224). Christians goes on to say, "When seen in terms of the cultural, social, economic, and political forces that have shaped our media, video systems take on a rather different interpretation than the 'revolutionary' role originally assigned" (p. 231). Christians does an excellent job of predicting the eventual role of the VCR, which has affected but not supplanted any other media and has not radically altered our media use habits.

He also went on to critique the forecasts offered at the time of the VCR's development, arguing that:

> Most analyses of video systems have erred because they are built from very narrow frames of reference. Nearly all assessments have focused on one aspect--hardware or software, some technological feature, the standardization issue, home or commercial markets, domestic or foreign producers. The apocalyptic generalities have resulted from superficial reductionism rather than the interrelating of all the complex factors that constitute any communications system. (p. 231)

Here we see an insightful understanding and application of forecasting theory that perfectly describes the fundamental flaws of many of the inaccurate forecasts discussed here.

Rothe, Harvey, and Michael (1982) also demonstrated a thorough and well-rounded forecasting approach, citing technological innovations such as the semiconductor chip used in programmable VCRs; market factors such as investor interest; and consumer factors such as viewer satisfaction with broadcast television all combining to fragment the broadcast viewing audience (p. 57). In a later piece, Harvey and Rothe (1985/86) offered more specific forecasts, accurately predicting the development of the infomercial and an increase in product placement in entertainment programming (Wasko, et al., 1993) to follow in the wake of the VCR's diffusion. Agostino (1980) utilized an analysis of the behavior of early VCR adopters to predict public broadcasting's loss of viewership to other outlets (such as VCRs and cable) targeting the same audience segment (for an economic model of this phenomenon, see Owen & Wildman, 1992, p. 143). Hartley and Moore (1981) predicted a decrease in the viewing and effectiveness of television advertisements. Research in this area is plentiful, much of it confirming that VCRs indeed promote "zapping" and reduce commercial viewership and effectiveness (Harvey & Rothe, 1986; Yorke & Kitchen, 1985; Zufryden, Pedrick, & Sankaralingam, 1993).

Though relatively few in number, the academic forecasts

regarding the VCR's effect on broadcasting were more consistently accurate than the forecasts found in either the broadcasting or advertising trade press. We can attribute this accuracy to two factors. First, we see in some of these forecasts a clearly defined integration of both technological and social determinism. Second, given the more objective position from which academics approached this subject, it seems possible that an absence of institutional biases contributed to the more accurate conclusions of these forecasts.

Conclusion

The conclusions drawn in this paper are useful from both a theoretical and a historical perspective. On a theoretical level, the forecasts analyzed here support the existing theory of media technology forecasting, demonstrating the importance of integrating an analysis of the technology with an analysis of the social determinants affecting the potential use of the technology. Repeatedly, VCR forecasts that appeared grounded only in an analysis of the technology's capabilities or only in consumer research were inaccurate. Forecasts that effectively integrated technological determinism and social determinism generally provided much more accurate predictions.

On a historical level, the data indicate distinct differences in how various institutions performed their role as technology forecaster. The broadcasting trade press paid little attention to the VCR; when it did, it was consistently

inaccurate, often simply repeating the inaccurate forecasts of the networks. Whether this inaccuracy reflected genuine misinformation, unconscious biases within the forecasting methodology, or efforts to use the trade press as a public relations tool is a question that has not been definitively answered here. Future research needs to determine the extent to which the forecasts in the trade press accurately represented the true positions of the broadcasting industry. However, evidence discussed here points to forecasting methods that were often theoretically unsound, lending support to Auletta's (1992) characterization of the networks as the "Three Blind Mice." The broadcasting trade press dutifully relayed this ignorance.

In contrast, the advertising industry and its trade press actively investigated all aspects of this new technology and its possible uses and impacts, often reaching very accurate conclusions. However, the pitfalls that befell the broadcast trade press also befell the advertising trade press when it came time to forecast the VCR's future as an ad medium. Again we can conclude that institutional biases led to theoretically unsound forecasting approaches or that the forecasts were primarily promotional in nature.

Finally, the best record for accuracy was found within academic publications. We can attribute this accuracy to a lack of institutional biases affecting academic forecasters, as well as to a greater likelihood on the part of academics to account

for both technological and social factors. As Linstone (1975) says, "the specialist is not necessarily the best forecaster. He focuses on a subsystem and frequently takes no account of the larger system" (p. 581). Academics appeared less likely to exhibit such myopia.

These points lead to one general conclusion--that the relationship between the forecaster and the technology in question is potentially an effective predictor of the accuracy of the forecast. The extent to which the forecaster is a part of the "subsystem" under analysis appears to affect forecasting accuracy, indicating that institutional biases can either consciously or unconsciously affect forecasting outcomes. For designers of Delphi-type studies, this finding highlights the need for a diversity of participants in the forecasting process.

According to Carey and Moss (1985), "the market development of many new services has been characterized by excessive hyperbole and false expectations. . . . if corporate strategists begin to believe the hyperbole . . . bad planning may follow" (p. 158). Klopfenstein found evidence of such hyperbole in his analysis of formal government and industry VCR forecasts (1989b). Yet the findings here also demonstrate the flip side of this situation, as excessive pessimism may result from a conscious or unconscious need to protect institutional interests. Both extremes underscore the caution with which one should approach trade press forecasts of new media technologies. This situation

also raises the question of the role and function of trade publications. Are they simply passive outlets for industry members to disseminate information that best serves their interests or are they sources of informed and objective analysis? The material analyzed here points to a position somewhere in between, though future research should attempt to clarify this issue. Particularly useful in this regard would be an analysis of trade press sourcing patterns.

In sum, for those evaluating technology forecasts it is essential to consider both the relationship of the forecaster to the forecast in question and the principles of technology forecasting. Keeping these factors in mind should lead to an improved ability to assess the accuracy of contemporary technology forecasts as we evaluate the current avalanche of predictions about the impending Information Superhighway's effects on the American media system. These conclusions should also aid in the design and implementation of technology forecasts, since understanding past mistakes can help us avoid repeating them.

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