Chapter 5

THE FLOW OF COMMUNICATIONS INTO THE HOME

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CONSIDER THE MILLION YEARS of human presence on the earth. For the first 900,000 years, the period in which our basic physiology and mental capacity came to take its current form, the typical human experienced only an occasional grunt or gesture in a normal day. It was not until 100,000 years ago that primitive speech began to take form. At this point, the mind was required to store and process an occasional utterance or perhaps a brief narrative story or two in an average day. At about 3500 B.C. writing was invented. Now ideas and events could be captured fully and passed on to succeeding generations.

If human existence on earth were compressed into 24 hours, the emergence of writing would come at 8 minutes before midnight, Gutenberg's popularization of movable type and mass printing at 46 seconds before midnight, and finally the telephone, radio, and television all within 8 seconds of midnight. Given that speech and writing are such recent inventions, it would seem that the human mind would be working at close to capacity in processing the information from conversations with friends and family members and an occasional few paragraphs of text. How could it be possible to process the barrage of images and language brought to us by high-speed printing and the electronic media? The television set throws forth 3,600 images a minute per channel. Radio on average generates just under 100 words per minute, totaling between 3,000 and 5,000 words broadcast by

radio each minute of each day in the typical market. The average daily newspaper contains 150,000 words and several thousand graphic images. Magazines and books add to the flow of information on a similar scale. In historical perspective, it is clearly an information explosion. Is there evidence that the audience is stunned and numbed by information overload?

Psychological experiments show that in some circumstances high demand for information processing can induce tension and anxiety. Military studies indicate that information overload sustained at extreme levels over long periods of time can induce a psychological passivity and a withdrawal syndrome. Other studies of problem-solving exercises demonstrate that the human mind has a functional limit of about seven factors that it can process simultaneously. There are indeed clear and distinct limits to human information-processing capacity.

But we believe that research on experimentally induced information overload is an inappropriate model for understanding the flow of communications into the home. Military and industrial psychologists have, quite appropriately, studied stress on air traffic controllers, battlefield commanders, and business executives. These working professionals are under constant pressure to evaluate multiple streams of information and make critical decisions, bearing at times on matters of life and death. Educational psychologists study how pressures on achievement-oriented students can lead to debilitating test anxiety. But such environments are profoundly dissimilar to the casual monitoring of communications that characterizes mass media exposure in the home.

How well do our primitive and feeble brains respond to the greatly expanded flow of mass communications? They do quite well, thank you. The human psyche is remarkably adaptive and resilient. Media audiences have developed considerable skill in organizing, filtering, and skimming information and maintaining a partial attentiveness to the flow of broadcast and print information. Most people do not feel bombarded or overloaded by the expanded array of available mass media. On the contrary, for the most part they seek out more media exposure and respond enthusiastically to the expanded choices available. People *choose* to turn on the radio for several hours and the television set for two to four hours each day. In the United States, 97% of cars are equipped with radios because the market demands it. People routinely listen to radio and increasingly to television in the kitchen as meals are prepared and consumed. Clock radios are likely to be the first thing heard in the morning, Johnny Carson the last

thing heard before a weary viewer drifts off to sleep. This is, indeed, voluntary behavior, surely a puzzling phenomenon to those who equate exposure to the mass media as a form of Chinese water torture.

If a crudely formulated hypothesis of psychological information overload represents more myth than reality in the free-choice situation of mass media exposure, how are we to interpret and understand the very real growth of information flow into the home? We have been working on an alternative formulation. We call it the Equilibrium Model.

The premise of the model is that there are indeed finite limits to individual information-processing capacity and appetite for media exposure. We posit that the central equilibrium of media exposure is a decline in attentiveness to each medium as the number of media to which one is exposed goes up.

This equilibrium can be seen at both individual and aggregate levels. At the individual level, in a household where the television is on 10 hours a day, the average attentiveness per unit time is likely to be lower than in the household in which it is on only 2 hours a day. In the former case, the TV set is often used as a secondary activity while other activities such as cooking, cleaning, and talking are taking place in the room. In the latter case, TV viewing is, for the most part, a primary, single-attention activity of prime-time viewing. Or, also at the individual level, one might expect the amount of time spent with a given magazine to be greater in a household subscribing to two to four magazines compared to a household subscribing to over a dozen.

At the aggregate level we note that since the full penetration into the American home of television in the early 1960s, there has been a slow but steady rise in exposure levels from five to seven hours of viewing time per household per day. But a closer analysis of the data reveals that most of this growth represents expanded viewing at the fringe times (early morning, early evening, late evening), not in the high-attentiveness prime-time viewing period.

Figure 5.1 outlines the basic dynamics of the Equilibrium Model. A central premise is the concept of a continuum of media attentiveness. Ordinarily, we tend to think of media exposure as dichotomous—either one has read a book or not, either one has seen a television program or not. And this dichotomous notion of media exposure has become an accepted convention measuring audience size in the communications industry. Advertisers, producers, and audiences alike have become comfortable with the traditional measures of circulation, box office, and Nielsen ratings. But as numerous more detailed research studies uniformly document, there is in reality a continuous

sliding scale of attentiveness. Some print media are read carefully from cover to cover, some partially read, some skimmed, in some cases just picture captions are read, and frequently periodicals are never even opened. There are, of course, parallel continua for attentiveness in radio, television, and other media.

The analysis that follows is based on a model of countervailing pressures for attention and time, and the corresponding competition for a share of the individual's limited entertainment/information budget. The data allow us to document some intriguing trade-offs among competing media over the last two decades and we hope for some informed projections into the future.

AN OVERVIEW OF THE COMMUNICATIONS FLOW FINDINGS

We have compiled data on trends in the circulation and use of the mass media and a number of point-to-point media in the United States for the period 1960 to 1980.[1] We tracked the amount of information supplied, the amount consumed, and corresponding cost data. The basic unit of measurement is the number of words transmitted and actually received in the home through each medium each year.

The data here provide a plentiful resource for those concerned about "information overload." The average American, by our estimates, is exposed to 61,556 words from the mass media each day. Most of that (87%) comes from radio and television. That works out to just under 4,000 words per waking hour, about 60 words per waking minute per person per day. This represents a growth of 151% from 1960 to 1980.

The critical issue for the Equilibrium Model is the comparison of supply and consumption. Yes, indeed, media consumption has grown, but the supply has grown considerably faster. In 1960, the mass media supplied about 3 million words per capita per day. Our measure of supply simply includes all of the unwatched available channels and unread newspapers, magazines, and books delivered to the home.[2] By 1980, words supplied had grown to almost 11 million, a growth of 367%!

The modesty of growth in consumption compared with supply for this period attests to the steepening gradient of resistance to new media. Each item of information produced faces a more competitive market and, on average, a smaller and less attentive audience. The ratio of words consumed to words supplied by 1980 had fallen to less

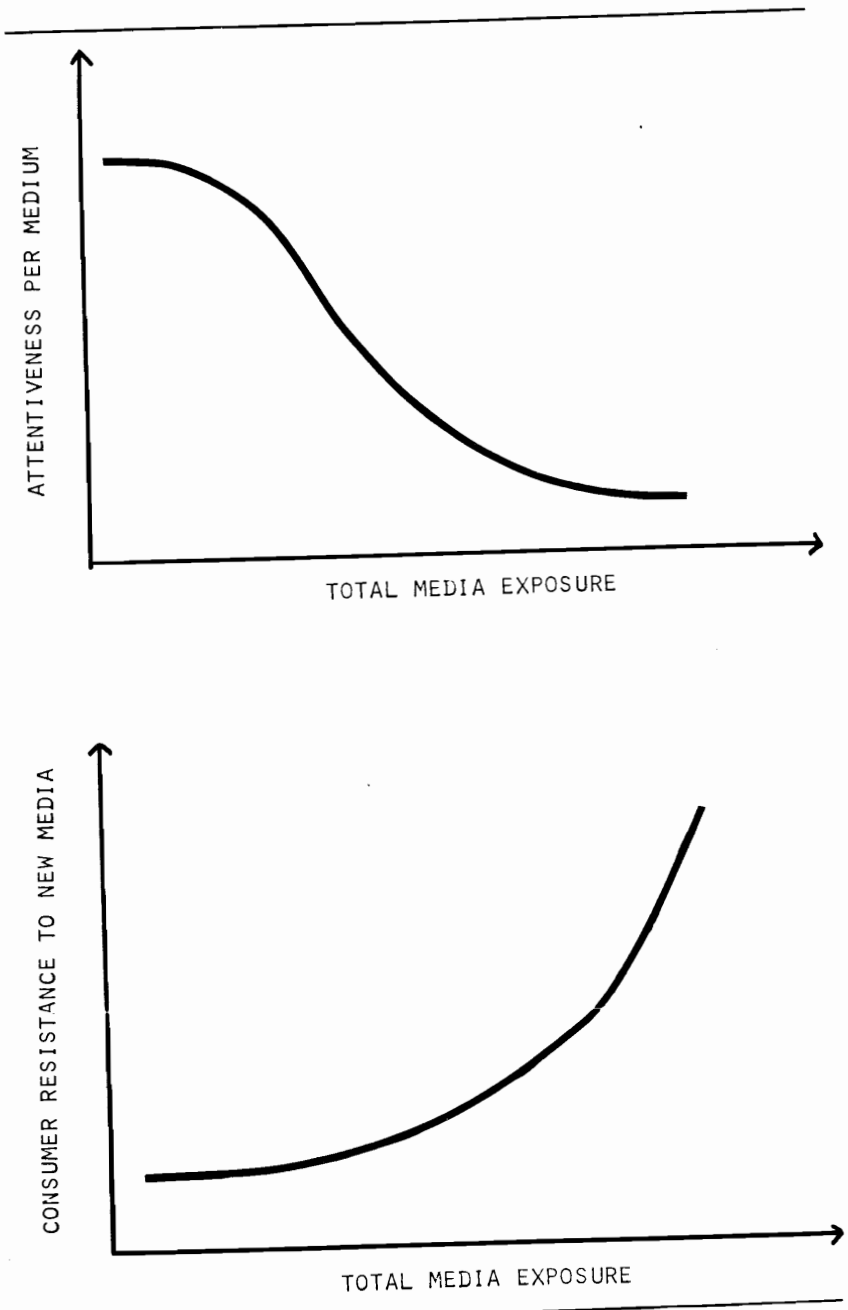

Figure 5.1 The Equilibrium Model: Theoretically Derived Curves

than half the level in 1960. The ratio has fallen in each of the mass media we have studied.

By 1960, television had reached near universal penetration of American homes and was already an undisputedly dominant force in advertising economics and in share of the average American's leisure time. The radio and motion pictures industries had already completed fundamental adjustment to the competition of television during the 1950s. Thus, the only "new" industry through this period was the belated discovery of the market for cable and pay television in urban and suburban markets in the 1970s. For the most part, then, these figures represent the steady state battle of attrition and growth of the major mass media in the United States.

The pattern of winners and losers is quite clear. The electronic media have been gaining and this gain has been achieved at the expense of the print media, especially newspapers. The pattern of media exposure is not directly reflected in the profitability of the various media, especially advertising-supported media, through this period. The newspaper industry, for example, in competition with other media for advertising support over the past two decades has done very well. But in time, these patterns of use are likely to affect industry economics in this decade, especially with the introduction of videotex, teletext, and a variety of new home video media. Figure 5.2 summarizes these basic findings.

In the next section we will describe our methodology for deriving these estimates of communication flow into the home. The following section will review the data in detail for two exemplary media, television and cable.

METHODS OF MEASUREMENT

The methodology that allows us to make such estimates was first developed at the Ministry of Post and Telecommunications in Japan.[3] The key decision was to translate all flows of information into units of words.[4] This required ascertainment of the typical word rate for each medium. An important distinction, as we have noted, was made between words supplied and words consumed. Our definition of a word supplied is that it is available at people's homes so that all they would have to do to hear or read it would be to choose to do so, at most turning a switch or opening to a particular page. Thus, the number of words supplied by television would grow not only if broadcasters broadcast more words, but also if the number of receivable stations

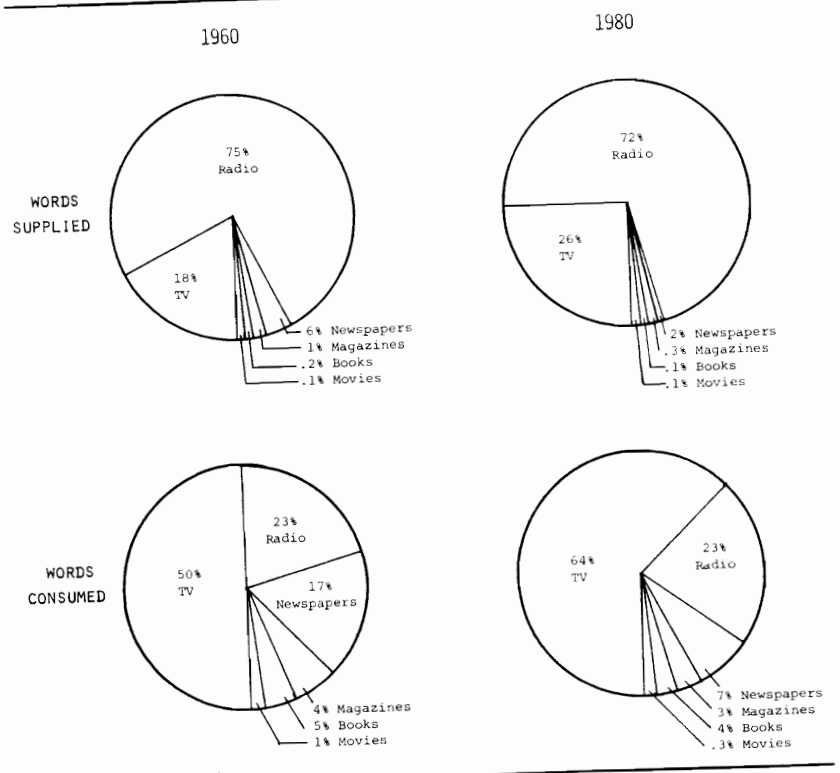

Figure 5.2 Overview of Communication Flows

increased (for example by cable importing additional signals) so that the listener had more alternatives at hand, or if second sets came into the home so different members of the family could choose different stations at once. The data from which the supply time series were calculated were thus primarily data on the activity of information industries, and did not take account of the behavior of the audience members in choosing what to attend to.

On the other hand, words consumed are those that the members of the population actually heard or read. The basic data from which such estimates are derived are behavioral surveys, such as time-budget studies. Such data are generally collected by particular media industries in audience studies and present some problems of comparability. No doubt, many of the statements we now make will have to be revised in the light of new, fuller, and better-adapted time series and behavioral measures. The present results share many of the infir-

mities of any work with index numbers, particularly new and unexercised ones. The measures are derived by secondary analysis of data collected for other purposes, and not always consistently. Nor are all data reported annually, so some interpolations and extrapolations had to be used.

In general, users of the data reported here, as of any index number, should give more credence to trends than to comparisons across different situations. Many operational decisions go into the construction of any index number, and these apply differently in different situations. Thus, comparing specific production or consumption indexes across media at one point in time is likely to be less valid than comparing rates of growth or decline across time. These data are appropriate for the broader questions of the overall environments, media tradeoffs, and growth gradients, but not for more focused questions, such as the advertising efficiencies of alternative advertising media.

An important omission for an understanding of the full character of communication flow was interpersonal conversation. Unfortunately, we are unaware of any appropriate data. Another is the level of communications flow in various work settings, especially from internal memoranda and reports.[5] The available data do include media exposure at work, such as reading the newspaper on a coffee break, but not internally generated, work-related communication.

Table 5.1 summarizes the formulae and data sources used for computing communications flow for each of the major mass media. Recall that we defined *words supplied* as "made available in the home." All the person need do is turn on a set and select a channel, or select a print medium to read. Accordingly, the basic formula for computing words supplied for broadcasting is the number of broadcasting stations receivable by the average listener times the number of minutes broadcast per day times the number of receiving sets per capita times the word rate per minute. The growth in television broadcasting over the last two decades reflects growth on each of these variables except word rate. The expansion of FM broadcasting and the multiplication of the number of radios in the home resulted in a similar growth pattern for radio. Both the television spectrum (VHF and UHF) and the radio broadcast spectrum (AM and FM) are now at the saturation point in the larger and middle-sized market areas. Further growth is still possible, however, because of cable and new technological developments that allow for more efficient use of existing spectrum, such as Low Power Television (LPTV) in television and Subcarrier Digital Transmission (SCA, teletext) in radio and television and higher frequency broadcasting, such as the FCC's new allocations for Multichannel-MDS and Direct Broadcast Satellites.

TABLE 5.1
Estimating Communications Flow

Medium	*Words Supplied*				*Words Consumed*	
Television/ cable	(6.62) Number of broadcasting stations per average market (1, 2)	(922) Number of minutes broadcast per station per day (3)	(1.45) Number of receiving sets per household (4)	(153) Words per minute (5)	(196) Minutes exposed per day (6, 11)	(153) Words per minute (5)
Radio	(16.9) Number of broadcasting stations per average market (3)	(992) Number of minutes broadcast per station per day (3)	(5) Number of receiving sets per household (4)	(60) Words per minute (5)	(162) Minutes exposed per day (6, 12)	(68) Words per minute (5)
Newspapers	(1.2) Circulation per household (1, 7)	(150,000) Words per issue (5)			(18.3) Minutes exposed per day (11)	(240) Average reading speed (13)
Books	(22.9) Books sales per household (8)	(100,000) Words per book (5)			(18.3) Minutes exposed per day (11)	(240) Average reading speed (13)
Magazines	(24.7) Circulation per household (9)	(45,000) Words per issue (5)			(6.4) Minutes exposed per day (11)	(240) Average reading speed (13)
Motion pictures	(18.5 Number of theatrical screens per average market (14)	(2.7) Showings screen (10)	(620) Seats per screen (1)	(135) Minutes per movie (10)	(2.5) Minutes exposed per day (14, 15)	(110) Words per minute (5)

SOURCES: (1) Sterling and Haight (1970); (2) Broadcasting/Cable Yearbook; (3) Standards Rates and Data Service; (4) Television Factbook; (5) MIT Research Program on Communications Policy: sampled estimates from *Boston Market* (Spring 1980) for broadcast media and movies, sampled and pooled estimates (1360, 1965, 1970, 1975) for print media; (6) A.C. Nielsen; (7) Ayer Director of Publications; (8) U.S. Bureau of the Census; (9) Magazine Publishers Association; (10) National Association of Theater Owners; (11) Robinson (1977, 1980), Szalai (1972); (12) Radio Advertising Bureau; (13) Sindborn Associates; (14) Motion Picture Association of America; (15) Predicasts, Inc.

The formulae for the print media is a simple function of the circulation per capita times the size of an average issue in words. So growth and decline in the supply of print media in this chapter will be a direct function of circulation and issue size.

The measures for theatrical motion picture supply are a bit more problematic. One element of noncomparability is that, by definition, theatrical motion pictures are not seen in the home. They are included here because they are an important element of leisure mass communication behavior. We selected a measure of supply based on the number of theatrical showings times the average number of seats per screen times the average number of words per movie. These calculations seemed to generate the most comparable ratios of supplied to consumed content. Movies, of course, ultimately represent an important component of network and pay television communication flow and contribute to those indices as well as theatrical exhibition. Home video, through both direct sales and rental of video recordings to the home, represents an increasingly important distribution channel but entails too small a share of aggregate viewing time up through 1980 to warrant inclusion in this time series.

The measures of consumption are all a simple function of average number of minutes of exposure per medium per day per person times rate of words per minute broadcast or read. We are very much at the mercy of the available data here. Because of the nature of broadcast advertising economics, A. C. Nielsen and the other broadcast research services provide detailed time-series exposure data. In print the basic audited measure is circulation rather than time exposed, so we have relied on academic time-budget studies and interpolated for yearly growth and decline estimates. The estimate for declining newspaper exposure is especially controversial and likely to be subject to further field research. There seems to be fairly extensive evidence that daily newspaper reading has declined, especially among the young, but the data are incomplete.

The sources for each element of the formulae for each of the media are listed in Table 5.1. Further detail can be found in de Sola Pool, Inose, Takasaki, and Hurwitz (1984).

ANALYSIS OF TELEVISION AND CABLE

Television is by far the dominant American mass medium. Even at the beginning of our time series in 1960, when television had been available for only a little more than a decade, it was already responsible for 50% of the communications flow consumed in the home. By

1980, that share of the communications flow had grown to 64%. These proportions are measured in words. The dominance of television would be even more overwhelming if the measure included graphic communication or was based on time spent with the media.

Figure 5.3 outlines the data for supply and consumption of television and cable programming. Supply in Figure 5.3 is indicated by the solid line and is measured against the metric on the vertical axis on the left-hand side of the figure. In the case of television, the metric is millions of words supplied per capita per day. Media consumption is indicated by the dashed line and is drawn against the metric on the right-hand vertical axis, in this case measured in thousands of words consumed per capita per day. The inclusion of both words supplied and words consumed on a single graph may be disconcerting at first because of the very different scales involved. The ratio of mass media words supplied to words consumed is, roughly speaking, about 100 to 1. That will be reflected (with a few exceptions) in the left-hand and right-hand scales in these figures. The advantage of this format, however, is that the graphs allow for a comparison of supply and consumption and illustrate in most cases the growing disjuncture between the two.

The supply of television grew a phenomenal 536% over this 20-year period. That works out to an annualized per capita growth rate of 8.8%. The growth rate in the first decade was actually somewhat faster, 9.4% compared to 7.4% for the most recent decade. The growth rate of television supply may well return to the 10% range in the 1980s, as a result of the steep growth curve for cable television, with its ability to multiply the number of available channels for subscribing households by a factor of from three to six.

The growth from 1960 to 1980 reflects a combination of factors, including the growth of both VHF and UHF broadcasting, the expansion of multiset households (approximately 50% of American households had multiple sets by 1980) and at the tail end of the curve, the expansion of cable television. Cable television occupies an increasingly large portion of viewer time and the trade-off between cable-delivered versus broadcast services will continue to be the subject of research in this vein. But in the present analysis of broad trends of communications flow, we combined cable and broadcast viewing into a single indicator, because cable-originated programming, including pay television, occupied only 2% of the communications flow by 1980.

Television viewing has also expanded dramatically in the last two decades. Total growth in viewing is 192% for an annualized growth rate of 3.3%. That rate holds steady for most of this period. But the

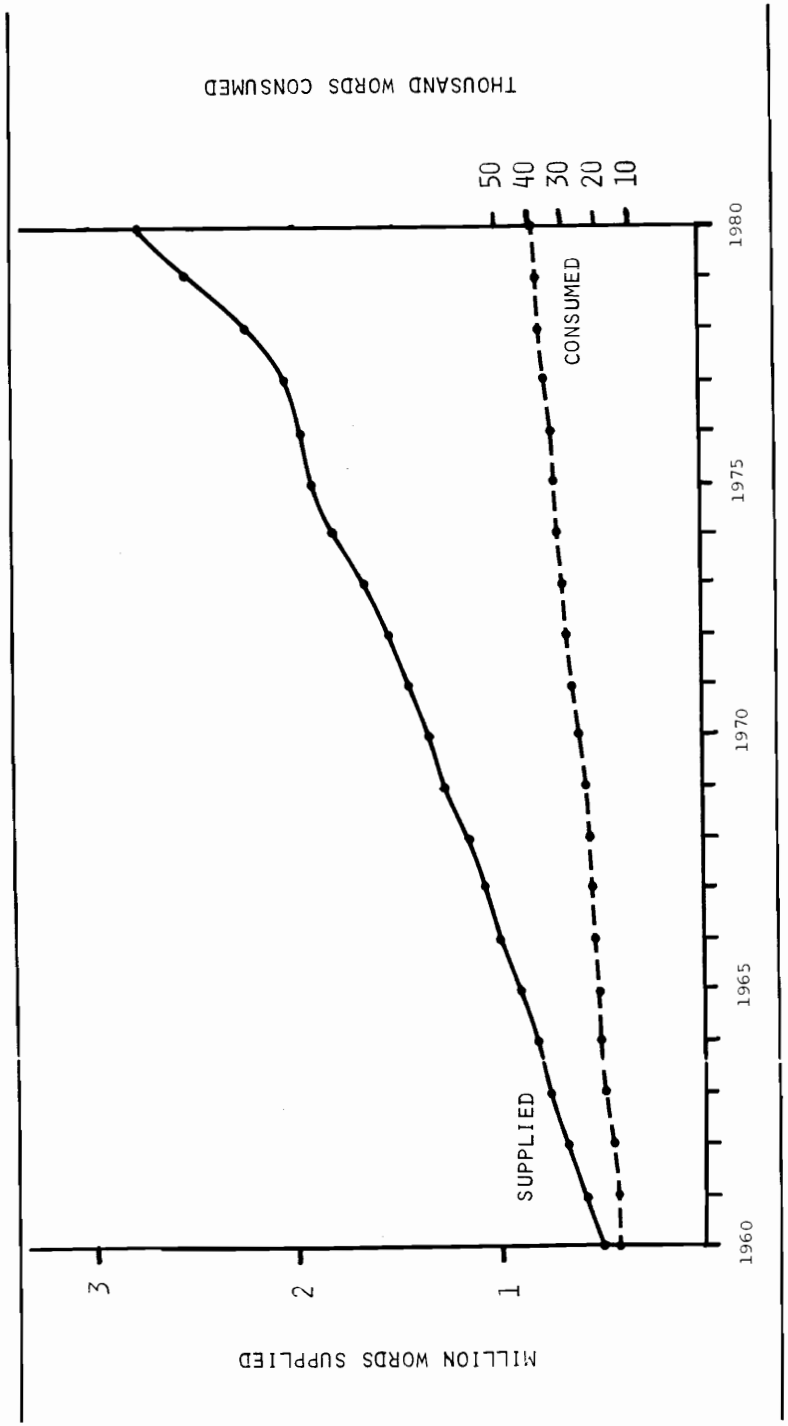

Figure 5.3 Television/Cable

decline of growth in consumption predicted by the Equilibrium Model does show up in the last two years, when the growth rate falls to 2.4% per year. The growth in time spent in front of the television set may well continue for a number of years, especially with the expansion of video games, home video, and videotex-type media. But television, narrowly defined as viewing over-the-air network broadcasting, will fall as a percentage of total media exposure.

CONCLUSION

In a related essay on the fragmentation of the mass audience, Neuman (1982) reported on the growth and decline of various media over the past century. The point was made that as new media emerge, the old ones adjust and specialize in various ways in order to survive. One of the most clear-cut examples of this is the competition between radio and television. In the 1930s and 1940s, situation comedy and adventure programming in prime time on radio dominated the attention of the American public. Families would gather in the living room and literally stare at the radio as Jack Benny and other national celebrities performed. That prime-time, high-attention function was taken over by television during the 1950s. People no longer sit around and stare at their radios. In fact, the great bulk of radio listening takes place while other activities are being undertaken. Indeed, it is hard to imagine an audience member simply sitting, listening to the radio. The special advantage of this music-oriented medium is its pleasant accompaniment to other activities.

This pattern of increasing inattentiveness and partial attentiveness is the hallmark of the Equilibrium Model. Radios are cheap and omnipresent. Because of low production costs, radio stations are in plentiful supply. But the persistence of radio against competition generates costs of a different sort—the lower attentiveness of audience members. Where once families gathered around their radios and hung on every word, the medium now provides background music and features "easy listening" and "fewer interruptions."

Because our measures of media exposure in the above graphs are simple units of time of exposure multiplied by word rates, we have, if anything, underestimated the increasing gaps between supply and consumption. Attentiveness per unit time is not independently measured. This is not accidental. In most cases, the data are collected by the industries themselves, which, for competitive reasons, prefer to measure exposure in ways that maximize their apparent audiences.

The expansion of television viewing in the last decade has been primarily at the margins, that is, early and late evening rather than prime time. Similar to radio, viewing in these time periods often accompanies other activities. Careful experimental research indicates that the viewer's eyes remain on the set only 65% of the time while the viewer is in the room. One-third of the time, viewers are engaged in other activities while viewing. These proportions are likely to increase. Some audience members, for example, use MTV, the rock music cable channel, as the functional equivalent of radio. It is simply turned on and left on as background music, with the audience member paying attention only when a particular favorite comes on, much as they would turn up the radio for a favorite song.

Are people reading less of the magazines they subscribe to? Probably. But the data available thus far are frustratingly incomplete. The success of the *People* magazine format in which much of the readership restricts itself to skimming by reading picture captions, may well become increasingly dominant. The picture of the gentleman in the smoking jacket attentively reading his magazine in his study is more a phenomenon of the advertising trade press than of American media behavior.

In the final reckoning, motion pictures and books will be directly determined by market demand. If people have less available time they will buy fewer books and go to the movies less often. In the case of newspapers, magazines, radio, and television—the less expensive habitual media—the economic basis is different. They are advertiser supported.

Here the critical element will be the ability of research to relate audience attentiveness to advertising effectiveness. With the established media somewhat insecure about their place in the electronic future, each industry will for a time stick close to its traditional estimates of audience size, calculated in circulation and units of time. Each will keep its measures of advertising effectiveness and advertising efficiency basically incomparable with other media, again for fear of possible competitive disadvantage. The motion picture industry will continue to measure its progress in box office dollars rather than admissions, so that rising ticket prices can mask dips in attendance. The television networks will increasingly promote themselves in terms of audience size rather than audience share per unit time to downplay the inroads of independent broadcasters, cable, and pay cable. Even the advertising industry, with its strong ties to existing media, will be cautious about proposing any new metrics of media exposure.

But we predict that ultimately three factors will coalesce to force change in media audience measurement. The first is the fact that we

are getting close to the inflection point on the equilibrium curve. The reservoir of available time and reduction of attentiveness that has allowed expansion of mass media thus far is near exhaustion. The growth of new media will increasingly lead to a direct and proportionate loss of audience for existing media.

The second factor is that because of the increasing prevalence of electronic delivery and display, what once were perceived by producers and audience members alike as unique media become competing media.

The third factor is that electronic forms of audience measurement will also grow. Nielsen's metered sample will ultimately monitor videodisc, videotape, videotex, teletext, and video games as well as television.

It remains to be seen whether coordinated cross-media audience measurement will emerge before the technology forces the issue. Furthermore, and perhaps more important, it remains to be seen whether an independent measure of audience attention will become an industry standard. Television Audience Assessment in Boston is perfecting a diary/questionnaire approach. Roger Percy in Seattle, as well as both Arbitron and Nielsen, has experimented with mixed electronic and questionnaire methodologies. Burke Marketing in Cincinnati has developed an approach based on day-after recall of commercial messages. None has tried to apply its techniques to multiple media.

The Equilibrium Model leads to a prediction that ultimately a shakeout will occur across the mass media. It may emerge gradually or as a sudden economic crisis. Our candidate for the leading indicator of a crisis in media economics would be a weakness in demand in the next few years for network television advertising as the spring advertising season opens. Television is the dominant medium and its advertising is aggressively priced. It is a likely bellwether. We feel that if research on communications flow and audience attentiveness is well publicized and the major players encourage intermedia competition now, rather than put it off, the corresponding economic adjustments will be more gradual and less likely to lead to a shakeout crisis.

We began this chapter with a critique of psychologistic interpretations of information overload. Does it make sense to argue that the increasing flow of mass-mediated communication will leave the unsuspecting audience member stunned and numb? After reviewing the research, we concluded that because of the way media are casually monitored in the home setting it is indeed an unlikely result. Then we took a long hard look at the increasing ratio of media supply to consumption. Our final conclusion is that if there are to be victims of com-

munications explosion they are more likely to be found within the media industries rather than within the audience.

NOTES

1. This analysis is drawn from the data collected by the Communications Flow Census Project directed by Ithiel de Sola Pool with support from the Markle Foundation. Research associates on the project include Sophia Wong, G. Richard Fryling, Roger Hurwitz, and Gavan Duffy. The initial report from this project was published by Professor Pool under the title "Tracking the Flow of Information" in the August 12, 1983, volume of *Science.* The full report, *Communications Flows: A Census in the United States and Japan,* includes complete data tables and extensive comparisons to parallel Japanese data and has been published by Tokyo University Press, and in the United States by North Holland Press. This particular report is part of a series from the Future of the Mass Audience Project for which W. Russell Neuman is principal investigator.

2. We will use the phrase "delivered to the home" or some variant throughout this report as an informal descriptor of leisure-time mass-communications behavior. It is true, of course, that people listen a great deal to radio in the car, watch television at a neighbor's home, and read a newspaper on the train or on a coffee break at work. We will simply include these behaviors (insofar as current data collection techniques permit) within our definition of leisure media exposure "in the home."

3. See Tomita (1975). The Japanese study was done under the direction of Professor Hiroshi Inose of Tokyo University and Mr. Nozomu Takasaki of the Research Institute of Telecommunications and Economics.

4. The Japanese attempted to include measures of the flow of graphic communication as well as words, and used the concept of the information bit derived from classic communication theory as the central metric. Television versus magazines, radio versus books, confronts us with a classic issue of apples and oranges. Each uses a very different mix of graphic, textual, and audio communication and no single metric could possibly do justice to each. The unit of the word was selected by the MIT research team as the optimal first cut at comparative measurement. We have not included estimates of graphic communication in these data.

5. We are, however, currently analyzing new sources of time-series data on informative flow in the office setting and hope ultimately to integrate those findings into the current data set.