The Continued Growth of Text Information: From an Analysis of Information Flow Censuses Taken during the Past Twenty Years

by Tetsu AKIYAMA*

Introduction

It has long been said that the dependence on written text is declining. In Japan, this tendency has been expressed as *moji-banare* (detachment from written text)[1], *katsuji-banare* (detachment from written characters), *dokusho-banare* (detachment from reading) [2], or *shinbun-banare* (detachment from newspapers)[3]. It has been pointed out that this tendency is more marked among the younger generations. Competition from television[4], video, comic books[5] and magazines, and the changes in lifestyle in general[6] have been cited as possible causes for this alleged decline in the use of text information. The consecutive decline during the past five years in the domestic sales of publications in Japan indicates that this trend is becoming even more pronounced.

I wonder, however, if this alleged decline in the use of text information is true. It certainly seems true if you think only of books, magazines and newspapers. We should be reminded, however, that the bulk of information that people exchange by e-mail and over the Internet is also text information. In other words, while the use of text information in published form is declining, that in the electronic form is increasing.

The purpose of this study is to determine quantitatively the usage of text information carried by all the different kinds of communication media. The source of the data used for this analysis is the Information Flow Census, which has been published annually by the Japanese Ministry of General Affairs (formally Ministry of Posts and Telecommunications) for more than twenty-five years. By analyzing the Information Flow Census data, I have been able to trace the changes in the flow volumes of text, video, and voice information over time. Contrary to what is generally believed, it was found that the use of text information has been growing faster and more steadily than the other two types of information.

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Analysis of the Information Flow Census

Structure of the Information Flow Census

The Information Flow Census (hereafter IFC) by the Japanese government[7] is unique and unparalleled any where in the world in that it applies a common criterion to measure the volume of information carried by all kinds of communication media. Although the survey officially started in 1975, census data are available from as early as 1970 (hereafter, years are all fiscal years, unless otherwise defined). The measurement method was drastically revised in 1980. Therefore, this study uses the data since 1980 in order to ensure consistency.

Virtually all types of information flows, including written and spoken languages, music, and still and video images, are measured in the IFC. It not only covers information carried by mass media and telecommunications but also information transmitted in conferences, education, and by word of mouth.

The IFC has adopted the "word" as its proprietary unit for measuring the volume of information flows. The assumption of the IFC is that the amount of any information flow should be measurable using a conversion ratio assigned to each particular form of information. For example, in the case of spoken language, one minute of speech is calculated as 71 words. In the case of music, the same one minute is calculated as 120 words. One minute of watching color TV means the consumption of 672 words of information[8].

The most peculiar but controversial characteristic of this measurement method is the conversion of information into the single unit of the "word". Conversion rates are definitely arguable. Therefore, it would be inappropriate to compare the volumes of information flows across different kinds of media. This problem, however, is less serious and may be ignored in the longitudinal analysis of the information flows in the same media or comparisons of longitudinal trends of different media. In fact, for this reason, the IFC data accumulated over several decades have become a precious asset for longitudinal analyses including comparisons and correlation analyses among different media.

The IFC categorizes information measured in "words" into the following five types: "original information", "transmitted information", "available information", "consumable information", and "consumed information". For the purpose of this research, which is to analyze how much information is actually utilized, it is desirable to look at the consumption side of information flows[9].

Amongst the five categories just mentioned, there are three categories that measure consumption of information. Let us see exactly how each of them operate, taking television programs as an example. First, the "available information" refers to all the TV programs on all the channels one can receive. This means everything in the timetable of TV programs in each reception area. Needless to say, however, it is impossible to watch all the programs on different

channels simultaneously. Second, the "consumable information" in the case of television refers to TV programs of one channel (per one TV set). Third, "consumed information" refers to the programs actually watched. This study uses this third category. For books, newspapers, and magazines, the volume of consumed information is measured based on average time spent on reading such text information, which is available from the nation-wide time budget surveys conducted by the NHK (Japan Broadcasting Corporation) every five years.

The Flow Volume of Text, Image, Voice, and Data Information

As mentioned before, all forms of information flows including text, image and voice are measured by the standard unit of the "word". It is practically impossible to separate the flow volumes of text information (hereafter, the "flow volume of information" refers to the amount of information consumed unless otherwise mentioned) from those of non-text information such as still pictures, films, videos, and music within each medium. To give an example, newspapers and magazines have photographs, illustrations and other still image information in addition to text information. All the items of non-text information are measured separately, but they are aggregated with text information in the final census data. It is practically impossible to extract the amount of photograph information in newspapers and subtract it from the total amount of newspaper information. Therefore, it is impossible to discuss the relationship between cartoons and texts[10] in magazines, which is an important aspect of the hypothesis that people's exposure to text has been declining (*moji-banare* or detachment from written text).

Finally, we decided to approximate the flow volume of text information across different media by the sum of information flows of the media in which text accounts for the predominantly largest share. A list of these "text media" is shown in Table 1. Similarly, the flow volumes of image, voice, and data information are approximated by the amounts of information flows of the media in which these forms are predominant. These "image media", "voice media", and "data media", are listed in Table 2. Rigorousness may have been lost to some degree as a result of this arrangement, but there is no reason to doubt that the final results, or the general trends of text, image, voice, and data information have become seriously inaccurate.

Table 1. Trends of Text Information Consumption

	1980	1985	1990	1995	1996	1997	1998	1999	99/80
PC communication	0	0.0237	1.06	5.06	7.85	7.72	8.63	9.38	(1.85)
Internet	0	0	0	0.0886	0.258	0.451	0.632	0.999	(11.28)
FM text multiplex	0	0	0	0.0685	0.117	0.198	0.274	0.271	(3.96)
Letters & Postcards	2.017	2.549	3.624	4.049	4.142	4.291	4.331	4.344	2.15
Handwritten documents.	2.37	2.87	3.17	3.15	3.15	3.09	3.11	3.06	1.29
Processor documents	0.00993	4.44	9.65	6.62	4.53	4.79	3.78	2.46	247.73
Computer documents	10.3	16.7	42.7	41.1	39.1	38.3	37.0	36.7	3.56
PC documents	0	0.433	3.33	23.3	42.7	57.0	69.0	74.5	(3.20)
Copied documents	38.0	59.2	146	208	238	258	268	277	7.29
Newspapers	117	125	132	137	137	138	139	140	1.20
Magazines	36.9	41.4	49.1	50.2	51.1	50.8	50.1	48.9	1.33
Books	57.8	57.2	56.9	52.4	52.1	50.9	49.2	47.6	0.82
Libraries	10.5	14.3	17.0	23.2	23.5	24.9	26.9	28.8	2.74
Other written language.	0.0313	0.0278	0.0766	0.3497	0.4034	0.4444	0.4722	0.4977	15.90
Total /Written language.	275	324	465	555	604	639	660	675	2.45
Total/Facsimile information	0.0071	0.0590	9.1	18.7	23.7	29.6	35.4	44.4	(2.37)
Total /Text information	275	324	474	574	628	669	695	719	2.61

Unit: 1 trillion WORDs

Notes:
1. The last 99/80 column indicates the growth multiple between 1980 and 1999. The figures in parentheses indicate those between 1995 and 1999.
2. Newspapers and magazines include both text information and image information, such as photographs.

Text Information and Change in its Flow Volume

Table 1 shows the trend of text information flows during the twenty-year period from 1980 through 1999. This table clearly shows how each medium has evolved over the years. In 1999, the amount of newspaper text information was 140 trillion Ws (W stands for “word”). Magazines had 48.9 trillion Ws, and books had 47.6 trillion Ws. Between 1980 and 1999, text information flows in newspapers, magazines, and books grew by 1.2, 1.33, and 0.82 times, respectively. During this twenty-year period, the amount of newspaper text information increased slightly, whereas that of books consistently decreased. Growth of magazines stopped in 1996 and then began to decline. These trends coincide with an overall slump in the publishing business. However, if we include publications borrowed from libraries, the total growth rate of books and magazins reaches 1.19, which is on a par with that of newspapers. Sluggish sales of books and magazines have often been mentioned as evidence of the “detachment from reading”. This, however, is not necessarily true if we include books and magazins borrowed from libraries.

Letters and postcards increased by 2.15 times and other personal documents by 1.29 times during the same period. In contrast to the conventional media

such as books and magazines, the use of these emerging text media is on the rise. The most remarkable text area is that of copied documents. The amount of information flow by copied documents is 277 trillion Ws, exceeding the total information flow volume of newspapers, magazines, books, and libraries combined. The use of copied documents grew by 7.29 times during the same twenty years, bringing about the era of the so-called "copy culture".

PC documents (documents produced by personal computers) are also increasing. During the five years between 1995 and 1999 alone, the amount of PC documents increased by 3.2 times. The amount of information flow by PC documents was 74.5 trillion Ws in 1999, which already surpassed that of magazines and books. On the other hand, the amount of information produced by word processors and main frame computers started to decline during the late 1990s. It means that there have been vicissitudes even amongst the newer media.

PC communication has kept growing. In 1999, the amount of information flow by the Internet was still 0.999 trillion Ws. However, the amount of Internet information flow grew by as much as 11.28 times during the period between 1995 and 1999.

"Other written language" in Table 1 is a category created by the author that combines the data for such media as LAN, wireless beepers (pagers), telegraphs, and electronic mail. Although the amount of flow is rather small, it is one of the rapidly growing categories. Telex is included in this category until it was dropped from the census in 1999. All told, it was found that the total information flow volume of written language grew by 2.45 times during the twenty-year period mentioned above.

Furthermore, facsimiles are included in the text information category. Although there is no breakdown in Table 1, facsimiles' information flow volume through subscriber lines is the largest, reaching 35.6 trillion Ws in 1999, followed by those through leased circuits and ISDN. Their growth rates are very high. The amount of facsimile information flow as a whole increased 2.37 times during the five years between 1995 and 1999.

The definition of text information in this research includes written language and facsimiles. The flow of text information defined as such grew by 2.61 times during the twenty years, which was a remarkably steady growth, meaning that the use of text information is by no means declining.

Some people may criticize this view referring to the growth of comic books and magazines that were cited as a cause of *moji-banare* (detachment from written text). According to the 2001 Shuppan Shihyou Nenpou [Annual Report on Publication Indices, 2001] published by the Institute of Publishing Science at the National Publishers Association, comic magazines accounted for 23.6 percent of total sales volume of magazines and comic books 23 percent of total sales value of books in 2000.

Let us assume that all these comic books and magazines are not text information and subtract their information flows from the total flow volume of books and magazines. Considering the complexities of conversion rates and so on, the results of this calculation only indicate rough estimates. In any event, the calculation shows that the growth multiple of text information flow volume in the twenty-year period drops from a previous 2.61 to 2.53 as a result of excluding comics. In other words, our conclusion that there has been a stable growth of text information does not need to be changed or modified even if we exclude comic books and magazines from the text information media list.

Image Information and Change in its Flow Volume

Let us now look at the trend of image information, which allegedly has been in competition with text information[11]. Table 2 shows the longitudinal data for the information volume of major image media.

Table 2. Trends of Major Image, Voice and Data Information Consumption

	1980	1985	1990	1995	1996	1997	1998	1999	99/80
1: Terrestrial TV	5,070	5,180	5,510	5,560	5,120	4,890	4,860	4,480	0.88
2: CATV	460	693	1,070	1,830	2,000	2,260	2,500	2,680	5.83
3: BSTV	0	0.373	25.1	80.9	88.3	106	86.2	121	(1.50)
4: CS digital TV	0	0	0	0	0.599	3.56	6.81	11.0	<18.36>
5: Other printed matter	47.4	60.9	110	141	151	159	161	178	3.76
6: CD-ROM	0	0	0.174	2.32	4.00	6.07	7.79	9.66	(4.16)
7: Rental videos	0	22.4	68.2	56.8	59.8	56.9	61.9	60.7	(1.07)
8: Movies	21.8	20.5	19.3	16.8	15.8	18.6	28.5	19.7	0.90
9: Telephones (subscriber)	7.25	12.2	14.7	16.6	16.5	15.7	15.0	14.5	2.00
10: Mobile phones	0.00082	0.00798	0.102	0.844	1.65	2.70	3.92	5.41	(6.41)
11: AM radio	75.9	77.2	84.3	86.7	87.1	81.7	78.8	71.7	0.94
12: FM radio	36.6	37.6	40.1	39.2	40.2	39.7	44.5	39.6	1.08
13: Cable radio	215	251	290	321	326	337	342	288	1.34
14: Audio software	37.0	22.8	19.5	33.0	33.4	33.8	35.7	37.2	1.01
15: Databases	1.84	1.94	2.26	4.34	4.85	6.27	6.73	7.17	3.90
16: Computer software	0.264	0.545	0.846	1.19	1.26	1.34	1.42	1.50	5.68
17: PC software	0	121	194	365	487	656	857	1,160	(3.18)

Unit: 1 trillion WORDs

Notes:

1. Major image information media from 1 through 8 cover 99.5 percent of all image information flows, major voice information media from 9 through 14 cover 88.5 percent of all voice information flows, and major data information media from 15 through 17 cover 2.9 percent of all data information flows.
2. The last 99/80 column indicates the growth multiple between 1980 and 1999. The figures in ( ) indicate those between 1995 and 1999 and the figures in < > indicate those between 1996 and 1999.

Terrestrial TV broadcasting carries the largest amount of information of the image media, which reached 5070 trillion Ws as early as 1980. According to the conversion ratio in the census, as has already been explained, one minute of color TV broadcasting is equivalent to the information volume of some 3054 kana (Japanese alphabet) characters. It is only natural, therefore, that the flow amount of image information tends to be larger than that of text information. As far as the total volume of flows is concerned, terrestrial TV broadcasting exceeds the text information as a whole. However, since 1996, the flow volume of terrestrial TV has registered negative growth rates year after year.

The amount of information carried by cable television (CATV) has been rising. New TV media such as satellite television (BSTV) and communication satellite (CS) digital TV have also been growing. Changes are taking place in the area of TV broadcasting. Even if we include these new emerging TV services, the information flow volume of TV media as a whole was on the decline between 1995 and 1999. It means that, in the case of TV broadcasting, volume of information consumed does not necessarily increase even with an increase in the amount of supply. The amount of time that a person can spend watching TV is limited, new kinds of TV services only pre-empt existing ones.

Other than TV, we find that use of printed matter and CD ROMs is growing. Image information in total, however, has not grown as much as one might expect. As Table 3 shows, the flow volume of image information grew by 1.35 times in the twenty-year period. It more or less remained unchanged in the early 1990s, and declined between 1995 and 1999.

Even if comics are added, the flow volume, which was estimated in the previous section, only boosts the growth rate up to 1.36. The difference is negligible.

Voice Information and Change in its Flow Volume

Table 2 covers major voice media as well. Amongst radio services, cable radio has the largest flow volume, and it is growing. AM radio has fallen significantly since its peak in 1996. FM radio has roughly remained flat since the beginning of the 1990s. As for telephone services, there has been a shift from subscriber line services to mobile phones. There is no doubt that the total flow volume of telephone information has been rising with the spread of mobile phones.

The trend of voice information shown in Table 3 indicates that the trend is very similar to that of image information. During the twenty-year period, the flow volumes of voice information and image information both increased by 1.3 times. Between 1995 and 1999, they both showed negative growth. The fall was steeper for voice information. They both showed another significant dip in 1999.

Table 3. Modes of Information and Their Consumption Trends

	1980	1985	1990	1995	1996	1997	1998	1999	99/80	99/90	99/95	99/98
Text	275	324	474	574	628	669	695	719	2.61	1.52	1.25	1.03
Images	5,613	5,999	6,825	7,712	7,466	7,530	7,743	7,595	1.35	1.11	0.98	0.98
Voice	378	426	485	539	549	558	569	516	1.37	1.06	0.96	0.91
Data	33	479	3,471	7,951	12,008	15,814	19,777	39,666	1,202	11.43	4.99	2.01
Direct	5,843	6,171	6,342	6,375	6,359	6,364	6,359	6,369	1.09	1.01	1.00	1.00
Total	12,142	13,399	17,579	23,151	27,010	30,935	35,143	54,865	4.52	3.12	2.37	1.56

Unit: 1 trillion WORDs

Note: The columns 99/80, 99/90, 99/95, and 99/98 indicate growth multiples from 1980 through 1999, from 1990 through 1999, from 1995 through 1999, and from 1998 through 1999.

Data Information and Change in its Flow Volume

The flow volume of "data information" is calculated by converting "bits" into kana or letters of the Japanese alphabets. Specifically, this category includes data transmission and (main frame and personal) computer software. According to the IFC, the flow volume of data transmission has greatly increased. However, there is much to doubt regarding the accuracy of figures used in this calculation. The reason is that the flow volume of data transmission is calculated by multiplying transmission capacity by the time of usage. However, with the spread of broadband communication, transmission capacity has been expanding at a rapid rate in recent years. On the other hand, recent data for the time of usage is not available. A staff member at the Mitsui Joho Kaihatsu, a think tank that has conducted the IFC survey for the Ministry of General Affairs, told me that since recent data for the time of usage was not available they had to continue to rely on the past data. This would explain the extremely rapid expansion of data transmission in the IFC. It grew 11.43 times during the ten years between 1990 and 1999. During the five years between 1995 and 1999, it grew approximately five times, and it doubled in 1999 alone.

In fact, data transmission accounts for 62.3 percent of total information flow volume in 1999, which sounds unrealistic. Obviously, this is a defect in the IFC, and this problem needs to be solved somehow. In this study, therefore, data transmission is ignored whenever possible. See, for example, Table 2, in which data transmission is excluded. According to Table 2, databases and software are growing significantly in the category of data information, indicating that use of new electronic media is on the rise.

Direct Face-to-Face Information and Change in its Flow Volume

In the IFC, there is a category of direct face-to-face information. This category includes information flows through lectures, theatrical performances, watching sports, school education, social education, conferences and personal

conversations. This is a category of information flow without media, or information flow using space as a medium. The flow volume of information in this category is large, but it has not changed much over the years, as shown in Table 3.

Conclusions

Although the three tables with this article make it possible to compare the amounts of information flows of different media, it does not make much sense considering the defects and shortcomings in the measuring methods of the IFC, including the conversion rates. As mentioned already, however, longitudinal comparisons make sense in spite of these shortcomings.

Even the figures for data information, which are probably the least reliable in the IFC, seem to indicate rapid penetration of information technology into society. Other than data information, the most rapidly expanding is text information. Its flow volume increased by 2.61, 1.52, and 1.25 times during the twenty-, ten-, and five-year periods, respectively. In 1999, it grew by 3 percent. In none of these time periods, did the growth rates of image, voice, and face-to-face information exceed that of text information. Image and voice, in particular, showed negative growth between 1995 and 1999.

More specifically:

1. Information flow volumes of magazines, terrestrial TV, and AM radio started to decline in the latter half of the 1990s. Books have continued to decline. Except for newspapers, which have remained unexpectedly strong, the use of conventional media has clearly been declining.

2. In the categories of image and voice information, new media have yet to emerge to offset the decline of conventional media such as terrestrial TV and AM radio. Except for mobile phones, new media have only been replacing conventional media, and have not yet contributed to the growth of these categories.

3. In contrast, in the category of text information, new electronic text media such as copied documents, PC documents, computer documents and facsimiles have markedly increased their information volume. Consequently, text information as a whole has continued to grow — new electronic text media more than offsetting a partial decline in the more conventional text media.

4. There were some constraints and reservations regarding the use of IFC data for data information and comic books and magazines. In spite of them, it is possible to conclude that the growth of text information exceeds those of image and voice information.

It is true that conventional text information media such as books and magazines are declining (not necessarily the libraries, though). It does not necessarily mean, however, that people are less exposed to text information. I would argue that it is wrong to see this phenomenon as *moji-banare* (detachment from

text information). It is not the text information that is on the decline. It would be more accurate to say that the current vehicles used for the dissemination of text information are changing towards those based on digital and network technologies.

Why does text information keep growing? I believe there are two fundamental reasons.

1. Text information is the communication tool that is at the very foundation of human culture, without which mankind would never be able to conduct necessary and sufficient communication[12]. Therefore, even newly emerging media also have no choice but to depend heavily on text information.

2. Both image and voice information have time and space constraints when consumed. As a result, new media in these categories only bring about zero sum kind of situations, where there is no growth in the volume of information consumed. In comparison, text information is more suited to on-demand consumption, which has less constrains on its consumption. As a result, more often than not, emergence of new media in this category increases the consumption of information.

With the growth of electronic information, conventional text media are actively making inroads into new electronic media[13]. It is an inevitable response to people shunning conventional forms of information circulation, such as books and newspapers. There have been active entries into the area of electronic media by those outside the conventional media industry. There is no doubt, therefore, that there will be a continued transformation of media and changes in the vehicles used for information flows. It is inconceivable, however, that text information will be replaced by image and voice information in the process of media evolution. On the contrary, this study suggests that text information might expand its share in the information flows of the future.

NOTES

1. *Moji-banare* (detachment from written text) was first mentioned in Japan in 1972. *Almanac of Publishing, 1974* compared children in 1963 and 1972 and pointed out that the number of children who do not read books drastically increased (Oka, 1994:76).
2. The percentage of junior high school students who read no books in a month was 33.1 percent on average during the period between 1971 and 1975. The five-year average rose to 49.22 percent in the 1996-2000 period. For senior high school students, the percentage increased from 37.92 percent in the 1971-1975 period to 64.88 percent in the 1996-2000 period. (Mainichi Shimbun, 2001:129).
3. According to a survey conducted by Nihon Shimbun Kyokai (The Japan Newspaper Publishers and Editors Association) in 1996, 43 percent of single persons did not subscribe to newspapers (Nihon Shimbun Kyokai Kenkyusho, 1998:42).
4. A study group on newspapers concluded: "...the biggest environmental change for newspapers was the emergence of a technology called television. Newspapers saw television as a threat to their survival and growth in the mass media industry, and they ultimately realized that television was a formidable rival in journalistic activities." (Shimbun Hodo Kenkyukai, 1995:291)

   Amongst the people who responded that they spent less time reading newspapers in a survey conducted by the Nihon Shimbun Kyokai in 1991, the most frequently quoted reason was "too busy" (52.3 percent) followed by "watch television news" (46.3 percent), which means that TV and newspapers compete with each other. (Nihon Shimbun Kyokai,1996:35) The spread of television viewing had the strongest impact on the evening edition of newspapers. Many evening newspapers were suspended or discontinued as a result. (Nihon Shmbun Kyokai, 1996:237-243)
5. According to "Dokusho Chosa" [A Survey on Reading] conducted by the National Association of School Libraries in 1994, third graders, fifth graders, junior high school students, and senior high school students read 10.1, 5.9, 2.1, and 1.9 books respectively in February of 1994. In contrast, elementary school children, junior high school students, and eleventh graders read 10.9, 10.9, and 7.9 comic books per month respectively. Junior and senior high school students read four times more comic books than books. (Amano, 1996:180).
6. Behind the so-called *moji-banare* (detachment from written text) phenomenon, there exist changes in lifestyles and other factors (Fujitake, 2000:152; Nihon Shimbun Kyokai Kenkyusho, 1998:51-52).

7. The Planning Division in the Minister's Secretariat at the Ministry of Posts and Telecommunications used to be in charge of the Information Flow Census (IFC). Since the 1999 edition, however, the General Policy Division of the Information and Communication Policy Bureau at the Ministry of Public Management, Home Affairs, Posts and Telecommunications has succeeded to the task as a result of the administrative reform in the Japanese government. Actually, a private think tank, the Mitsui Joho Kaihatsu, has conducted the IFC survey for the government. For the details of the Information Flow Census and its implications, see Okada (1978), Ito (1981), and Yoshizoe (1988)
8. Table 4 shows the conversion ratios of different modes of information. These ratios were determined based on various methods, including psychological experimentation, and were significantly revised in 1992.

Table 4. Conversion Ratios among Different Modes of Information

Mode of information				**Unit**	**Conversion ratio**
Text information	Written language	*kana* sentence		word	0.220
	Written language	*kanji* & *kana*		word	0.300
	Spoken language			minute	71
Pattern information	Music			minute	120
	Still images	Monochrome		sheet	80
		Color		sheet	120
	Video images	Color	Direct	minute	1200
		Color	TV	minute	672
		Color	HDTV	minute	1032
		Movies		minute	1032

Source: *1999 Joho Ryutsu Sensasu Hokokusho* [Report on the Information Flow Census, 1999] P.11.

9. The following are the definitions of information volumes. (*1999 Joho Ryutsu Sensasu Hokokusho*: 5)

   Original information: Total volume of original information transmitted by each medium, excluding reproductions and reiterations by the medium.

   Transmitted information: Total volume of information transmitted in a year by information suppliers of each medium, including transmission of reproductions and repeated transmission of identical information.

   Available information: Total volume of information in a year that each medium offers in a selectable way at a point where consumers receive information.

Consumable information: Total volume of information that can be actually consumed. For example, even if television programs are broadcast to a home television set over ten channels for 24 hours a day, the consumable amount that can be viewed by the family is limited.

Consumed information: Total volume of information actually consumed by consumers in a year; for example, the actual amount of television programs actually being watched.

10. Since 1987, the total sales of comic books and magazines has been more than 20 percent of the total annual sales of all publications. It grew by 1.52 times during the fifteen years from 1986 through 2000, which is well above 1.33 times for all publications. (Zenkoku Shuppan Kyokai, Shuppan Kagaku Kenkyusho, 2001). This means that text and comic book publications have fiercely competed with each other.
11. Nihon Shimbun Kyokai Kenkyusho (1998) states: "...with the spread of multiple media, people will become more oriented towards video image media, and *katsuji-banare* (detachment from text) will further progress..." (p. 51) and "...the basis of media and communication will shift from the text oriented system to the image and visual oriented system." (p. 52)
12. See Ong (1982) and Eisenstein (1983) for the roles of text in communication.
13. See Akiyama (2002) for electronic media businesses by the newspaper and publishing industries.

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