Science News: A Content Analysis of Several Media Forms

Yvonne G. DeGraw

University Undergraduate Fellow, 1986-1987

Texas A&M University

Department of Journalism

APPROVED

Fellows Adviser: _____
Dr. Michael Buchholz

Honors Director: _____
Dr. Louise Canfield

ACKNOWLEDGMENTS

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

ABSTRACT

This study describes four attitudes that can be take toward science news. These four are evidenced by the way science news is treated in the three media forms sampled.

Two network news broadcasts, two national newsmagazines and four newspapers were surveyed for two months. Aspects of these media that were studied included the amount of science news, the placement of science news, science news topics, the length of science news stories and a host of other variables.

The four functions described in this study are the "hard news" function, the "filler material" function, the "health and consumer awareness" function and the "special interest" function. None are used independently and all contribute in some way to the particular flavor of science news coverage in a publication or broadcast.

A second contribution of this study is the establishment of baseline data for science coverage in a variety of media. This often overlooked area will benefit from the ability to look at the entire picture.

INTRODUCTION

Three scientists were awarded the Nobel Prize last October for developing microscopes that revolutionize the way we see tiny particles. These microscopes may reduce the space needed to store *all* the information available to man to a trivial size someday. CBS Evening News devoted 24 seconds to the award, and NBC Nightly News did not cover it at all.

This study puts science coverage by the mass media under the microscope. The science content in network news broadcasts, newspapers and newsmagazines will be examined to find the extent and direction of the information the public receives. I will discuss the similarities and differences in coverage of science topics by these three forms of media.

Purpose

This study will answer the questions, "How is science news treated in the mass media?" and "What are the differences in science news coverage by broadcast and print media?" Answers to these questions will enable journalists and editors to assess their current strengths and weaknesses, and plot a course for the future.

Most people claim to be at least somewhat interested in science news. Over one-third of the people questioned by Clyde Z. Nunn said they were "very interested" in science news, and another third claimed to be "somewhat interested."[1] However, few comparisons have been made between newspapers, newsmagazines and network news broadcasts. Differences in the limitations of these media create differences in the way they cover all news. Science news is particularly affected by the audience a newspaper, magazine or broadcast is

trying to reach. In general, more education and a higher income correlate highly with the use of print media, especially magazines. The use of broadcast media as a primary news source correlates with lower education and income.[2]

A comparison of science communication in broadcast and published media will provide baseline information for comparisons and show what functions media use science news to fulfill.

Scope

This content analysis examines several areas of science news coverage:

1) the prevalence of science news.
2) the attention given to science news.
3) the categories of science topics covered.

Various subtopics — length, placement, attention, day of the week, visual content, news source and the effects of political events — will be discussed in conjunction with these three areas.

Plan of Development

After considering prior research in this area and methods used in this study, this report will discuss the results of the analysis. It will deal with the news media in the following order:

1) network news broadcasts
2) newsmagazines
3) newspapers
4) comparisons among these three

The discussion will interpret the results and discuss the functions science news is intended to serve.

LITERATURE REVIEW

Over two decades ago, a Texas publisher predicted that in the future "we will print as much science news as we now do sports news."[3] Though this day has not arrived, we have seen weekly science sections in many metropolitan dailies.

But there are signs that the trend toward more coverage of science news that researchers have documented is reversing. This year the Oakland *Tribune* dropped its 2-year-old science page in favor of a collection of health tips in the sports section. It cited a readership survey as the reason for this action.[4]

Many scientists and media professionals are concerned by the quality of science journalism. They say a scientifically literate population is necessary for the continued economic growth of the nation. Professor Hillier Krieghbaum of New York University wrote,

> For adults who have been out of school for five or more years, the mass media coverage of science remains the one big, broad highway for informing a majority about science, technology and medicine.[5]

Because of this, it is important that mass media coverage of science be accurate, comprehensive and understandable. Just as navigators cannot reach a goal unless their current position is known, so reporters and editors need to know about existing science coverage before they can write and publish better science stories.

Research in science journalism is a varied field. Some researchers conduct audience analyses, while others focus on accuracy, readability, source characteristics, reporter characteristics, comprehensiveness and content. It is this last subcategory that I will examine.

Most people who do content analysis select a specific topic and determine how it is dealt with by the media. Most also select a single medium to study. This had led to a lack of background statistics for basic comparisons.

Recombinant DNA coverage in two major newspapers was analyzed for technical and philosophical content and found lacking in the latter area.[6] Bowman analyzed eight mass circulation magazines and found environmental coverage was sparse.[7] Freimuth, *et al.*, studied cancer coverage in 50 newspapers and found more extensive coverage of events than of background, making the pubic's overall knowledge of the disease spotty.[8]

In case studies like these, newspapers are the most common form of media studied. Multiple formats -- newspapers, wire services and news broadcasts -- are compared in very few studies.

Rubin and Hendy compared coverage of swine influenza in 19 daily newspapers, one wire service and the three evening news broadcasts for one week. They found that overall coverage was rarely inaccurate or sensational. However, the study showed that a "body-count" approach and superficial coverage characterized the sampled stories.[9]

The National Association of Science Writers studied differences between the audiences of newspapers, magazines, television and radio. They found that higher education correlated with greater preference for magazines as a source of science news. Lower education was related to a preference for television and radio news. Newspaper preference was constant across a broad range of educational backgrounds.[10]

A study by Dunwoody and Scott supports this correlation. Scientists who had been sources for news articles were found to prefer magazines first over

newspapers and then television news as their source of mass media news in their own specialty. They said television did a bettter job than newspapers at covering general science topics.[11]

While it is interesting to see what readers think of the news they get, it remains difficult to interpret the few studies of various media, because no overall picture has been drawn. In works of art, foreground details can only float in a frame without background. So, works of research cannot serve a practical purpose without the availability of background knowledge.

No study was found to compare the overall emphasis placed on science news by both print and broadcast media.

A study by the Newspaper Advertising Bureau indicated that science and related items made up about 5 percent of the content of newspapers in both 1971 and 1977. The study separated science content into four categories: public health and welfare, the environment, science and invention, and energy problems.[12]

Nunn, in an analysis of the bureau's surveys, compared public interest in science and science coverage. While readers placed health, nutrition and environment stories in the top three to six categories (depending on the age of the reader), newspapers devoted more space to puzzles and horoscopes than to these categories of interest.[13]

Riffe, et al, studied the topic mix of network news broadcasts. When the researchers compared the ranking of time devoted to 10 categories of news by the three networks, they found strong correlations. Even when they considered length of stories and placement, they found that in any given year the three networks used nearly equal percentages of their air time for each of the categories.

The category of "science, technology and art" had an average rank of seven (of 10) in the most recent two years of the sample — 1980 and 1981. According to the study, ABC put 4.8 percent of its stories to this category between 1973 and 1981, CBS put 5.3 percent and NBC put 5.15 percent. Science news was most popular in 1978, when it made up 10.9 percent of CBS' content. Just four years before that, science coverage was at a low, with 1.0 percent of the stories on CBS.[14]

A study by Stempel divided news coverage into 14 categories. "Science and technology" was one of them. He took a census of the material contained in four broadcasts of the three network evening news broadcasts and six daily newspapers. Science and invention tied for last place on ABC and NBC and placed eleventh on CBS. It had a very low rank in five of the newspapers. The New York *Times* placed it highest of the five — in tenth place.[15]

However, the validity of Stempel's study is uncertain because of his small sample size. Thirty-three years before this, Stempel himself published a study that compared various sample sizes. He determined that random samples of six, 12, 18, 24 and 48 issues from one year of a newspaper all made adequate sample sizes, and that there were no large differences in the results beyond a sample size of 12.[16]

Because differences between the six- and 12-issue samples were found, it is reasonable to expect greater deviations with a four-issue sample, especially when random sampling is not used. Such small samples can create large sampling errors.[17]

Stempel also excluded special interest pages such as sports, business and lifestyle pages and stories under 100 words or 30 seconds. While these length

limitations would not exclude a large proportion of newspaper articles, more than 20 percent of all stories on network news broadcasts fall into this category.

Another category of interest in Stempel's news category study was "public health and welfare." This had an average rank of about 6 (of 14 categories). It ranked first or second in the two mid-size Ohio newspapers he sampled and had an average rank of seven in the other media.

Most researchers find an emphasis on coverage of medical issues in the media. One study showed that of the 6 percent of all prime-time programming devoted to science in the San Francisco market, 75 percent concentrated on medicine and psychology. The other sciences were de-emphasized.[18]

Content analyses have called science journalism many different things.

Burger says the media tends to sensationalize and oversimplify. This has led to less than adequate and sometimes destructive coverage of health risks, he claims.[19]

Another study found that newspaper coverage of the Tellico Dam issue was *not* sensationalistic. However, the newspapers did concentrate on what Glynn said were peripheral issues.[20]

Freimuth, *et al.*, studied cancer coverage in 50 newspapers. They found that "fast-breaking" events were covered, often to the detriment of stories about prevention and detection.[21]

Readers' concerns are not taken into account by editors, Culbertson and Stempel concluded after an analysis of more than 2,000 medical news articles and a survey of more than 400 people. They found that 34 percent of the medical articles were about diseases, but only 3 percent of those surveyed mentioned diseases when asked about the most important health problem in America.[22]

Greenberg, *et al.*, found that articles about cancer bore little relation to the priorities of specialists in the fields of cancer and health communications.[23]

These studies reflect scientists' complaints about news stories in which they are quoted. On the whole, misstatements are not their concern. Omission of important facts is the problem, they say.[24]

A study by Tankard and Ryan and a follow-up study by Pulford show that questionnaire design has much to do with the resulting accuracy rating.[25]

Differences in the mean number of errors cited were directly related to the number of error categories. In both studies, the most common complaints were similar: relevant information omitted, investigator misquoted and misleading headline. Dunwoody suggests that scientists may be using the wrong standards to judge journalism. Scientists and journalists do not understand each other's backgrounds and limitations, she says.[26]

Overall, studies that give a complete picture of science news coverage by various forms of media have not been conducted. Without baseline measurements, data from the specialized studies mentioned do not provide the maximum amount of valuable information. This study provides those baselines.

MATERIALS AND METHODS

To obtain the sample of science stories needed for this study, I took an eight-week comprehensive sample of two evening network news shows, two newsmagazines and four newspapers. In these samples I located the science articles and stories I would analyze. The sampling period was October 6, 1986, through November 30, 1986.

In the analysis step, I measured length and position of the sampled stories, compared the number of science stories with the total number of stories, and categorized stories by topic. Finally, I compared this information about each media outlet with the other outlets to draw some conclusions about the current state of science journalism.

Materials

Network News Broadcasts

NBC Nightly News and CBS Evening News were chosen because they had the highest ratings of the three major network news broadcasts in September 1986, the month before the sampling began.[27] The evening new shows were videotaped for eight weeks. Because the networks have erratic weekend broadcasts, the news was sampled whenever it was shown on Saturday or Sunday at the regular weekday time. This yielded three weekend broadcasts of the CBS Evening News and nine of the NBC Nightly News.

Newsmagazines

Subscription copies of Time and Newsweek were sampled. These two were chosen because these two reach the largest audience of the three major national newsmagazines.[28] Also, a study by Oates found these two provided much more science coverage than U.S. News & World Report.[29]

Over half of those who were attentive to science news said they read at least one newsmagazine "most of the time," in one study. Time was the most popular choice by both the "attentive public" and the "interested public" groups. It was followed closely by Newsweek and distantly by U.S. News and World Report.[30]

Both Time and Newsweek attempt to put the week's news into perspective. A guide to dealing with the media for scientist-sources says, "These publications

cannot cover fast-breaking news the way the dailies do, but they attempt to provide more in-depth coverage of events and trends in the world."[31]

To support this claim, we would hope to find a less event-oriented, superficial coverage of science in these newsmagazines than we find on television or in the newspapers. We would expect the average newsmagazine science article to be longer than the average newspaper science story.

Newspapers

The newspapers selected were the Boston *Globe*, the San Jose *Mercury-News*, the St. Louis *Post-Dispatch* and the Minneapolis *Star and Tribune*. All but the San Jose *Mercury-News* were obtained from the university library through mail subscriptions. The California paper was received by mail subscription.

These four newspapers were chosen for three reasons.

1) They are geographically representative of the United States.

2) Two serve areas known for scientific and technological research -- Silicon Valley and the MIT-Harvard area. The other two represent areas dependent on blue collar industry.[32]

3) Their sizes are comparable. The daily circulation figures and national ranks of the four newspapers are contained in Table 1.[33]

TABLE 1
Circulation Figures and National Ranks of Sampled Newspapers

The Boston *Globe*	509,464	14th
The Minneapolis *Star and Tribune*	381,808	20th
The St. Louis *Post-Dispatch*	277,527	30th
The San Jose *Mercury-News*	261,668	35th

The four papers are large, but not so large that a geographic representation of the United States could not be obtained without using newspapers with widely varying circulation figures. Because the papers have similar sizes, their resources will be comparable.

Methods

Coding Content

I examined the material in each sample, and cataloged the science news content. I will discuss several of the measures, categories and definitions used after listing the coding categories.

Network News

Each news broadcast was coded by several criteria:
- network
- day and date
- length of news hole — total time minus commercial time
- total number of stories
- number of science stories
- sample of the individual lengths of all stories

For each science story found in the news broadcasts, the following were recorded:
- topic of each science story
- transcript of each science story
- summary of the visual content
- length in seconds of each science story
- time into broadcast of each science story
- placement — consecutive rank of each science story
- placement between commercial breaks

Newsmagazines

The procedure with the newsmagazines was similar. The following data were gathered from each issue.
- magazine title
- date
- total number of articles
- total number of science articles
- total number of pages

For each science article, I recorded the following data:
- page number
- section name
- placement — consecutive rank of the story
- specific topic
- general topic category
- total length — converted to standard advertising units (SAU)
- type of graphic elements used

Newspapers

Each issue of the four newspapers was coded by these variables:
- newspaper
- day and date
- title of each section
- number of articles in each section
- number of science articles in each section
- total number of articles in each issue
- total number of science articles in each issue

Further information about each science article was coded:
- page number
- specific topic
- general topic category
- total length of article including headlines and graphics — in SAUs
- type of graphics used
- source of article
- attention score

Defining Science

A decision that affects the results of any study of science journalism is the definition of "science" used in the sampling process. Such a definition can be broad enough to include any mention of scientists or of science or technology -- even if the mention is in a business article or an obituary. Or the definition can be narrowed to include only recently published original research in the hard sciences and medicine -- to the exclusion of the social sciences.

I have chosen to use a definition that avoids the two extremes but leans toward a narrow interpretation of science. A definition used by Cole in his study of conflict coverage in science news provided the original form of the definition.

> Science news is defined for this study as all news stories which have substantial subject matter concerning results or interpretation of empirical research in the sciences, applied science or development, technology, engineering, medicine and public health.[34]

To this definition I have added the social sciences as a topic.

It is important to remember this definition. Many of the stories that look like science at first glance are either non-empirical research or not research at all. For example, the U.S. Census Bureau releases an analysis of a part of its massive database almost every week, but this is an interpretation of a census, not research designed to answer a question. To meet the "empirical research" criteria, a study must do more than regroup existing data. Polls usually employ sophisticated statistical techniques, but their results aren't *science*, they are a measure of opinion. Some lines must be drawn in the process of deciding what to include in the study. The placement of these lines may seem arbitrary, but without specific guidelines, a study such as this would be impossible. In general: a study is scientific; a survey is not. To complicate this definition, reporters do not always distinguish well between the two.

I did not include studies by obviously biased groups such as religious organizations and political action committees. Reports by task forces were not considered. Studies of this sort — the Meese report for example — are rarely objective. Often their recommendations are determined before they do any research.

Defining Story

The sampling unit — the story — also must be defined. In the news broadcasts it was simple to determine where one story ended and the next began. Magazines and newspapers, however, tend to group stories together to create a package. In doing this they make it difficult for researchers using the story as a sampling unit.

Specific guidelines were chosen to prevent coding something more than one way. In general, something was counted as a single story if it would have been counted as an individual unit had it contained science news.

News briefs, even when packaged together but with separate headlines, were counted separately. Editorials and columns by the paper's editorial board or columnists were counted separately, but the letters to the editor section was counted as a whole. The comics page was considered one package.

The sports sections presented special problems. Each story that contained text counted as one. A single headline followed by several game results was counted as one. Tabular content – like box scores, puzzles and stock prices — were not included in the article count.

Obituaries with individual headlines were counted separately. Sidebars were counted only if they contained text in paragraph form.

Choosing the Sampling Period

Two reasons made it necessary to sample consecutive issues of current publications and broadcasts rather than using an nth-issue sampling scheme.

First, the temporary nature of newspapers and news broadcasts makes it difficult to find copies in any useable, affordable form. One of the newspapers had to be obtained by subscription, and only the Boston *Globe* is preserved by local libraries on microfilm. Also, it is difficult to obtain archival videotapes of network news broadcasts.

Second, more than enough science stories are contained in a sample of this size to make a statistically significant sample. This was done to overcome any cyclical variations in news content by month. Certainly, the science content of news varies throughout the year. Seasonal events — the Nobel Prizes, the annual conference of the American Association for the Advancement of Science – do exist. But there are enough of these events that any reasonable-sized sample would include some of these. Although the progress of science can be seen as a series of breakthroughs, sociologists and historians do not know whether these events are random.

There is also the possibility that a factor that determines the amount of science news in the mass media may not be the actual amount of science news available. Science news may be a back-up — a filler for slow news days.

International events made it possible to check this idea. On November 6 the story of arms shipments to Iran reached the United States. News of redirected funds going to the Contras hit the presses on November 25. These two related stories were covered extensively by all the sampled media outlets.

Measuring the Amount of News Content

The bulk of the work in this study came in counting the non-science stories in each sample. To determine the percentage of space the mass media devotes to science news, we must find the total amount of news space. Budd, Thorp and Donohew describe three methods of doing this.[35]

The first method is to measure the exact length of the sample — either the number of column inches or the length of the broadcast. It was feasible to time the news programs, but measuring the entire news hole of the newspapers and newsmagazines is beyond the scope of this project. This method was, however, used to measure the science stories found in the samples.

The second method is to count items. This method was used to measure the total number of science and non-science stories in all three media.

The third method uses an "attention score" or "display index." These combine different factors about the play given to each story to rate the emphasis given to the story quantitatively. The attention score described by Budd was used to measure the play given to science stories. It combines placement, size and headline factors to give a whole-number score from zero to five.[36] The scoring system works as outlined in Table 2.

TABLE 2
Explanation of Budd's "Attention Score"

If the headline is two or more columns
and not over half a page wide . . . . 1 point

If the headline is over half a page wide . . . . 2 points

If the body of the text starts above the fold . . . . 1 point

If the entire story is 3/4 of a column long or more . . . . 1 point

If the story is on page one, a section page or an
"open" page (without advertisement) . . . . 1 point

Budd found that measurements of the amount of coverage using column inches and his attention score had an average correlation of 96 percent. Column inches and item counts correlated 92 percent, and the attention score and item count correlated almost 94 percent.[37]

These high correlations allow us to use any of the three methods in this content analysis.

Converting to Standard Advertising Units

Most U.S. papers now use a six-column format for standard layouts. It measures 2 1/16 inches by one inch.[38] This works well as a way of measuring space in newspapers. When column widths are changed it is easy to convert the story length to standard advertising units. For example, if three columns of text run in the space normally filled by four columns, we multiply the total length of the three columns by four-thirds to get a measure of the space they fill.

Topic Categories

Each of the stories was coded by its topic area. I chose to use six topic categories:

- physics and astronomy
- geology and anthropology
- biology and ecology
- psychology and sociology
- genetics
- medicine

Categories other than medicine were not divided further because the fields of science tend to overlap a great deal. Six categories allowed clear distinctions between the groups although there was still a broad range of topics within each group.

Medicine, the category with the greatest number of science articles in it, required further subdivision. It was divided into five categories: diseases, substance abuse, human reproduction, diet, and new surgical or testing techniques. Previous studies and this one show that diseases receive more coverage that other aspects of medicine.

When looking at the results of the study, it is important to remember that articles and commentary about the ethical aspects of science and about the business and technological applications of recent research were not considered in this study.

RESULTS

The results of this study will be discussed first by individual media. The specific discussions of network news, newsmagazines and newspapers will be followed by comparisons of the three media formats. Within each area there are several topics to consider. In general, they will be dealt with in the following order: amount of coverage, length of articles, placement, play, day of week, effects of other events, topics, sources and visuals. All of these topics will not apply to each media.

Network News Broadcasts

Out of 1,197 sampled stories from 88 broadcasts on two networks, there were 47 science stories. Thus, in our sample 3.93 percent of the stories were science news. However, if we compute the time devoted to science news, we find that only 3.13 percent of non-commercial time during network news broadcasts

is devoted to science news. This indicates that the mean length of a science story is shorter than the average story.

The two networks — CBS and NBC — exhibited certain differences in the amount of science news they covered.

CBS aired 24 science stories during 42 broadcasts. NBC showed 23 during 46 broadcasts.[39] Thus, while CBS has 4.10 percent science news by number of stories, NBC had only 3.76 percent.

A greater distinction was seen in the time allotted to science news by the two networks. Even though NBC aired fewer science stories than CBS, it devoted more time to science news overall. CBS spent only 2.96 percent of its time with science stories to NBC's 3.29 percent.

Another indication that NBC gives more time to each science story is that the median length of an NBC science story was 83.77 seconds to CBS's 67.45 seconds. This is consistent with the fact that CBS airs one more story per broadcast than NBC, on the average. There seems to be an emphasis on longer stories at NBC. Studies show the length of network news stories has been increasing, and NBC seems to be ahead of that trend.[40]

However, the average length of science stories on both networks is less than the overall average of 94.59 seconds per story. CBS' overall average is 93.21 seconds and NBC's is 97.69.

The distribution of story length was very different on the two networks. Column A of Figure 1 shows this distribution for science stories. Although NBC's mean story length was 24 percent higher than CBS', the chart shows that half of NBC's science stories are shorter than 30 seconds. These short stories are

21

FIGURE 1

Distribution of Lengths of Network News Stories in Seconds:
NBC   CBS

COLUMN A   COLUMN B

Science News Content   Overall Content
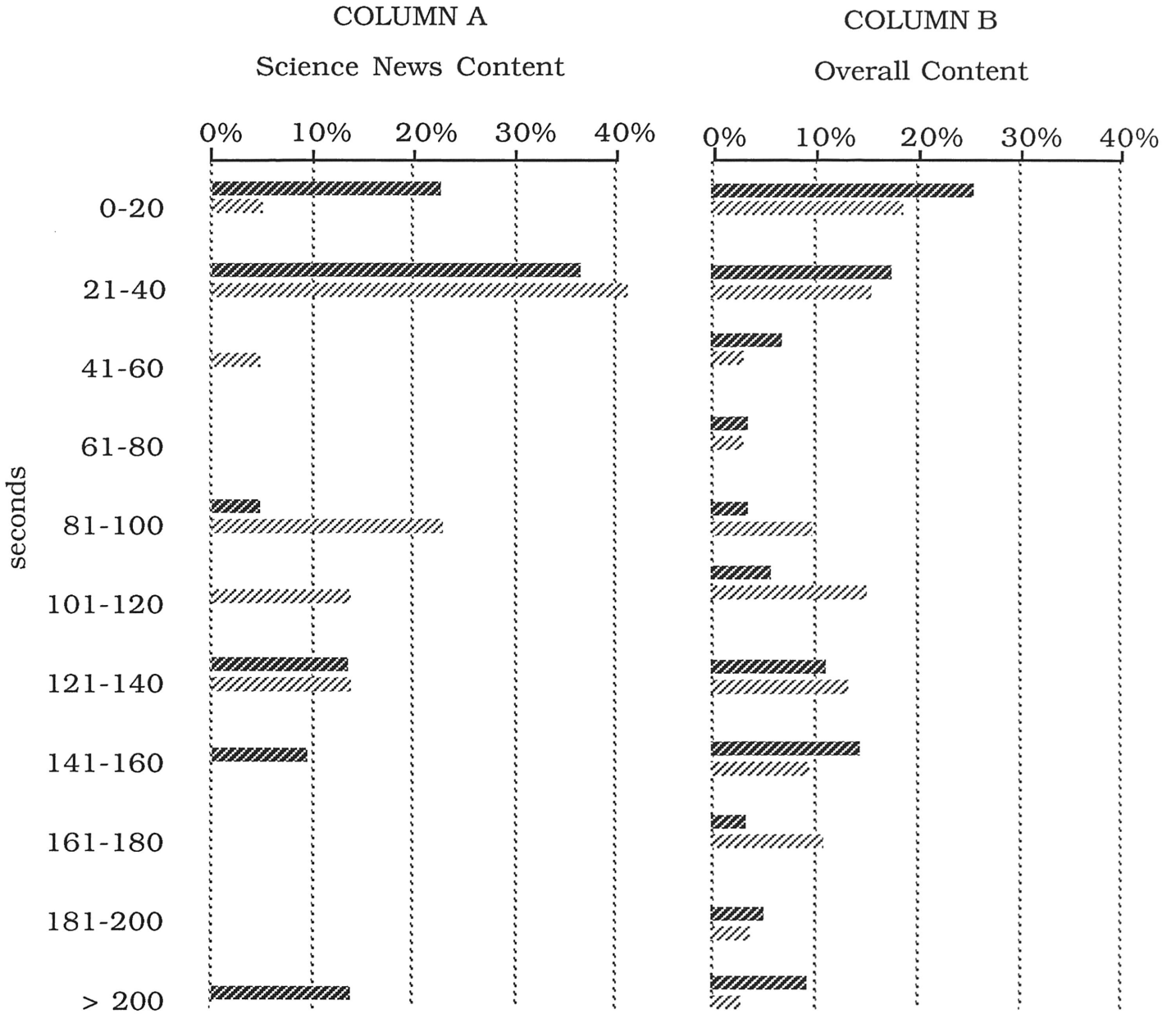
balanced by some stories — extraordinarily long by television news standards — in the four-minute range. NBC aired no science stories between 30 seconds and 1.5 minutes during the sampling period.

CBS also had two clusters of science story lengths. One is a group of stories about half a minute long. The other group falls between 1.5 and two minutes in length.

Compared to the distribution of all news stories CBS airs fewer lengthy science stories than it would if science news had equal emphasis with the other news topics. Column B of Figure 1 shows this. It also shows that NBC has an almost emphasis on long science stories that almost equals its attention to general news, but fewer medium-length science stories and more short-length science stories.

Riffe's study of the topic mixes on network news from 1973 to 1981 also contained length distribution information for overall news coverage by the three networks. It shows that network news shows usually have clusters of stories of various lengths rather than anything close to a bell curve. Unfortunately, the study does not further divide stories longer than 60 seconds.[41]

Adapting the data from this study to Riffe's scheme yields the results shown in Table 3.

TABLE 3
Distribution of Lengths of Network News Stories by Percent

	1980 (Riffe) (all news)		1981 (Riffe) (all news)		1986 (DeGraw) (all news)		1986(DeGraw) (science news)	
	CBS	NBC	CBS	NBC	CBS	NBC	CBS	NBC
1-10 sec.	11.8	14.7	12.2	15.1	8.6	3.1	0.0	0.0
11-20 sec.	22.5	19.5	14.8	14.3	11.8	19.1	4.5	22.7
21-60 sec.	19.3	7.6	20.0	9.1	15.1	26.2	45.5	36.4
> 60 sec.	46.4	58.2	53.0	61.5	64.5	51.6	50.0	40.9

As this table shows, the different clusters of stories are not evident unless differentiation is made beyond the 60 second mark. Overall the stories have gotten longer since Riffe's study, but science stories are underrepresented in the category of longest stories.

Science news in the sampled media tended to be placed near the end of each broadcast. The median science story placement was tenth of 14 on CBS and eighth of 13 on NBC.

Table 4 compares the percentile that science stories fall into when they are consecutively numbered. Notice that the time percentile is lower than the order percentile. This reflects the longer stories that are aired toward the end of each broadcast.

TABLE 4
Comparison of Placement of Science News by Rank and Time

	Ave. rank	Rank %ile	Time %ile	Ave. time into show
CBS	10 of 14	71.4	61.2	13:18 of 21:45 total
NBC	8 of 13	61.5	57.6	12:11 of 21:10 total

Both news broadcasts have four commercial breaks each night. These divide the show into five periods. On both networks the science content tends to be placed in the latter time periods. Figure 2 shows that NBC airs science news during the fourth period — a place for hard news that is judged to be of least importance. The stories after the final commercial break usually involve cute children, heroic pets or some other light feature material.

FIGURE 2

Number of Science Stories per Period Between Commercials (by Network).
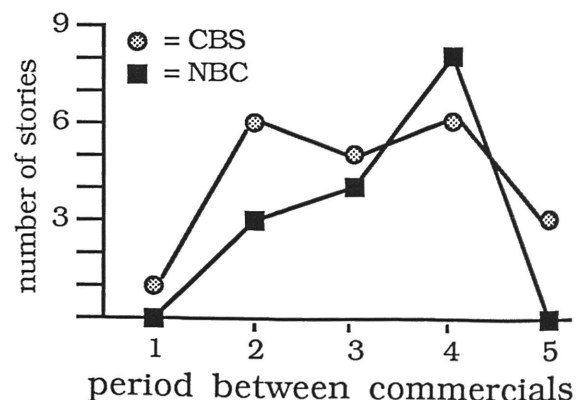
Both networks tend to run the bulk of their science news on Wednesdays. CBS ran 37.50 percent of its science stories on Wednesdays, and NBC ran 39.13 percent on that day. Figure 3 shows how strong this trend is.

Several calls to newsroom personnel at the two networks failed to find any reason for this. It may be that Wednesday simply tends to be a slow news day.

FIGURE 3
Number of Science Stories Aired on Each Day of the Week by Network
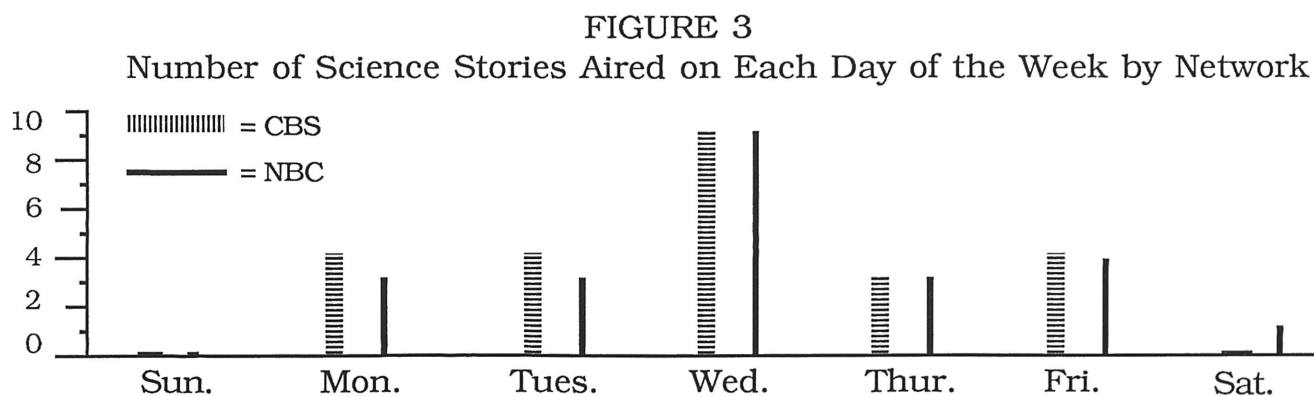
The low number of stories on Saturday and Sunday is primarily due to the low number of weekend news broadcasts. Seven Saturday broadcasts and two Sunday broadcasts of NBC Nightly News were taped during the eight-week sample period; two Saturday broadcasts and one Sunday broadcast of the CBS Evening News were taped.

One of the biggest news stories during President Reagan's two terms broke on November 6. This conveniently divides the sampling period into high news content and low news content sections. How was science news affected?

Table 5 shows that NBC had a drop in science content after November 6, despite a two-part series on aging. This was evident by number of stories and by time devoted to science. NBC's science coverage was particularly sensitive to the change in available news. This may relate to NBC's shorter broadcast and longer stories. When big news breaks, there may be no room for that extra story.

CBS, while it aired fewer science stories, devoted the same amount of time to science news after the big story broke.

TABLE 5
Percent of Science News Coverage by Networks
Before and After Revelation of Arms Sales to Iran

	Before Nov. 6		Nov. 6 and thereafter	
	% science (by item)	% science (by time)	% science (by item)	% science (by time)
CBS	4.47	2.70	3.66	2.72
NBC	4.50	3.28	2.88	2.65

Overwhelmingly, the science topic most often covered by network news is medicine. CBS devoted over two-thirds of its science coverage to medicine. NBC covered medical topics in a staggering 86.36 percent of its science stories. This medical coverage was weighted heavily toward stories on diseases.

A breakdown of the story topics found in the sample is provided in Appendix A.

Because there were very few stories in any topic other than medicine, it was impossible to analyze differences in length and placement of stories in various topic categories.

Network news broadcasts do not make use of sources other than their own staff reporters. When television reporters give information obtained from a wire service or newspaper, they don't credit the intermediary medium.

An analysis of the visual elements used in science stories on network news would constitute a major research project in itself. Some general observations can be made, however.

Stories that are less than 50 seconds long are usually read by the anchor only. The visual aspect of these is normally nothing more than a graphic in the corner of the screen. Occasionally, a full-screen, still graphic is used during one of these brief reports. Longer stories are usually taped, edited and produced by people in the field. Common visuals include people who have the disease that is the subject of the report, people sitting at a desk being interviewed, lab technicians putting chemicals into test tubes and anything with a human interest component. Charts and diagrams using expensive character generators and graphics packages are used in stories that are longer than two minutes.

Newsmagazines

The 16 issues of the magazines sampled yielded a total of 818 articles. There were 30 science stories printed during the eight-week sampling period. By item count, newsmagazines contained an average of 3.67 percent science news or 1.88 science articles per issue.

Time magazine had a substantially higher science news content than Newsweek. There were 20 science stories in Time out of a total of 430. Science content makes up 4.65 percent of the content of Time magazine by item count. Of a total of 388 articles in the eight issues of Newsweek, there were only 10 science stories. Thus, Newsweek contained only 2.58 percent science stories by item.

Time also ran more stories per issue than Newsweek did. It had an average of 53.75 to Newsweek's average of 48.5 articles per issue.

Most pages in the two magazines have a three-column format. This creates column inches that are slightly wider than measurements in standard advertising units. The character count of one line of text in this three-column

format is very close to the character count of a line of text in a five-column format of a newspaper. To convert newsmagazine article lengths to standard advertising unit equivalents, the procedure in the following example will be used:

> A one-page story in a newsmagazine measures three columns wide by 10 inches deep. This makes 30 column inches, which is equivalent to the character count of a 30 column inch story that is printed with five columns in a six-column space. To convert to standard advertising units, we multiply 30 by 1.2 (six-fifths) and get our answer of 36 column inches.

Newsweek's mean science article length was higher than Time's. The mean article length in Newsweek was 46.11 column inches. But the average length of Newsweek's stories was also longer than Time's.

Time's mean article length was 35.83 — not much less than the corrected page size of 36 column inches. Time's average was strongly influenced by stories that were one page in length. Eight of its 20 science stories filled exactly one page.

Time's median article length for science stories was 30, reflecting a large number of shorter articles.

In contrast to the mean article lengths, Newsweek's median article length — 25.8 column inches — was lower than Time's.

These average figures are compared with figures for the entire content of the magazines in Table 6. This table shows that Newsweek devotes only slightly less space per article to science news than it does to other types of news.

Time's science articles are longer, on the average, than other articles in the magazine.

TABLE 6
Mean, Mode and Median Lengths of Articles
for Overall Content and Science Content in Newsmagazines

		Mean	Median	Mode
Time	(overall)	29.2"	24"	36"
	(science news)	35.7"	30"	36"
Newsweek	(overall)	47.7"	28"	36"
	(science news)	46.1"	25.8"	—

The distribution of science article lengths is shown in Table 7. This shows
Newsweek's tendency toward longer articles. Cumulative totals (in parentheses)
make this trend more evident.

TABLE 7
Percent Distribution of Lengths of Articles in Time and Newsweek

	Time		Newsweek	
	(science news)	(overall)	(science news)	(overall)
0" - 12"	20.0 (20.0)	32.1 (32.1)	40.0 (40.0)	23.5 (23.5)
12.25" - 24"	30.0 (50.0)	26.8 (58.9)	10.0 (50.0)	21.0 (44.5)
24.25" - 36"	40.0 (90.0)	23.2 (82.1)	20.0 (70.0)	30.9 (75.4)
36.25" - 48"	*	7.1 (89.3)	10.0 (80.0)	7.4 (82.8)
48.25" - 60"	*	*	*	2.5 (85.3)
60.25" - 72"	*	5.4 (94.6)	10.0 (90.0)	7.4 (92.7)
72.25" - 84"	5.0 (95.0)	1.8 (96.4)	*	2.5 (95.2)
84.25" - 100"	*	1.8 (98.2)	*	*
$100" < x \leq 200"$	5.0 (100.0)	1.8 (100.0)	*	1.2 (96.2)
$200" < x \leq 300"$	*	*	10.0 (100.0)	2.5 (98.8)
$> 300"$	*	*	*	1.2 (100.0)

(* denotes no articles appearing in this category)

Time's science news was placed further forward in the magazine, as
shown in Table 8. Two methods were used to judge this. First, all stories in the
magazine were numbered consecutively, and the mean science article rank was
calculated.

This figure, along with the average number of articles per issue, led directly to calculation of ranked percentile scores. Second, the pages on which science stories began and the total number of pages in each issue were used to compute a second percentile score.

TABLE 8
Percentile Ranks of the Placement of Science News in Newsmagazines

	Ave. story #	Rank %ile	Page %ile	Ave. page #
Time	35.6 of 53.8	66.2	70.9	72.8 of 102.75
Newsweek	37.7 of 48.5	77.7	83.9	81.4 of 83.9

The science articles in these two magazines were not always printed in the science section. In fact only three of the 20 science articles in Time and one of the 10 Newsweek stories had a "Science" heading above them. In Time the other headings given to science stories were as follows: Medicine – 9, Nobel Prizes – 3, American Notes – 2, Health & Fitness – 1, Environment – 1, and Education – 1. Newsweek's other headings were similarly varied: Society – 3, Medicine – 2, Health – 2, and Transitions (a column for listing births, marriages, major awards and deaths of famous people) – 1.

In both magazines there was a lower percentage of science content in the two issues published after the news of the Iran scandal broke. Because of the publication delay associated with weeklies, the first issue to reflect the change was the November 17, 1986, issue of both magazines.

A sample of only two issues makes this an inconclusive indication, but the information is included in Table 9 because further study in this area would be valuable.

TABLE 9
Percent of Science News in Newsmagazines
Before and After News of Arms Sales to Iran

	# articles /issue	#science article /issue	% science content
Before Nov. 17 issue			
Time	55.33	2.67	4.82
Newsweek	47.33	1.33	2.82
Nov. 17 & Nov. 24 issues			
Time	49.0	2.0	4.08
Newsweek	52.0	1.0	1.92

The topics covered in the newsmagazines focused on medicine and health as the other forms of media did. However, other topics were covered. Time included one story on superstring theory -- a complex topic in physics -- that was not discussed in any of the other sampled media outlets during the sampled period.

Time's medical coverage made up 62.5 percent of its science coverage. Newsweek, while it had less science content overall, did branch into non-medical coverage a larger percentage of the time. Its medical coverage made up only 50 percent of its science coverage.

A breakdown of science topics covered in newsmagazines is available in Appendix A.

Time used much more graphic content in its science articles than Newsweek. Fully 90 percent of its science articles used photographs or diagrams. Only 60 percent of the science articles in Newsweek contained graphic content.

However, this does not mean that Newsweek used graphics sparingly when it did use them. One article on anthropology contained 12 photographs.

This single article skewed the average number of visual elements per story quite a bit. If the anthropology story is included, the average number of visual elements per story is 2.2. Without that story the average is 1.1 visual elements. All but one of the visual elements in Newsweek's science articles were photographs. The one exception was a chart of the human anatomy in a medical story.

Time had an average of 1.7 visual elements per science article. The largest was a six-page cover story on viruses. It used seven photographs and one chart. Without this article the average would have been 1.3 visual elements per science story. Again, Time's visual elements were largely photographs — 85.3 percent of the visual elements. The five non-photo visual elements were either charts, graphs or maps.

Newspapers

As expected, the newspapers in the areas where the economy is dependent on research and technology covered more science and technology. However, the difference was not as great as expected in all areas.

The newspapers contained a lower percentage of science news than any other medium sampled. This is to be expected because of the large news hole a newspaper has to fill and because newspapers fill many roles for their varied group of readers. Newsmagazines and broadcast news do not run food or automotive sections. They also do not run horoscopes or full stock market quotes.

The Boston *Globe* had the highest percentage of science content of the four. By item, its content was 2.19 percent science. The amount of science news items was similar in the other three newspapers. Table 10 details the amount of science content in the four newspapers.

TABLE 10
Percent and Actual Amount of Science and Overall Content
in Four Newspapers

	Boston Globe	San Jose Mercury -News	St. Louis Post-Dispatch	Minneapolis Star & Tribune
# of science articles	173	151	120	106
% of science content	2.19%	1.87%	1.79	1.81
mean # of sci. art./iss.	4.12	3.15	2.88	2.52
max. # sci. art./iss.	14	12	6	5

The average lengths of the science articles were shorter than the articles in the newsmagazines. The distribution of lengths of newspaper science articles is shown in Figure 4. This figure shows that the largest number of newspaper science articles were printed at the shorter lengths in all four newspapers. The highest number of stories occured between 10 and 20 inches. The next largest group came at or below 10 inches. The number of science stories continues to drop precipitously in the categories thereafter.

FIGURE 4
Distribution of Science Article Lengths

(D) The St. Louis *Post-Dispatch*

inches (20 = 10.25 to 20)

(A) The Boston *Globe*

inches (20 = 10.25 to 20)

(B) The San Jose *Mercury-News*

inches (20 = 10.25 to 20)

(C) The Minneapolis *Star and Tribune*

inches (20 = 10.25 to 20)
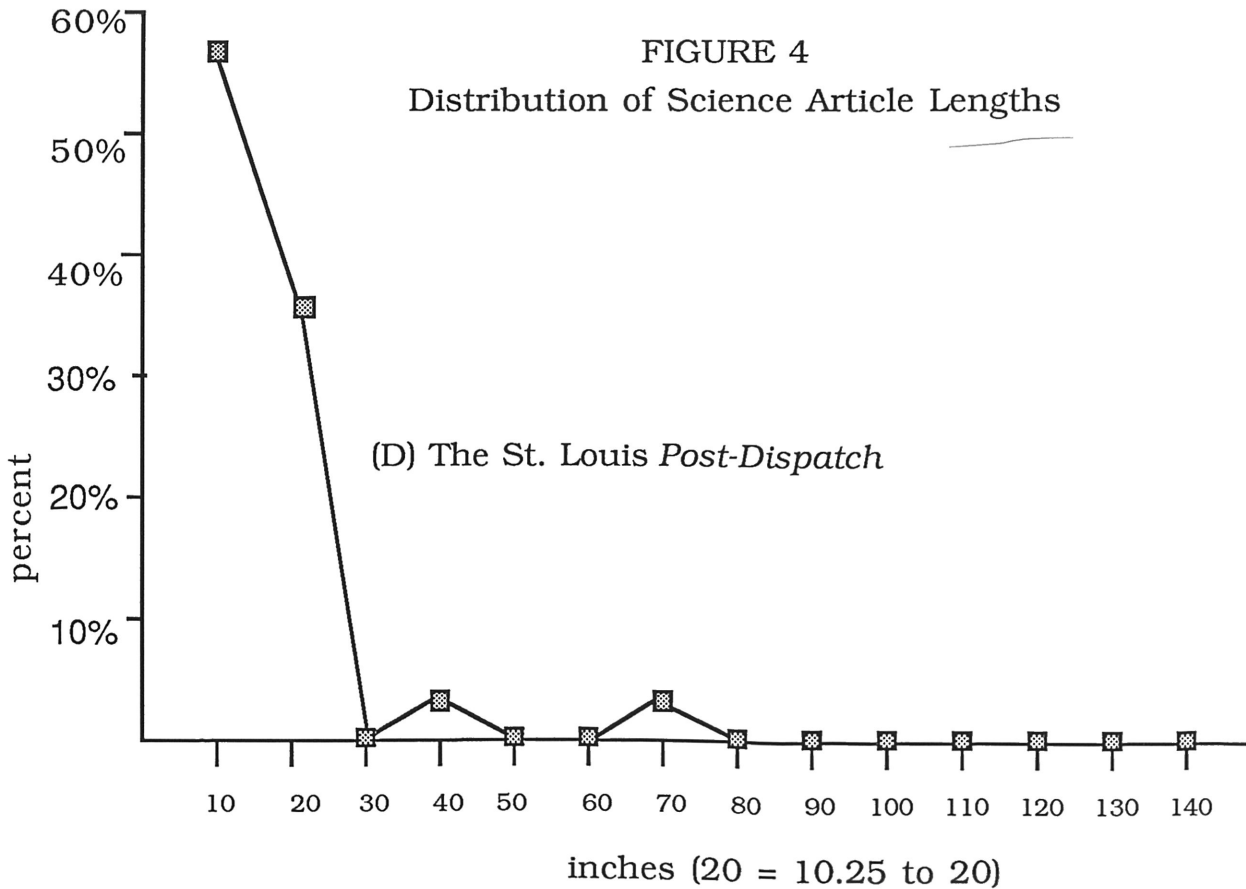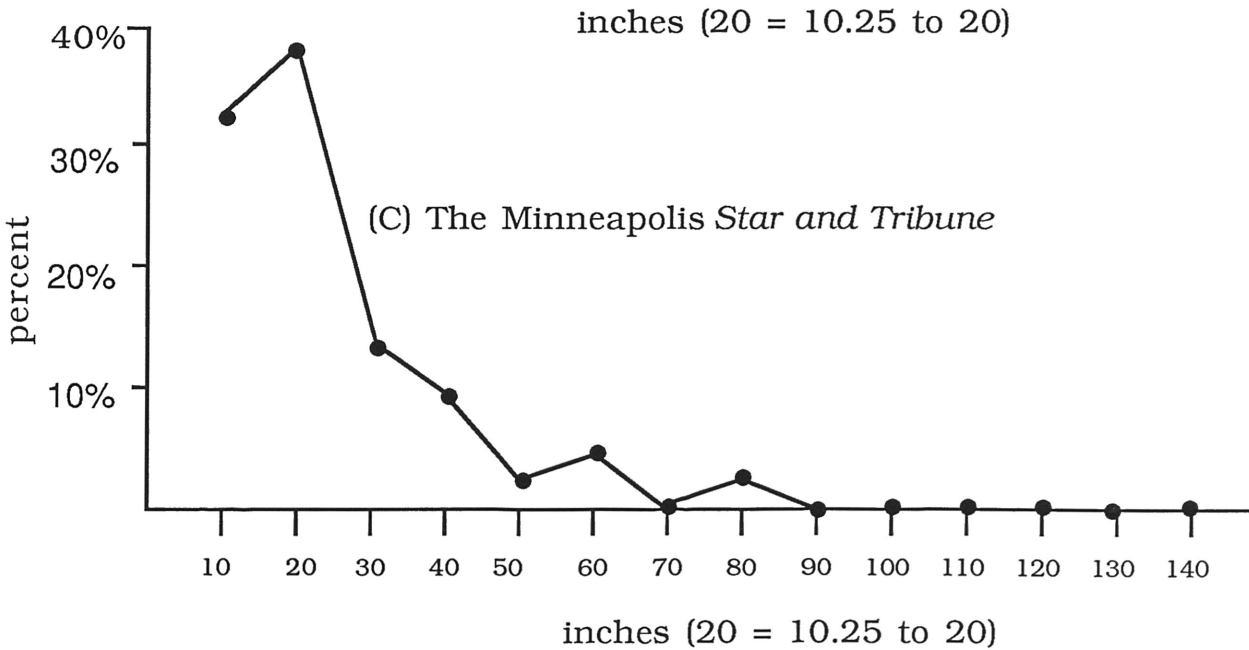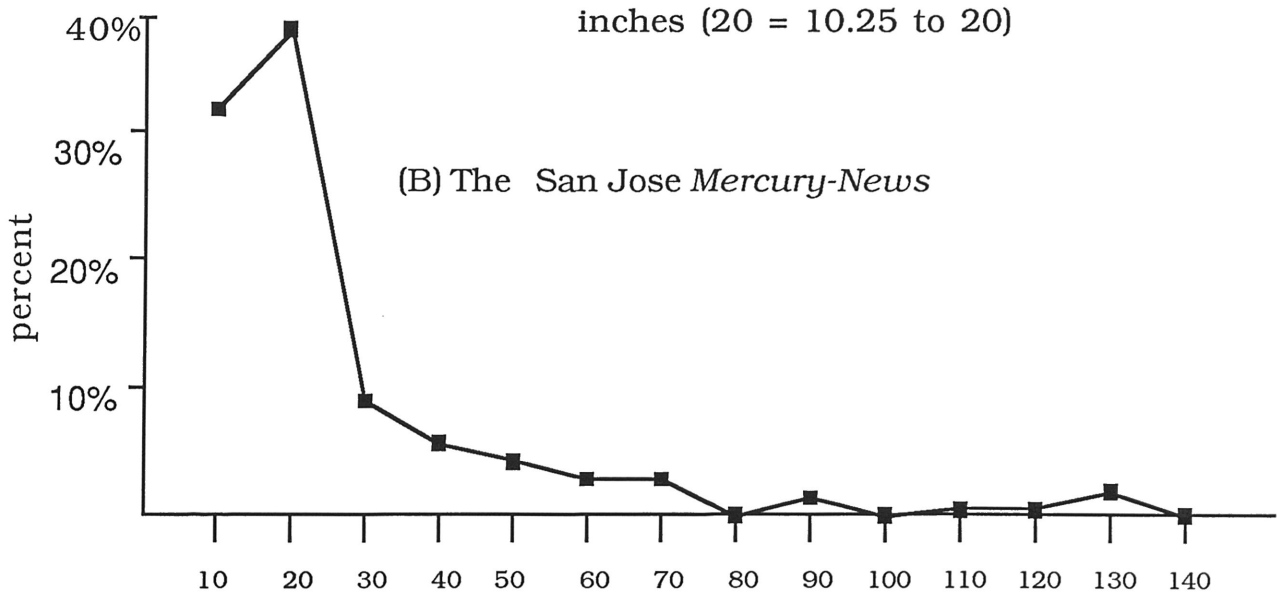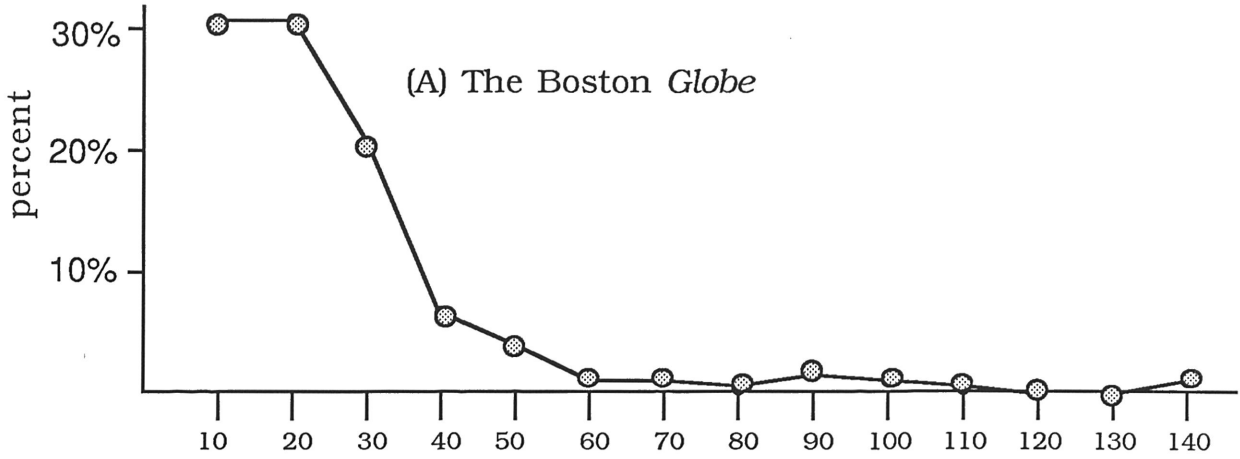
Different newspapers placed science stories differently. Both the Boston *Globe* and the San Jose *Mercury-News* have science and technology sections. They each run about four pages long. Neither of the other papers has a science section. But this does not preclude the inclusion of science news in a newspaper. Both of the newspapers with science sections actually ran more science news outside that section than inside it.

Sections included in a newspaper differ. However, several topics and conventions are followed in section setup in the United States.

Table 11 compares the percent of science content in the various sections of the four newspapers. A large percent of science news is run in section A in all of the newspapers. This shows that many newspaper editors view science content as hard news, not as filler content.

TABLE 11

Percent of Science Content by Newspaper Section

Section	Boston *Globe*	San Jose *Mercury-News*	St. Louis *Post-Dispatch*	Minneapolis *Star & Tribune*
A	52.38	30.07	34.78	56.60
B; general news	13.10	2.80	43.48	**
metro; region; state	2.98	11.89	8.70	16.98
sports	2.98	0.70	*	9.43
business	5.95	0.70	*	5.66
Sci-Tech; Sci. & Med.	16.67	31.47	**	**
living; variety	2.38	16.08	13.04	11.32
local	*	4.20	*	**
other	3.49	2.10	*	*

*: section exists, but contained no science content

**: no section of this type exists in this paper. The *Post-Dispatch's* science page appears in the variety section.

Another way of determinging the emphasis placed on science news is the attention score devised by Budd. The score is not intended to provide an absolute measure of emphasis. Changes in layout fashions would affect it if it were used in this manner. Appropriately used, the attention score is compared to the attention scores given to other articles in the newspaper. Figure 5 shows this comparison. The percent of science content that earn each of the six possible attention scores is compared to the same figures for the overall news content.

From this figure we see that the San Jose *Mercury-News* and the Boston *Globe* give science news approximately the same priority it give to the rest of its news. Overall, the Boston paper does the most to draw more attention to all of its articles.

However, while the Minneapolis *Star & Tribune* places greater than average emphasis on science news for its page style, the St. Louis *Post-Dispatch* puts a very low priority on science news, even when compared with its low emphasis page style.

This shows how different views of the function of science news can affect the amount of science information available to the public. The *Globe* and the *Mercury-News* seem to see science news as equal in importance with other types of news.

But the two papers from areas not known for economic dependence on science and technology have different views of science news. The *Star & Tribune* give science more emphasis by printing feature articles. The *Post-Dispatch* gives very little emphasis to science news. Most of the articles had an attention score of only one or two.

FIGURE 5
Distribution of Attention Scores of Science and Overall Content

□ Science Content
◆ Overall Content

Boston *Globe*

San Jose *Mercury-News*

Minneapolis *Star & Tribune*

St. Louis *Post-Dispatch*
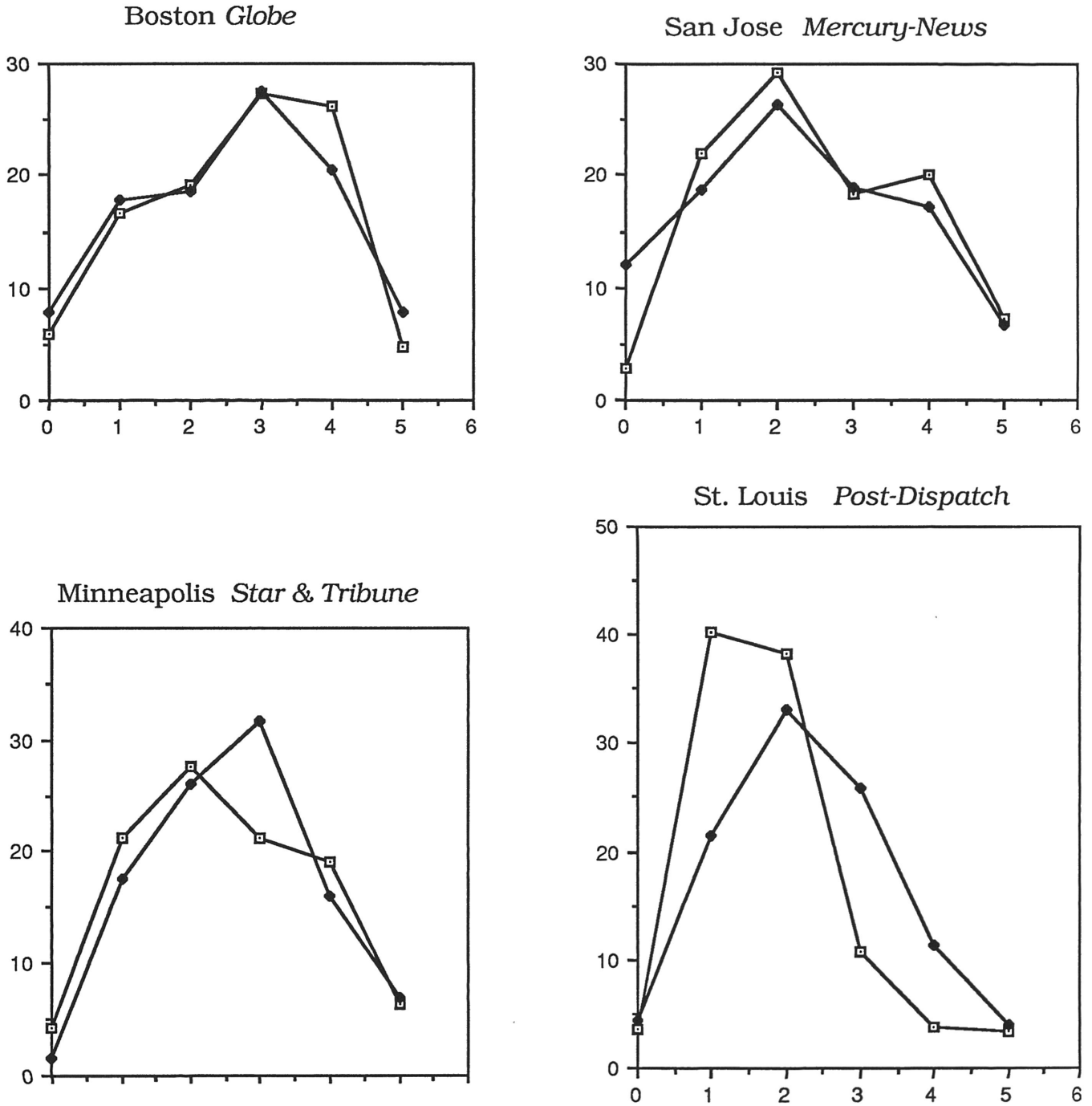
The day of the week that science content was most common varied from newspaper to newspaper. Table 12 shows the distribution of science content by

day of the week. The Boston *Globe* ran its science section on Monday, whereas the San Jose *Mercury-News* ran its science section on Tuesday. The editors of the science pages say there is no reason for these particular days other than that the particular day didn't already belong to another special section.[42] The St. Louis *Post-Dispatch* prints a page titled "Health Notes" each Thursday. Most of the articles concern health tips and other topics not classified as science by the definition of science used in this study. It is usually buried inside the Everyday section.

TABLE 12
Average Number of Science Articles per Issue by Day of Week

Day	Boston *Globe*	San Jose *Mercury-News*	St. Louis *Post-Dispatch*	Minneapolis *Star & Tribune*
Sunday	2.22	2.83	2.12	3.00
Monday	10.40 (1.20)	1.57	1.94	2.0
Tuesday	3.16	6.71 (0.86)	2.87	1.33
Wednesday	3.00	3.00	1.13	4.00
Thursday	5.71	1.43	3.96 (2.85)	4.00
Friday	2.71	3.00	2.79	2.67
Saturday	1.50	1.43	3.14	1.75

(Figures in parenthesis show what the figure would be without the special science section.)

The length of the papers on different days of the week does not relate directly to the number of science articles per issue. The Sunday issue is the largest in all four of the sampled newspapers, but its science content is lower than most days of the week.

How did international events affect science content in these newspapers? Very little, it seems. Table 13 shows the change in the "vital statistics" of the newspapers before and after the Iran scandal was revealed. Science coverage stays fairly constant before and after November 7 — the first day morning

newspapers reported the story. Tendencies toward more articles per issue in some papers can be explained by increased advertising lineage because of the approaching holiday season.

TABLE 13
"Vital Statistics" of Science Coverage Before and After News of Iranscam
in Four Newspapers

	Boston *Globe*	San Jose *Mercury-News*	St. Louis *Post-Dispatch*	Minneapolis *Star & Tribune*
Before Nov. 7				
tot. articles/issue	187.81	163.96	160.17	139.83
% science by item	2.23	1.88	1.81	1.79
Nov. 7 & after				
tot. articles/issue	187.40	172.78	172.34	138.87
% science by item	2.13	1.86	1.76	1.82

Again, the topics in these four newspapers were heavily weighted toward medicine and disease coverage. Appendix B contains breakdowns of the science topics covered by each newspaper.

There are interesting differences between the science coverage printed in the special science sections of the San Jose *Mercury-News* and the Boston *Globe*. These differences are shown in Table 14. The science sections do not emphasize medical news to quite the extent that the papers do overall. Physics and biology are close to the same range of coverage as medicine in the science pages. While the "hard sciences" get more coverage in the science pages, social sciences and medicine get less. Editors of science pages evidently associate hard science topics more closely with science news than they associate social science with science news.

TABLE 14
Percent of Content by Topics in Science and Non-Science Sections

| | Science Sections | | Other Sections | |
	Boston Globe	San Jose Mercury-News	Boston Globe	San Jose Mercury-News
biology/ecology	22.22	17.07	11.29	5.21
geology/anthropology	11.11	17.07	7.26	5.21
genetics	6.67	2.44	4.84	5.21
physics/astronomy	20.00	24.39	16.94	3.13
psychology/sociology	4.44	4.88	8.06	31.25
medicine	35.55	34.15	51.61	50.00
disease	56.25	64.29	81.25	68.75
substance abuse	6.225	7.14	1.56	10.42
reproduction	12.50	0.00	9.38	10.42
diet	0.00	14.29	1.56	2.08
surgery & testing	12.5	14.29	1.56	6.25
other	12.5	0.00	4.69	2.08

Another way to analyze topic coverage is to look at the attention score and space devoted to each topic. Table 15 compares average article length in each topic category in each newspaper. Table 16 shows the distribution of attention scores for each topic category.

TABLE 15
Average Science Article Length by Topic Category
in Four Newspapers (in column inches)

	Boston Globe	San Jose Mercury-News	St. Louis Post-Dispatch	Minneapolis Star & Tribune
physics/astronomy	27.03	32.52	9.57	18.92
geology/anthropology	30.02	39.73	4.05	33.85
biology/ecology	24.84	36.23	7.38	15.94
psychology/sociology	29.11	20.37	11.21	33.31
genetics	18.05	18.27	*	18.42
medicine	17.66	16.13	8.77	14.38
Averages	**22.20**	**22.60**	**8.99**	**18.74**

Table 16 shows that although medicine is the category that garners the most articles, individual medical articles get the least attention. The bulk of the attention, instead, goes to the topics that are generally considered more difficult to understand.

TABLE 16
Average Attention Scores by Topic
in Four Newspapers

	Boston *Globe*	San Jose *Mercury-News*	St. Louis *Post-Dispatch*	Minneapolis *Star & Tribune*	**Averages**
phys./astro.	2.77	2.85	1.03	3.33	**2.50**
geol./anthro.	2.79	3.18	1.87	3.40	**2.81**
biol./ecol.	2.88	3.33	1.76	2.75	**2.68**
psych./soci.	2.82	2.56	1.83	2.78	**2.50**
genetics	2.44	2.67	*	3.33	**2.81**
medicine	2.51	1.60	1.64	2.07	**1.96**
Averages	**2.70**	**2.70**	**1.63**	**2.94**	**2.54**

*: no articles in this group

The sources used by the four newspapers for their science content were related to the sources used for general news in the newspapers. Table 17 shows these differences. While the Boston *Globe*, the largest of the four papers, primarily uses stories written by staff writers, the other three papers depend more heavily on wire services and reprinting articles found in other newspapers. The *Mercury-News* and the *Star & Tribune* used a large number of excerpts from other papers. They included articles that were originally printed in both the *Globe* and the *Star &Tribune*. The *Post-Dispatch* was the paper that depended most on wire stories. Less than 5 percent of its science news had a local origin. The Boston *Globe*, the largest of the four papers and the most prestigious, obtained 47 percent of its science news from local sources.

TABLE 17
Percent of Science News from Different Sources
in Four Newspapers

Source	Boston *Globe*	San Jose *Mercury-News*	St. Louis *Post-Dispatch*	Minneapolis *Star & Tribune*
Staff Writer	38.10	18.25	4.35	19.15
Freelance Writer	8.93	2.19	*	*
AP	22.02	16.79	43.18	36.17
UPI	17.26	10.22	26.09	*
other wire services	13.10	21.17	13.04	19.15
other newspapers	0.60	31.39	13.04	25.53

*: none found in ths category
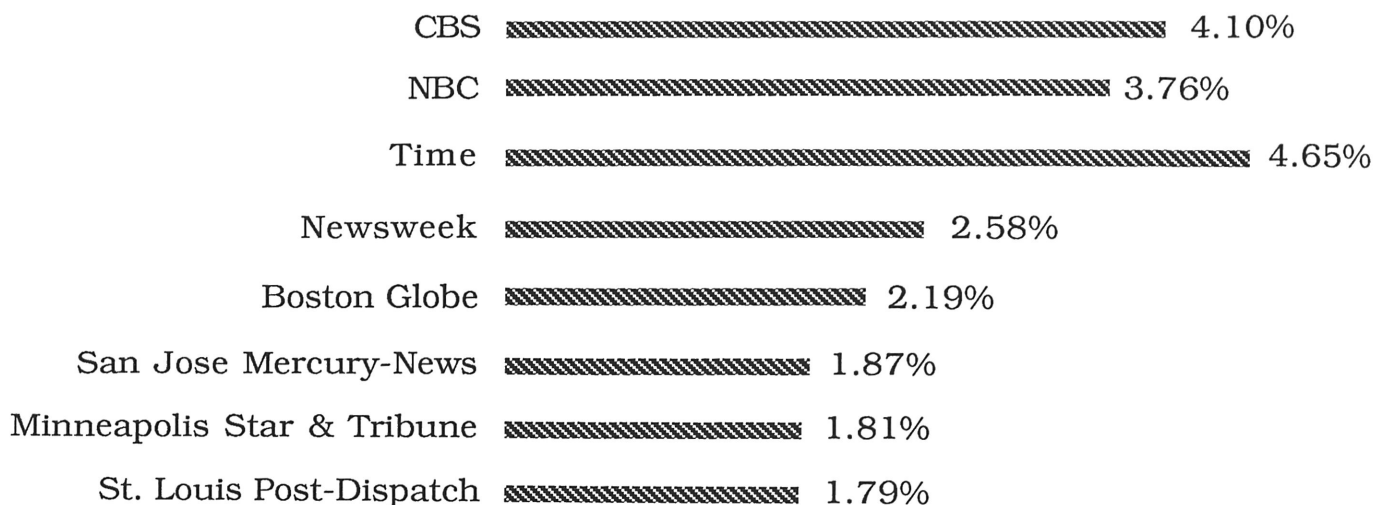
Comparison of the Three Media Forms

Five of the measures used in this report — percent of science coverage, length, placement, the effects of other events on science coverage and topics covered — apply to all three media forms. They are the clues to finding how science news is viewed by media gatekeepers and what kind of knowledge of science is gained by readers and viewers of the mass media.

General attitudes toward science news can be inferred from the data found in this study. However, this by no means proposes that editors and producers make concious decisions about how much and what type of science news to run. It only claims that the data indicates that underlying and possibly unconcious attitudes exist and affect the science news that is available to the average person.

Figure 6 compares the percent of space or time devoted to science content by the eight media outlets sampled. The figure shows this data by number of items. However, the three forms of media differ greatly in their available space. When the size of the news hole is taken into account, newspapers provide the greatest amount of science coverage in absolute terms.

FIGURE 6

Percentages of Science News Content
By Number of Science Stories

CBS	4.10%
NBC	3.76%
Time	4.65%
Newsweek	2.58%
Boston Globe	2.19%
San Jose Mercury-News	1.87%
Minneapolis Star & Tribune	1.81%
St. Louis Post-Dispatch	1.79%

Newsmagazines have the longest average science articles of any of the three media. This is a factor determined by the physical limitations of each media form and not an indication of the emphasis placed on science.

However, a comparison of the distribution of the lengths of science stories — and the attention score distribution in newspapers — compared to the overall distribution does communicate the emphasis a medium places on science news. NBC, Newsweek, the Boston *Globe* and the San Jose *Mercury-News* have similar length distributions for total-news content and science-news content. This reveals an opinion that science news serves the same purposes other types of news serve.

Time and the Minneapolis *Star & Tribune* show greater than average emphasis on science news when length distribution is considered. This indicates that editors see science news as serving a special purpose . They may also believe that greater length is required to make technical information clear.

CBS and the St. Louis Post-Dispatch are the two media outlets studied that had short science articles than average. They both tend to use science news as fillers.

The placement of science articles indicates much within a single media form. But comparisons of placement differences run into various conventions when comparisons among various media are conducted. In newspapers and newsmagazines the section the article is placed in is the best indicator of the editors view of science news. On television, there are few such clues. Instead, the best indicator available is how far into the broadcast the stories are placed.

When CBS used science content as general news, it placed more emphasis on it than NBC did. NBC almost never used science news as feature material, whereas CBS did so often.

Newsmagazines and newspapers showed a strong distinction in the headings they used for science news. While both newmagazines used consumer-oriented headings, three of the newspapers placed most science news in "hard news" sections. Common headings for science news in newsmagazines were along the lines of "Health," "Medicine" and "Education." Only the San Jose Mercury-News published less than half — almost 44 percent though — in its news sections.

News of arms sales to Iran and diversion of funds to the Contra rebels was interesting for other reasons than the simple news value of the story. It pointed to differences in the way science news is treated by different news media. Network news, particularly NBC Nightly News, showed a drop in science news coverage. But newspapers did not show any evidence of the effects of an increased amount of available "hard news." Because newsmagazines are

published weekly, the sample of issues published after the story broke was not large enough to provide reliable data.

The changes in television news and the lack of changes in newspapers reflects the vastly different amount of time or space available to each.

The unity factor in all three media forms is the overwhelming prevalence of medical news. The topical content of the science news in each media is shown in Appendix A. Both network news broadcasts devote over 75 percent of science news content to coverage of medical news. Newsweek and the Minneapolis Star & Tribune also devoted large portions of science content to medical news. Most of this medical news concerns various diseases. Heart disease, AIDS and cancer are the most popular.

Unlike medical news, which was constantly the leader, the category of psychology and sociology varied widely. The network news broadcasts did not include any stories in this category. Newsmagazines omitted the category for the most part. But two newspapers, the San Jose Mercury-News and the St. Louis Post-Dispatch, devoted about 25 percent of their science content to these "soft science" fields.

CONCLUSIONS

The results of this study indicate that different media, and even different outlets in the same media format, see science news differently. Science news is used to serve several functions. These differences may be caused by the practical characteristics of each media, the characteristics of the audience or by attitudes held by the people who control that medium.

Four functions of science news were seen in this study: the "hard" news function, the "filler material" function, the "health" function and the "special interest" function. None of the media outlets sampled used science news to serve any single one of these functions. In all cases the results indicate that the broadcast or publication has two or three reasons for using science news.

Science news is used as hard news more often than many would expect, considering the number of studies that say the media trivializes, sensationalizes and oversimplifies science news.

Network news broadcasts use science news primarily as hard news. The length of a news broadcast is so short — just a little over 20 minutes of non-commercial time — that there is little room for feature material. Feature material is generally saved for after the final group of commercials. As Figure 2 shows, very little science news is broadcast in that time period.

The fact that the amount of science news did decline after the Iran arms story broke, especially on NBC, indicates that science news is in competition with other hard news for air time. If the amount of science news did not decrease at all, that would be an indication that science news is viewed as serving another function on network news.

Newspapers also treat a certain amount of the science news they publish as hard news. Both the Boston *Globe* and the St. Louis *Post-Dispatch* put over half their science news in the first section. The other two newspapers located about one-third of their science content in Section A.

If newspapers view science news as filler material, we would see science content spread throughout the paper. If it were seen as feature material, more would be placed in the entertainment and living sections.

This is not to say that newspapers never use science articles in a "filler" capacity. Both newspapers and newsmagazines occasionally run science news in the national briefs columns. In this capacity, the articles are not judged as much by their importance as they are by their ability to tell a story quickly and to fill space.

All three media formats use science news in its "health" function. Science news that performs this function is intended to provide helpful information for a wide audience. It is debatable whether this function is performed well by devoting a large percentage of the amount of science coverage to sporadic stories about rare diseases.

The "special interest" function is served by those science articles that are located in special science and technology sections. These are intended for those people who purposefully seek science news. Both the newspapers located in the areas with an economic interest in science have these special sections. The newsmagazines and the St. Louis *Post-Dispatch* use this function on a smaller scale.

Any recommendations about the amount of science to cover would be based on the premise that more science news should be available. It serves little to say

this, however. Most content analyses advocate more extensive coverage in that particular field. Because space and time cannot be created, not all these topics can be covered further.

Knowledge of the functions that science news serves will increase editors' ablility to suit science coverage to a particular audience's needs.

This study suggest several profitable avenues of further study. A similar study of technology news tjo determine baseline date and examine the reasons for the use of technology content would be useful. Further studies of how major events affect science coverage would shed light on that subject. Also, in the course of sampling newspaper articles it seemed that the obituaries run in the *Globe* and the *Star & Tribune* were for a disparportionate number of scientists.

This study also shows the ease of comparisons between various media. These techniques will be valuable in other areas of study.

ENDNOTES

[1]Clyde Z. Nunn, "Readership and Coverage of Science and Technology in Newspapers," *Journalism Quarterly*, 47:95-100 (Spring 1979).

[2]Serena Wade and Wilbur Schramm, "The Mass Media as Sources of Public Affairs, Science and Health Knowledge," *Public Opinion Quarterly*, 33: 197-209 (Summer 1969).

[3]Hillier Krieghbaum, "Reporting Science Information through the Mass Media," *Journalism Quarterly*, 40: 291-292 (Summer 1982).

[4]Peter Aleshire, "The Forces of Change," *The Oakland Tribune*, March 12, 1987, p. C6.

[5]Krieghbaum, *ibid*.

[6]Michael Altimore, "The Social Construction of a Scientific Controversy: Comments on Press Coverage of the Recombinant DNA Debate," *Science, Technology, & Human Values*, 7:24-31 (Fall 1982).

[7]J.S. Bowman and K. Hanaford, "Mass Media and the Environment Since Earth Day," *Journalism Quarterly*, 54:160-165 (Spring 1977).

[8]Vicki S. Freimuth, Rachel H. Greenberg, Jean DeWitt and Rose Mary Romano, "Covering Cancer: Newspapers and the Public Interest," *Journal of Communication,* 34:62-73 (Winter 1984).

[9]David M. Rubin and Val Hendy, "Swine Influenza and the News Media," *Annals of Internal Medicine,* 87:769-774 (December 6, 1977).

[10]National Association of Science Writers, *Science, the News and the Public* (New York: New York University Press, 1958).

[11]Sharon Dunwoody an Byron Scott, "Scientists as Mass Media Sources," *Journalism Quarterly*, 59:52-59 (Spring 1982).

[12]Newspaper Advertising Bureau, *Readership and Coverage of Science and Technology in Newspapers* (New York: Newspaper Advertising Bureau, 1977).

[13]Nunn, ibid.

[14]Riffe, et al., "Topic Mix in Network News," *Journalism Quarterly*; 59: 364-369 (Fall 1982).

[15]Stempel, Guido H., III, "Uniformity of Wire Content of Six Michigan Dailies," *Journalism Quarterly*; 36:45-48 (Spring 1959).

[16]Stempel, *ibid.*

[17]Budd, Richard W., "Attention Score: A Device for Measuring News 'Play'," *Journalism Quarterly*; 41:259-262 (Fall 1964).

[18]Sherburne, E.G., "Science on Television: A Challenge to Creativity," *Journalism Quarterly*; 40:300-305 (Summer 1963).

[19]Edward J. Burger, Jr. *Health Risks: The Challenge of Informing the Public* (Washington, D.C: The Media Institute, 1984).

[20]Carroll J. Glynn and Albert R. Tims, "Sensationalism in Science Issues: A Case Study," Journalism Quarterly, 59:126-131 (Spring 1982).

[21]Freimuth, ibid.

[22]Hugh M. Culbertson and Guido H. Stempel III, "Possible Barriers to Agenda Setting in Medical News," Newspaper Research Journal, 5:53-60 (Spring 1984).

[23]Rachel H. Greenberg, Vicki S. Freimuth and Elaine Bratick, "A Content-Analytic Study of Daily Newspaper Coverage of Cancer," in Dan Nimmo, ed., Communication Yearbook 3 (New Brunswick, N.J.: Transaction Books, 1979).

[24]Susan Cray Borman, "Communication Accuracy in Magazine Science Reporting," Journalism Quarterly, 55:345-346 (Summer 1978).

[25]James W. Tankard and Michael Ryan, "News Source Perceptions of Accuracy of Science Coverage," Journalism Auarterly, 51:219-225 (Summer 1974); D.L. Pulford, "Follow-up Study of Science News Accuracy," Journalism Quarterly 53:119-121 (Spring 1976).

[26]Sharon Dunwoody, "A Question of Accuracy," IEEE Transactions on Professional Communication PC-25: 196-199 (December 1982).

[27]*Broadcasting Age*, 29: 258 (September 1986).

[28]*Advertising Age*; 21: 21-23 (July 1986).

[29]William R. Oates, "Social and Ethical Content in Science Coverage by Newsmagazines," Journalism Quarterly, 50:680-684 (Winter 1973).

[30]Jon D. Miller, "Reaching the Attentive and Interested Publics for Science," in Sharon M. Friedman, Sharon Dunwoody and Carol L. Rogers, ed., *Scientists and Journalists: Reporting Science as News* (New York: American Association for the Advancement of Science, 1986).

[31]Neal E. Miller, "The Scientist's Responsibility for Public Information: A Guide to Effective Communication with the Media," in Sharon M. Friedman, Sharon Dunwoody and Carol L. Rogers, ed., *Scientists and Journalists: Reporting Science as News* (New York: American Association for the Advancement of Science, 1986).

[32]Information Please Almanac

[33]Editor & Publisher Yearbook, 1986

[34]Bruce J. Cole, "Trends in Science and Conflict Coverage in Four Metropolitan Newspapers," Journalism Quarterly, 52:465-471 (Autumn 1975).

FIGURE 7
Distribution of Science Topics
in Two Newsmagazines and Two TV News Shows

Time

14.29%

4.76%

47.62%

14.29%

9.52%

9.52%

Legend:
- phy./astro.
- geol./anthro.
- biol./ecol.
- psychol./soci.
- genetics
- medicine

Newsweek

30.0%

60.0%

10.0%

CBS

4.55%

9.09%

4.55%

4.55%

77.27%

NBC

4.55%

4.55%

4.55%

86.36%
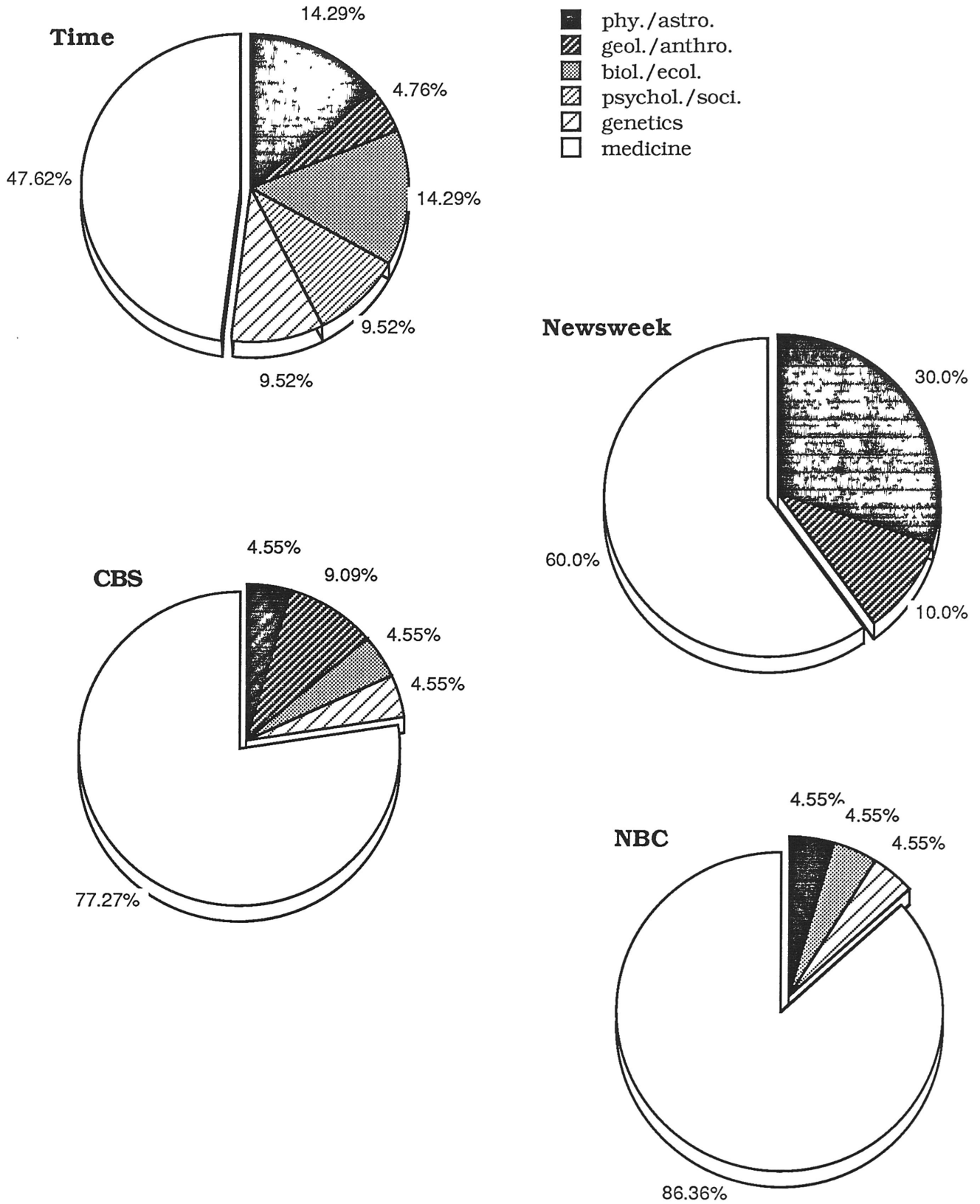
FIGURE 8
Distribution of Science Topics in Four Newspapers

- phy./astro.
- geol./anthro.
- biol./ecol.
- psychol./soci.
- genetics
- medicine

Boston *Globe*
- 17.75%
- 8.28%
- 14.20%
- 7.10%
- 5.33%
- 47.34%

San Jose *Mercury-News*
- 9.49%
- 8.76%
- 8.76%
- 23.36%
- 4.38%
- 45.26%

St. Louis *Post-Dispatch*
- 3.57%
- 7.14%
- 17.86%
- 25.00%
- 46.43%

Minneapolis *Star & Tribune*
- 6.38%
- 10.64%
- 8.51%
- 8.51%
- 6.38%
- 59.57%