

Report on Time Magazine Research

During the spring semester of 2001, the students in Dr. Nathan Wetzel's statistics classes embarked on a study of Time magazine. An imaginary client had presented the class with two questions of primary interest.

1. Has the reading grade level of the material in Time decreased over the last 20 years?
2. Has the percentage of Time devoted to advertisements changed over the last 20 years?

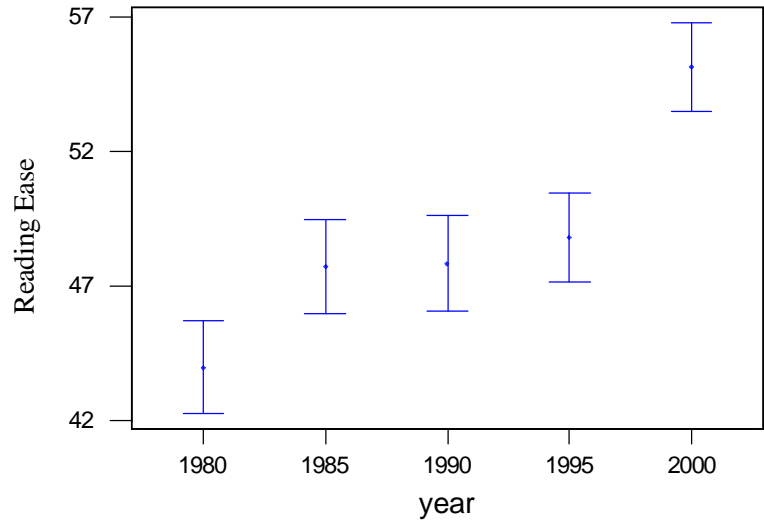
Any changes that we found may have been conscious editorial changes that have taken place in the last 20 years, others may be due to changes in the readership or in the society as a whole. The purpose of the study was to find and describe the changes. The reasons or motivations behind these changes were not a major concern.

In answering these questions, we focused on the years 1980, 1985, 1990, 1995 and 2000. We took a random sample of 35 issues from 1980, and then used the respective issues from 1985, 1990, 1995 and 2000. The randomness guarded against any bias that we may have had. Looking at the same issues for each year, allowed us to see if, for example, any changes in percentage of advertisements were due to seasonal trends. Each student was randomly assigned two issue of Time magazine. In each of those issues, the student was assigned three articles, (1) a random article from the world or international section, (2) the cover story article and (3) the last article in the magazine, which was typically an essay. For each article, the student made a copy and typed the first four paragraphs into Microsoft Word 2000. The Flesch-Kincaid Grade Level, Flesch Reading Ease, and Number of Words per Sentence were recorded. Since the assignment of magazines to students was random and fewer students participated than Dr. Wetzel expected, a few of the assigned magazines were not analyzed. In addition, two of the assigned 'articles' were a map and a comic. These were omitted from the statistical analysis. The student also physically counted the total number of pages in the magazine (each side of a full size page counted as a page), and also counted the number of pages of advertisements (counting by halves). The fact that there were 82 students doing this data collection adds to the measurement error in the study.

The Flesch-Kincaid Grade Level and Flesch Reading Ease scores are based on the average number of syllables per word and words per sentence. The Grade Level rates the text on a U.S. grade school level, but is capped at the 12th grade level. The Reading Ease rates text on a 100 point scale where the higher the score, the easier it is to understand. Thus, the higher the Ease, the lower the Grade level. Since, much of the writing in Time was determined to be at the 12th grade level, but may have been at a 13th grade level or higher, we will focus our analysis on the Reading Ease score which did not have this problem. The table and graph below shows the average Reading Ease score for the five years in our study. The graph also shows 90% confidence intervals for the mean reading ease for that year. A statistical analysis of these scores gives results that are fairly clear in the graph. The average Reading Ease increased significantly from 1980 to 1985, then remained relatively constant from 1985 to 1995, and increased again from 1995 to 2000.

90% Confidence Intervals for the Average Reading Ease by year.

Year	Number of articles	Average Reading Ease
1980	95	43.98
1985	93	47.75
1990	92	47.86
1995	105	48.80
2000	104	55.19

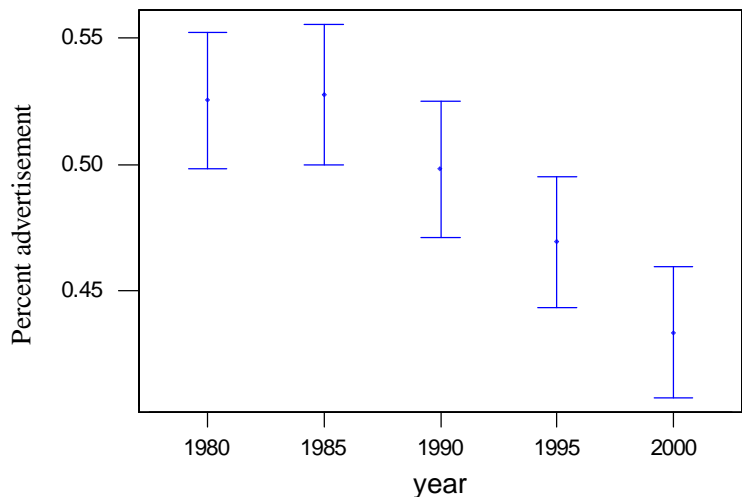


The results for grade level were similar, showing a decrease in the average grade level of about 1.38 grade levels (90% confidence interval of 1.04 to 1.74 grades) from 1980 to 2000.

The results for percent advertising were also interesting. As stated earlier, we counted pages of advertising and total pages, and then computed the ratio to be the percent of the magazine that was advertising. The results are tabulated and graphed below.

90% Confidence Intervals for Average Percentage of Time magazine pages which were advertising (by year)

Year	Number of magazines	Average Percent advertising
1980	32	52.53%
1985	30	52.77%
1990	32	49.81%
1995	35	46.93%
2000	35	43.32%



Again, the graph summarizes the data well. The change in average percentage of Time magazine devoted to ads has been a gradual decrease. Over the 20 years from 1980 to 2000, the average percentage of Time devoted to advertisement has significantly decreased about 9% (a 90% confidence interval of 5.6% to 12.8%). Investigating this trend further shows that the actual number of pages of advertisement has remained

relatively constant while the total number of pages has increased significantly (with the exception of 1995). It appears that the decrease in percentage of pages devoted to advertisement is due to an increase in the total number of pages. In addition, since Time magazine is divided into two volumes for each year, we looked at differences in advertising between the first and second half of the year. The results are not conclusive, but they indicate more pages and pages of advertising in the second half of the year.

Further analysis of the client's questions should include:

1. data from more years to try to identify when and if any dramatic changes took place.
2. more consistent counting of the pages and pages of advertisement. Students identified ads by sight and likely missed some advertisements with a high percentage of text. Also, a few students noted that the microfilm for Time had a few duplicate pages that may have been counted twice.
3. more text from each article. Since we only used the first four paragraphs, and the beginning of the article may be more overview and thus may contain longer sentences, we may be under-estimating the Reading Ease.

Nevertheless and in conclusion, we believe that the results of our study indicate two main changes in Time magazine over the last 20 years. The Reading Ease as calculated by the Flesch Reading Ease formula has increased, and the number of pages of content has increased.