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ABSTRACT

Noting that technology in the field of graphics and printing has permitted greater use of color, photographs, and graphics by newspapers, a study examined the effects of economic factors such as newspaper competition and ownership on the actual use of new technology for color and graphics. The newspaper sample, stratified on the basis of ownership and market structure, included 113 daily newspapers from 39 states and the District of Columbia for one randomly constructed representative week in November 1984. Content analysis began with measurement of the total content area of each newspaper front page, minus the area for the nameplate. The quantity and area of all graphic elements were measured, as was the area of color. The analysis revealed that maps, photographs, charts, and illustrations represented 27% of the front page's total area. Color was used by 32% of the newspapers regularly, while 59% occasionally used some front page color. Results also showed that the number and area of graphics and space devoted to color increased with increased newspaper competition, but not with television competition. It was also found that as the size of group ownership increased, the number of graphics used on the front page increased. (HOD)

Economic Forces Behind Newspapers' Increasing Use of Color and Graphics

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The success of USA Today has attracted reader interest and debate within the journalistic community concerning the merits, costs, and standards of publishing more color and graphics. Technology in the field of graphics and printing has allowed the possibility of greater use of color, photographs and graphics by newspapers at affordable costs, but these costs remain higher than publishing papers without color or graphics. Although newspapers have been converting to offset and electronic systems, use of new technology has not always been a management priority. The purpose of this study was to learn what effect economic factors such as newspaper competition and ownership have on the actual use of new technology for color and graphics.

Color, photographs and graphics on newspapers' front pages were examined because page one is a paper's showcase. If newspaper editors pay attention to their paper's appearance, then they will take special care with the front page, which attracts readers' attention on news racks.

Review of the Literature

Significant changes in the use of color and graphics in newspapers have occurred in the past 20 years. Today's front pages contain larger photographs and more graphics, and this has resulted in a drop of the front page story count from 13 in 1965 to 6 in 1985.[1] A 1983 study based upon questionnaires received from 78 newspaper editors found that 34.6 percent of daily newspapers regularly use four-color graphics on their front pages, and another 28.2 percent occasionally use front page color.[2]

The public enjoys color, photographs, and informational graphics. Editors, in general, also recognize their important role. People, for example, overwhelmingly prefer newspaper pages with color pictures.[3] Studies have found readership of photographs is higher than readership of text.[4] In addition, stories accompanied by photographs get higher readership than stories without photographs.[5] Large photographs especially increase readership of stories, and people spend more time with the story which may lead to higher recall of the information within the story.[6] Color graphics also increase impact. They can make a complicated story easier to understand, and they can condense a tremendous amount of information into a small amount of space.

We are bombarded daily with thousands of visual images, each seeking a few seconds of our attention. Walking past news racks, grey newspapers cannot seem to compete with magazines' bright colors and photographs. Theories of monopolistic competition, economies of scale, and the joint product nature of newspapers explain why color and graphics should be used for differentiating products in direct competition and television competition markets.

Newspaper editors overwhelmingly agree (94.9%) that appearance is a critical factor in competitive newspaper markets.[7] Each paper in a market must cover the daily news. They may compete with each other through their analytic and investigative reporting or with their appearance. A paper with color and graphics can boost circulation and advertising revenues.[8] Given a monopoly or strong oligopolistic market structure, one would expect little effort or money devoted to product improvements. Papers would be slow to innovate because the lack of rivalry eliminates any need.

Newspaper publishers, for example, used to consider color too expensive and time consuming,[9] yet good color makes a newspaper seem up-to-date, and progressive.

Ozanich found that in towns with competing newspapers, smaller papers had to overcome cost disadvantages based on economies of scale through successful product differentiation.[10] This is supported by Weaver and Mullins' study which found that "trailing" papers in competitive markets were slightly more likely to use modern formats and color photographs on their front pages than "leaders."[11] Even small papers have taken to process color as a means of keeping competitive with larger dailies. A recent survey found that 58 out of 121 Southern dailies with circulations less than 25,000 produced their own color.[12]

Inter-media competition from television may explain why some papers use color and more graphics. While few homes in the United States had color television sets in 1966, today they are common. Color has become part of our media environment, and it has a cumulative effect on people.[13] With television providing colorful images of the news, newspapers must provide a substitute yet different product. Several Florida dailies adopted color partially from their sense of competition with television.[14]

The increased financial assets of large newspaper chains, and the need to attract circulation may explain why groups would more rapidly adopt new technology for publishing color and graphics. Management of a newspaper chain can invest in research and extensive marketing studies to which privately owned newspapers lack access. Management of a large group can provide specialists to train employees at its newspapers to implement new technology.

Large newspaper chains also have sufficient financial clout to buy equipment and presses necessary for papers to convert to four-color reproduction, whereas independent papers may be short of capital.[15]

This study attempted to test three hypotheses. These are:

1) As the intensity of direct newspaper competition within a market increases, the number of graphics, space devoted to graphics, and space devoted to color on the front page will increase.

2) As the intensity of television competition increases, the number of graphics, space devoted to graphics, and space devoted to color on the front pages will increase.

3) As the number of newspapers in a group increase, the number of graphics, space devoted to graphics, and space devoted to color on the front page will increase.

Method

An analysis was done on a sample of newspapers originally gathered by Stephen Lacy for his dissertation.[16] The sample was stratified on the basis of ownership and market structure. It included 113 daily newspapers from 39 states and the District of Columbia for one randomly constructed representative week in November 1984.

Content analysis began with measurement of the total content area of each newspaper page, minus the area for the nameplate. The quantity and area of all graphic elements on the front page was measured, as was the area of color. Existing data was used for the independent and control variables.

The three dependent variables were: (1) quantity of graphics; (2) percentage area of graphic material; and (3) percentage area of color. Quantity of graphics was operationalized as the total number of photographs, graphs, maps, tables, or illustrations for the week's papers divided by the number of publication days. Any

graphic elements present in the nameplate were excluded. The square inches of photographs, graphs, charts, maps, and illustrations was measured in order to get the total area of graphics. Measurement of photographs included the areas for overlines, captions, and cutlines. The total area of graphic material was divided into the total content area of the newspaper page to yield the percentage area of graphic material. The total area of color included the area of color graphics plus any tint blocks behind stories. Color in nameplate and index areas did not figure in this study. The square inches of color divided into the total content area of the newspaper page yielded the percentage area of color.

This study used the following independent variables in order to answer the research questions: (1) intensity of newspaper competition; (2) intensity of television competition; and (3) number of newspapers in a group. Intensity of newspaper competition was measured on a scale of zero to 100. In two-newspaper cities, the percentage of total city population of the trailing paper was subtracted from the percentage of total circulation of the leading paper. If each of the papers had 50 percent, then the score would be zero. If there was no competition, the score would be 100. In three-newspaper cities, the percentage of total city population for the trailing paper was subtracted from the percentage of circulation of the leading newspaper, or if the newspaper was the leading newspaper, its percentage of total circulation was subtracted from the percentage of circulation by the next closest paper. Joint operating agreement newspapers were counted as competitive newspapers because

there was little difference in the sample between the JOA and competitive newspaper content.[17] Intensity of television competition was indicated by the number of commercial television stations in a city and adjacent counties that provided grade A or grade B coverage of the city.[18] Grade A coverage means satisfactory coverage of 90 percent of the homes 90 percent of the time. Grade B coverage means satisfactory coverage of 90 percent of the homes at least 50 percent of the time. The number of newspapers in a group was recorded; independent papers were assigned a zero number.[19]

The following control variables were also entered in the regression equation with the dependent and independent variables: average daily circulation, number of households in a market, percentage of city population with a college education, and gross income per household.

A newspaper's circulation could be ar important explanatory factor for the presence of color. In 1979, a content analysis of 99 front pages found that larger dailies tended to use color more often than did smaller papers.[20] In that study, use of color was defined as at least one color element in a five-day period. A 1983 study of newspaper front pages, however, found the surprising result that larger circulation dailies are less likely to use color than dailies with circulation of less than 50,000.[21] Therefore, results of previous studies are no help in predicting the effect of circulation size upon the dependent variables. The average daily circulation was defined as the total weekly circulation divided by the number of days published.[22]

Three demographic variables were included. The number of

households in a market was included as an indication of market size.[23] Circulation and presence of competition may appear to be a function of market size, but some newspapers have a low market saturation, and some small cities have more than one newspaper. Gross income per household for 1984, and percentage of city population (SMSA) with 16 or more years of formal education were variables[24] selected on the possibility that people with higher incomes and a college education would be better served by a newspaper with more color and graphics.

A regression analysis was used in this study as a way of analyzing how each dependent variable is affected simultaneously by several independent and control variables. In other words, this statistical tool can tell us how the space devoted to color on newspaper front pages is affected by newspaper competition, television competition, and the number of newspapers in a group. With a regression equation, one can calculate the relative contributions of several independent variables. Beta coefficients indicate the direction and strength of the relationship between a dependent variable and the independent/control variables. In addition, the multiple-correlation coefficient (R^2) indicates the extent to which the independent and control variables together predict the dependent variable score. Degree of significance indicates how unlikely results of the analysis are due to chance. If results are significant at the $p < .05$ level, for example, then the sample study should properly represent the general population of all newspapers 19 out of 20 times.

Use of regression analysis for statistical inferences is based on five assumptions which must be met before assessing its results.

These assumptions are: random sampling, variable independence, continuous interval data, a linear regression line, and distribution of the data along a standard curve. The data fit these assumptions within acceptable limits. The data were also checked for outliers and the possibility of multicollinearity; both of these problems could affect the conclusions. Outliers were defined as those values that fell outside three standard deviations from the mean.[25] Five of the variables had one to three outliers. All outliers were reassigned the value of three standard deviations. The correlation matrix in Table 1 shows only one correlation above .500, and this is between circulation and number of households in the city. As a further check, multiple regressions were run alternating the various independent and control variables as the dependent variables to see if any of these were linear combinations of the other variables. No problem with multicollinearity was found.

INSERT TABLE 1 HERE

Findings

Newspapers in this sample used an average of 3.4 photographs, maps, charts, or illustrations on their front pages. These graphics represent 27 percent of the page's total area[26]. In this study, 32 percent of the newspapers use color regularly and 59 percent occasionally use some front page color[27]. This finding supports Utt and Pasternack's study which found that 34.6 percent of newspaper dailies regularly used four-color graphics on their front pages and another 28.2 percent occasionally used front page

color.[28] The average percentage area of front page color was 9 percent. There was no statistically significant correlation, however, between the circulation of newspapers and their use of color. This finding refutes the 1979 study which found that larger papers used color more often, and the 1983 study which found that larger circulation dailies were less likely to use color than dailies with circulation of less than 50,000.[29]

The first hypothesis predicted that the number and area of graphics and the space devoted to color would increase with increased newspaper competition. This hypothesis is strongly supported by the results presented in Tables 3, 4, and 5. As competition increases, the number of graphics, the percentage of front page given graphics and percentage of front page given color increase. The beta weights in the tables are negative because of the nature of the competition scale. In each of the three regressions, intensity of competition proved to be a statistically significant variable and accounted for between 10 and 12 percent of the total variance in the three dependent variables.

INSERT TABLES 2, 3, AND 4 HERE

The second hypothesis predicted that the number and area of graphics and the space devoted to color would increase with greater television competition. There is no support for the second hypothesis. Television competition was not a significant variable in explaining variance for any of the three dependent variables.

The third hypothesis predicted that the number and area of graphics would increase as the number of newspapers in a group

increased. Table 3 provides partial support for this hypothesis. Group ownership was a significant variable in explaining the quantity of graphics on front pages. As the size of a group increases, the number of graphics used on the front page increases. Group ownership accounted for 4.5 percent of the total variance for this dependent variable. It also accounted for 2.2 percent of the variance of the space devoted to color, although such variance was not significant at the $p < .05$ level. Group ownership does not appear to be related to the area of graphics on front pages.

In all three regressions, the total amount of variance in the dependent variables accounted for by the equations ranges from 16.9 to 18 percent. While this is not a great deal of variance, all three regressions are significant at the $p < .01$ level, which indicates there is less than a 1 percent chance the relationships between the dependent variables and the set of independent and control variables were due to sampling error.

Discussion and Conclusions

Quality color and graphics in newspapers is needed and wanted by advertisers and readers. As newspaper presses become old or unreliable from lack of good maintenance, management faces the decision of whether to make expensive investments for quality offset or flexographic printing and for pre-press equipment such as a Hell laser scanner for color separations, and a Hell Chromacom color-pagination system. Competition from other papers in the city seems to be a factor in management's decision. Some newspapers may adopt color and graphics to keep pace with the competition, and others wish to differentiate themselves from the competition; either way, readers benefit.

Television competition does not appear to have an effect on the front page appearance of newspapers. Perhaps television news and newspapers are viewed as totally different products. They are not such close substitutes that people can easily switch between the two. It seems reasonable, however, to believe that new technologies such as television news and videotext are having an effect upon newspapers and newspaper appearance. A more sensitive instrument for measuring television competition might better evaluate any impact of television competition on newspaper graphics. The number of stations in an area may not be a good indicator of the effects television has on the reader and advertising demand for daily newspapers.

Another area worth examination is the role of newspaper groups in determining newspaper appearance. Although no relationship was found between the number of newspapers in a group and the space devoted to color, for example, perhaps there is a relationship between some groups and the space devoted to color on front pages.

Papers in large newspaper groups use larger quantities of graphics, but not more area of graphics. The number of graphic elements, however, reflects a financial commitment because no matter what size graphics are reproduced, people must be hired, time must be used, and equipment must be purchased in order to produce those graphic elements. On the other hand, the cost of publishing a large graphic is no greater than the cost of a small one. Findings indicate, therefore, that the number of newspapers in a group is related to a financial commitment towards graphics.

As mentioned above, the seven independent and control variables account for only a limited amount of variance. Most of

the variance accounted for is associated with competition. Other factors also play an important role in determining the use of graphics and color on the front page. These variables would include costs of printing color and graphics, the knowledge of the editorial staff about the use of color and graphics, the staff's attitude about the use of color and graphics, and the capabilities of the printing equipment. The possible contribution of these technological and sociological variables suggests a more extensive study that would involve survey and content analysis.

Management's decision whether to increase its paper's use of color and graphics is not a simple one. Newspapers may have a long tradition in a community and be slow to change. Management may already have a heavy investment in press equipment which it needs to recover before purchasing newer technology. Some newspapers may adopt color to boost staff morale or out of a sense of social responsibility and professional competetence. Competition from other newspapers, however, stands out as an important economic factor in newspapers' increased use of color and graphics. Competition is an outside force forcing management to differentiate its product to attract readers. While not the only force, competition is important in determining what types of graphics will be used on the front pages of many copies ofdaily newspapers in the United States.[30] In addition, newspapers in groups tend to use more graphics. Competition and ownership differ, however, because competition requires a reaction by management if their firm is to survive, owners need not respond by increased use of graphics and color in the absence of competition. This discretionary ability of ownership suggests periodic evaluation of

groups use of graphics and color to see how the discretion is being exercised.

Notes

[1]A study by the Associated Press Managing Editors of front pages of more than 30 newspapers in different circulation categories for one specific day in 1965, 1975, and 1985 as reported in "Front Pages: How Much Have They Changed?" Editor & Publisher, 2 November 1985, p. 15.

[2]Sandra H. Utt and Steve Pasternack, "Front Pages of U.S. Daily Newspapers," Journalism Quarterly, 61: 879-84 (1984).

[3]J. W. Click and Stempel H. Guido III., "Reader Response to Front Pages with Four-Color Halftones," Journalism Quarterly, 59: 390-98 (1982).

[4]Keith P. Sanders, "Photojournalism Research," in Clifton C. Edom, ed. Photojournalism: Principles and Practices (Dubuque, Iowa: Wm. C. Brown Co., 1980), p. 164.

[5]Galen Rarick, Field Experiments in Newspaper Item Readership (Division of Communication Research, University of Oregon, 1967), p. 6.

[6]Rita Wolf and Gerald L. Grotta, "Images: A Question of Readership," Newspaper Research Journal 6: 30-36 (1984).

[7]Utt and Pasternack, op. cit.

[8]See Mark Fitzgerald, "Bottom Line--Color Pays Off," Editor & Publisher, 13 July 1985, p. 28; and "12-Paper Test to Show How Color Ads Boost Sales," Editor & Publisher, 28 September 1985, p. 18c.

[9]Bill Gloede, "What's Black & White and Red All Over?", Editor & Publisher, 24 September 1983, pp. 15-16.

[10]Gary Ozanich, "An Analysis of the Economic Factors Associated with the Consolidation of Metropolitan Newspapers," presented to the Mass Communication Division at the 32nd Annual Conference of the International Communication Association, Boston, MA., May 1982.

[11]David H. Weaver and L. E. Mullins, "Content and Format Characteristics of Competing Daily Newspapers," Journalism Quarterly, 52: 257-264 (1975).

[12]Survey done by Ed Livermore Jr., chairman of the Southern Newspaper Publishers Association as reported in "Color and Small Dailies," Editor & Publisher, 28 September 1985, p. 8c.

[13]Heath Meriwether, executive editor of the Miami Herald, said, "Color is simply part of the competitive environment. It has a cumulative effect on the reader and around here a black and white product will be left in the lurch;" quoted in M. L. Stein, "Color Helps Dailies Compete in Florida and Texas," Editor & Publisher, 24 September 1983, pp. 30-31.

[14]Ibid.

[15]Benjamin M. Compaigne, "Newspapers," in Benjamin M. Compaigne, ed., Who Owns the Media? (White Plains, NY.: Knowledge Industries, 1982), pp. 54-56.

[16]Stephen Lacy, "Effects of Ownership and Competition on Daily Newspaper Content" (Ph.D. dissertation, The University of Texas at Austin, 1986).

[17]Ibid.

[18]Source for the television competition variable was Television and Cable Factbook: Station Volume, vol. 52 (Washington, D.C.: Television Digest, 1984).

[19]Source for the chain ownership variable was the 1984 Editor & Publisher International Yearbook. (New York: The Editor & Publisher Co., 1984).

[20]J. W. Click and Guido H. Stempel III, "Rate of Adoption of Modern Format by Daily Newspapers," Washington, D.C.: American Newspapers Publishers Association News Research Report 22: (September 28, 1979).

[21]Utt and Pasternack, op. cit.

[22]Source for the circulation figures was the 1985 Editor & Publisher International Yearbook. (New York: The Editor & Publisher Co., 1985).

[23]Source for the number of households in city was Editor & Publisher Market Guide. (New York: The Editor & Publisher Co., 1985).

[24]Source for the "gross income per household for 1984" variable was Newspaper Rates and Data. (Wilmette, IL: Standard Rates and Data Service, May 12, 1985). Source for the "percentage of city population with 16 or more years of formal education" variable was data from the 1980 census as reported in City and County Data Book 1983, 10th ed. (Washington, D.C.: United States Department of Commerce, 1983).

[25]Discussion of outliers and multicollinearity can be found in Barbara G. Tabachnick and Linda S. Fidell, Using Multivariate Statistics (New York: Harper & Row, 1983).

[26]The standard deviation for number of graphics was 1.564. The standard deviation for percentage of front page in graphics was 7.5. The standard deviation for percentage of front page in color was 9.02. N = 113 for all three dependent variables.

[27]Regular use of color was defined as those newspapers with an average area of color 10 percent or greater. Occasional use of color was defined as 1 percent or greater area of color.

[28]Utt and Pasternack, op. cit.

[29]See Click and Stempel, op. cit. and Utt and Pasternack, op. cit.

[30]Based on figures from the 1984 Editor & Publisher International Yearbook (New York: Editor & Publsiher Co., 1984) 29.5 percent of the daily circulation in the United States was in markets with direct competition.

TABLE 1

CORRELATION MATRIX OF VARIABLES

	No. of Graphics	Color Area	Area of Graphics	Papers in Group	Ave. Circ.	Income	College Ed.	No. of TV Stations	Comp.	House-holds
No. of Graphics	1.000	.406	.256	.212	.084	-.050	.136	.073	-.351	.135
Color Area		1.000	.368	.141	.069	.126	.221	-.005	-.330	.131
Area of Graphics			1.000	-.042	.291	.102	.127	.152	-.356	.162
Papers in Group				1.000	-.095	-.066	-.070	-.052	-.008	-.124
Circ.					1.000	.093	.291	.472	-.426	.707
Income						1.000	.378	.287	.061	.274
College Ed.							1.000	.268	-.289	.334
No. of TV Stations								1.000	-.078	.494
Comp.									1.000	-.331
Households										1.000

TABLE 2

REGRESSION WITH QUANTITY OF GRAPHICS AS DEPENDENT VARIABLE

Variable	Beta Coefficient	Cummulative R Squared[a]	Sig.
Group Ownership	.2139	.045	.019
Intensity of Competition[b]	-.3065	.143	.004
Income	-.0935	.143	.365
Television Competition	.0786	.148	.471
Education	.0805	.152	.441
Households in the City	.1490	.154	.275
Average Daily Circulation	-.1830	.169	.183

Overall F = 3.026 Multiple R = .410

Overall Significance of Regression = .006

Regression D.F. = 7, Residual D.F. = 105

[a] The increment added to the cummulative R^2 represents the amount by which R^2 would be reduced if the independent variable was not included in the regression equation.

[b] The intensity of competition scale runs from zero to 100, with zero meaning no difference between competitors in market shares. Zero represents the most intense competition.

TABLE 3

REGRESSION WITH AREA OF GRAPHICS AS DEPENDENT VARIABLE

Variable	Beta Coefficient	Cummulative R Squared[a]	Sig.
Group Ownership	-.0354	.002	.693
Intensity of Competition[b]	-.3328	.129	.002
Income	.1481	.144	.150
Television Competition	.0708	.152	.513
Education	-.0564	.154	.586
Households in the City	-.1822	.155	.179
Average Daily Circulation	.2444	.180	.075

Overall F = 3.304 Multiple R = .425

Overall Significance of Regression = .003

Regression D.F. = 7, Residual D.F. = 105

[a] The increment added to the cummulative R^2 represents the amount by which R^2 would be reduced if the independent variable was not included in the regression equation.

[b] The intensity of competition scale runs from zero to 100, with zero meaning no difference between competitors in market shares. Zero represents the most intense competition.

TABLE 4

REGRESSION WITH AREA OF COLOR AS DEPENDENT VARIABLE

Variable	Beta Coefficient	Cummulative R Squared[a]	Sig.
Group Ownership	.1510	.020	.097
Intensity of Competition[b]	-.3338	.128	.002
Income	.1171	.152	.255
Television Competition	-.0712	.157	.512
Education	.1167	.166	.262
Households in the City	.1038	.167	.444
Average Daily Circulation	-.1430	.176	.297

Overall F = 3.199 Multiple R = .419

Overall Significance of Regression = .004

Regression D.F. = 7, Residual D.F. = 105

[a] The increment added to the cummulative R^2 represents the amount by which R^2 would be reduced if the independent variable was not included in the regression equation.

[b] The intensity of competition scale runs from zero to 100, with zero meaning no difference between competitors in market shares. Zero represents the most intense competition.