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A TEST OF TWO CONSUMER RESPONSE
SCALES IN ADVERTISING

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Abstract

In the past, advertising researchers have, in an exploratory fashion, built up multi-item profiles for measuring consumer response to advertising. Two of the most commonly used profiles--Wells' "Reaction Profile" and Leavitt's "Commercial Profile"--were developed this way. However, very little is known about the reliability, validity, or the predictive powers of the underlying structures postulated by these two profiles.

This study examines the hypothesized factor structure of the profiles developed by Wells and Leavitt. Their predictive validity with respect to attitude and purchase intention is also examined. It was found that the Reaction Profile was quite consistent with its postulated structure whereas the Commercial Profile was not. Both profiles predict attitude towards the brand equally well, but the reaction profile is superior with respect to purchase intention.

Introduction

Advertising researchers have shown considerable interest in developing scales to measure viewers' responses to television commercials. Such scales have been used to gauge viewers' immediate, initial reactions to ads and to understand how advertising works.

When consumers describe their responses to advertising in a written or oral fashion, a wide range of cognitive and emotional reactions emerge, and it is not always easy to capture these reactions accurately (Wells 1964). For this reason, advertising researchers have developed multiple-item rating scales. These scales typically consist of many items (twenty or more), and multiple dimensions (three or more) usually underlie the items (Schlinger 1979; Wells, Leavitt, and McConville 1971).

There are two major objectives behind the construction of consumer response profiles. The first is to create a stable, and yet complete, list of items to track reactions to advertisements. Such a complete inventory could be used in studies which attempt to understand how advertising works and in tests of individual advertisements. The second reason involves advertising effectiveness. For example, once an inventory of responses has been developed, it is possible to investigate which dimensions are related to measures of advertising effectiveness, such as attitude formation or purchase behavior.

The Problem

Virtually all published consumer response scales have been developed in an exploratory fashion, utilizing data reduction techniques such as principal components analysis or factor analysis. Researchers have started out with as many as 525 items (Leavitt 1970) and gradually reduced the set into a smaller, more manageable set. However, for any type of exploratory analysis, there is

a question of interpretability of results. Since exploratory analysis does not control for the impact of chance or sampling error, neither reliability nor validity has been demonstrated. This problem is particularly serious in factor analysis where one may obtain a multitude of different solutions with neither theory or hypotheses to sort them out (Fornell, 1983).

In view of the exploratory procedure used to develop some of the commonly used consumer response scales in advertising, it is clear that the reliability and validity of these scales warrant examination. This is the purpose of this study. Specifically, a 25 item scale proposed by Wells (1964) and a 27-item scale proposed by Leavitt (1970) are investigated, and an attempt is made to determine if these multi-item scales can be accounted for by the same dimensions as their creators suggest and to determine to what extent these scales are useful as predictors of advertising effectiveness.

Wells' Reaction Profile

The Reaction Profile was created from a series of experiments (Wells 1964). As a starting point for the Reaction Profile, a list was compiled of all words and phrases that a respondent might reasonably be expected to employ when reacting to a print advertisement. This list of items was then reduced through a series of tests designed to eliminate items (a) which fail to distinguish between persons who differ in the quality being measured and (b) which fail to measure the same quality as other items within the same dimensions.

Subsequently, the Reaction Profile has been used to predict advertising effectiveness. At present, its use is quite widespread, and it serves as a prototype which subsequent researchers have attempted to emulate (c.f., Schlinger 1979; Meyer-Hertschel 1983).

The Reaction Profile, then, is the product of a sustained research effort aimed at finding out what different reactions consumers can have to advertising. It is widely used by advertising agencies as a copy testing procedure. It measures consumer reactions in a simple way, is simple to use, and easy to understand. Subsequent modifications of this profile have adopted it for use with television commercials (e.g., Wells et al. 1971), but the version used here is the original formulation, designed for print ads.

The final version of the Reaction Profile consists of twenty-five items which, through use of common factor analysis, were found to load on three underlying dimensions. These items and dimensions are shown in the target matrix of Table 1.

Leavitt's Commercial Profile

Similar to Wells, Leavitt (1970) used an exploratory empirical approach to develop a multidimensional set of rating scales for television commercials. While he did not name his measurement procedure, we will call it the "Commercial Profile," as it was designed for capturing reactions to television commercials and to distinguish it from the Reaction Profile which was designed for print ads.

As an initial starting point for the profile, a pool of 525 words was generated. The number of items was reduced through a series of pretests designed to eliminate words which subjects (a) do not use spontaneously; (b) do not discriminate among commercials; and c) do not represent a basic dimension emerging from factor analysis.

The Study

Taking each of these rating scales separately and recognizing their differences, the first part of this study examines the structure of these two

profiles. That is, an attempt is made to determine if the various items load as expected on the hypothesized factors. Table 1 presents the expected loading pattern for the Reaction Profile, and Table 2 does the same for the Commercial Profile. The second part of the study examines the extent to which the profiles are related to traditional measures of ad effectiveness, such as attitude formation or purchase intention.

Method

Exploratory factor analysis is not an ideal technique for scale construction. Many subjects and repeated samples are required, and solutions are not unique (see for example, Nunnally, 1978). Leavitt used 98 commercials and over 3,160 subjects and Wells employed 171 ads and over 2,140 different subjects. Even though a large number of subjects and ads was used, little has been done in terms of validating the final results. The task of confirming the hypothesized factor structures remains. Such an attempt is made in this study through the use of target analysis, a type of confirmatory factor analysis. By using target analysis, it is possible to examine the number of factors and the factor pattern. An alternative method would be confirmatory factor analysis via maximum likelihood estimation. However, such modeling requires very strong assumptions about the data and covariance fit (Fornell 1983). Whenever the number of indicators is large, say 10 or above, it is virtually impossible to obtain a satisfactory covariance fit. In addition, there are the problems of sample size and improper solutions (that is, solutions outside the admissible parameter space such as negative error variances).

In contrast, target analysis requires no distributional or sample size assumption and it does not suffer from the problem of improper solutions.

Further, Acito et al. (1980) report the results of a simulation study which showed that target analysis performed about as well as maximum likelihood confirmatory factor analysis in terms of recovering "true" factor structures.

The hypothesized factor patterns are represented by target matrices, as shown in Tables 1 and 2. Each entry can be viewed as a hypothesis; for example, a 1 indicates a loading of an item on a factor, while a 0 indicates orthogonality. Thus, the target matrices specify the directionality of all variable relationships and specify three dimensions of consumer response for the Wells measures and for the dimensions of the Leavitt measures.

By maximizing the least-squares fit between the target matrix and the factor loadings matrix, it is possible to find a unique solution, given certain restrictions (see Appendix for a description of the method).

Data

Since the Reaction and Commercial Profiles were constructed using different media, two sets of data were gathered. For the Reaction Profile, 400 subjects were exposed to twenty different print ads. All subjects were recruited by an advertising agency, and all were prescreened in order to confirm that they were members of the target audience for a particular ad. Subjects were tested in groups ranging in size from 6 to 10. For each individual ad, twenty subjects were exposed to a print ad which was bound in a booklet along with other material that might appear in a national magazine. No subject was exposed to more than one advertisement, resulting in a sample size of 400 ad exposures. Following exposure, the subjects completed a version of the Reaction Profile in which scale items were randomly rotated.

For the Commercial Profile, similar data gathering techniques were used so that 400 subjects were exposed to twenty different television commercials.

Again, 20 subjects were exposed to a commercial in a natural programming environment and proceeded to rate that commercial using a version of the Commercial Profile where items were randomly rotated. This procedure resulted in 400 responses, with 20 viewers rating one of twenty ads, and no subject rating more than one of the target commercials.

For both data sets, subjects participated in a follow-up interview in which subjects were tested for attitude toward the brand (using semantic differential scales) and for purchase intentions. Specifically, attitude toward the brand (ATT_B) was operationalized by asking subjects to indicate on an 8-point scale how good-bad the advertised brand was. Purchase intentions (PI) were measured by asking about the probability of purchasing the advertised brand in the near future.

Results

The Commercial Profile

The results of the target rotation are shown in Table 3 along with the coefficient of congruence. The amount of explained variance is about 60 percent; the coefficient of congruence (which measures the fit between the target and the rotated solution) is .58. The 12 "Energetic" and "Amusing" items load strongly on the first factor; but, contrary to Leavitt's findings, the other loadings are far from zero. For example, 11 items which were expected to load on other dimensions display loadings of .50 or higher on this first factor. The "Personal Relevance" and "Sensual" factors stand out as expected; but the loadings on the second two dimensions are not as high as might have been anticipated. Many are below .50. And again, unexpectedly high loadings show up on items which were hypothesized to be orthogonal. Of all the factors, "Familiar" is the most successful and emerges about as clearly as in Leavitt's original analysis.

Overall, there are frequent violations in the loadings matrix of what Leavitt's findings lead us to expect. These violations are revealed in the relatively low coefficient of congruence. One possible remedy would be to eliminate some of the items in the Commercial Profile. For example, the fit could be improved by eliminating "Convincing" (loading = .041) as an indicator of "Personal Relevance." In addition, fit could improve by eliminating entire dimensions (such as "Sensual") which show uniformly low loadings. For example, only one of the "Sensual" loadings is greater than .30, and four out of the six loadings are at .25 or below. In this way, our target analysis results are able to pinpoint which items are performing as expected and which are candidates for deletion. In order to validate the efficacy of these proposed changes to the profile, additional data would have to be gathered and rotation performed to a revised target matrix.

In the instances where high loadings appear when orthogonality was anticipated, there may be a breakdown in discriminant validity. An example of this is illustrated in the first factor where some of the items expected to be represented there actually correlate less strongly than some of those items expected to be operated to the first factor. Conversely, when a group of items fails to load on its hypothetical factor, this may represent a failure in convergent validity. An example of this is illustrated in the "Personal Relevance" factor where the six loadings expected to be high are not larger than .40.

The Reaction Profile

The results of factor analysis followed by target rotation are shown in Table 4. In this instance the coefficient of congruence is very high (CC = .943). There are only a few departures from the expected factor structure as the three dimensions provide a fairly good summary of the data,

explaining 50.3 percent of total variance. The twelve items hypothesized to load on the "Attractive" dimension display uniformly high loadings. Only "Exciting" and "Colorful" correlate less than .50 with this dimension. The "Meaningfulness" dimension also emerges clearly, with all nine expected items loading greater than .50. Of the items expected to be unrelated to this factor, the highest loading is .20 (for "Pleasant"). Thus, discriminant validity does not seem to be a problem as it is in the case of the Commercial Profile. The third factor, "Vitality," is also well represented with but one exception. Wells had found that the item "Colorful" belonged with both the first and third dimension. Here, however, "Colorful" does not load very highly on either dimension, and in this sense, may represent the greatest departure from the expected pattern.

Overall, however, the results confirm the findings of Wells. Loadings which were expected to be high are high; those expected to be zero are essentially zero, and the coefficient of congruence is high.

In contrast to the case of the Commercial Profile, there are only minor reasons for improving the fit of the Reaction Profile. If a researcher were interested in reducing the number of items used to measure the "Attractiveness" dimension, "Exciting" and "Colorful" would be candidates for deletion. Also, it seems as though "Colorful" could be discarded as an indicator of "Vitality."

Predictive Validity

To investigate the predictive validity of the Reaction and Commercial Profiles, it is necessary that the measures be put into a broader context. Accordingly, attitude toward the advertised brand (Att_B) and purchase intention (PI) were used in a series of regressions.

First, the estimated factor scores from the two response profiles were used to predict attitude towards the advertised brand (ATT_B); second, the

factor scores and Att_B were used to predict purchase intention (PI). The results are found in Table 5.

Both reaction profiles predict attitude about equally well. The only difference is that Wells' reaction profile is more parsimonious: the first factor "attractive" accounts for 30% of the variance in the dependent variable whereas the contributions of the other factors are small.

With respect to the prediction of purchase intention, Wells' profile is superior (although only the first factor is significant). A total of 60% of the variance is accounted for and the F-test, for the contribution of the profile above what Att_B accounts for, is highly significant. In contrast, Leavitt's commercial profile accounts for a small (albeit statistically significant) increase in explanatory power (beyond what is accounted for by Att_B).

Overall, the results suggest that the reaction profile is superior in predictive power. Not surprisingly, the results also indicate that prediction does not require as extensive a model as the recovery of response structure. This of course is typical whenever there is a distinction between "explanation" and "prediction." Further, it should be noted that attitude is a better predictor of purchase intention in the context of print media than in television commercials. This is expected because print media contain a higher proportion of "high involvement" products for which a hierarchy of effects model appears more appropriate.

Conclusion

Limitations

This study is limited in that forced exposure techniques were used. Reactions may be somewhat different in a natural setting. Somewhat related to this point, only a limited number of ads were tested--especially in contrast to the large number of ads employed by the creators of the profiles tested. This

type of confirmatory study would not have been possible if it were not for the massive data sets gathered and analyzed by those such as Wells and Leavitt.

Another limitation involves the nature of the profiles themselves. Consumers may have many reactions to advertisements which are difficult to capture on a rating scale. However, as the developers of the profiles have pointed out, it is also difficult to quantify or analyze consumers' unaided or unedited comments, whether written or tape-recorded. Especially in the case of affective items, it seems possible that rating scales may not be able to capture consumers' real feelings, and the rating scales themselves may cause alienation on the part of respondents. Consumer response profiles may need to be tested against other techniques which employ maximally different measurement procedures, such as physiological testing, if we are to gain further insight into what such rating scales can measure and what they cannot. Although target analysis, as applied here, is a useful tool for investigating the psychological effects of advertising, it is not without limitations.

No sampling properties have been established for the goodness-of-fit statistics available under the target method. It is possible to compare competing models in terms of fit indices, but it is not possible to perform statistical tests for goodness of fit. Further, Horn (1967) and Humphreys et al. (1969) have claimed that the target method would fit almost any data to almost any hypothesis. However, Acito et al. (1980), using a simulation method, show that this is not so and conclude that target analysis is not "likely to mislead the researcher into believing that any arbitrary target factor pattern is consistent with an empirical correlation matrix (p. 148)."

Summary

The underlying structures of Wells' Reaction Profile and Leavitt's Commercial Profile have been explored through the use of target analysis. In general, the dimensional structure of the Reaction Profile was confirmed. This cannot be concluded for the Commercial Profile. Also, the Reaction Profile performed better in terms of predicting responses to advertising. Thus, there is evidence in support of reliability (in terms of the factor pattern) as well as of validity (in terms of the fit within a predictive context) for Wells' Reaction Profile.

The findings reported here also indicate some possible directions which future researchers may consider for improving the performance of these profiles. For example, in the case of the Commercial Profile, it may prove useful to eliminate "Convincing" as an indicator of "Personal Relevance" and to eliminate the "Sensual" dimension altogether since it is not internally consistent and since it is not a significant predictor of purchase intentions.

APPENDIX: PROCRUSTES TARGET ROTATION

Following the work of Green (1952) and Cliff (1966) in rigid factor rotation, Schönemann's (1966) confirmatory Procrustes rotation is applied to the factor matrix which emerges. Thus, a matrix \underline{Z} is formed from the target matrix \underline{T} and the empirical (factor loadings) matrix \underline{L} .

$$(1) \quad \underline{Z} = \underline{L}' \underline{T}.$$

We then extract the eigenvectors of $\underline{Z}'\underline{Z}$, $\underline{Z}\underline{Z}'$ and \underline{Y} and \underline{P} , from the equations:

$$(2) \quad \underline{Z}'\underline{Z} = \underline{Y} \underline{Y}' \underline{Y}'$$

$$\underline{Z}\underline{Z}' = \underline{P} \underline{Y} \underline{P}'$$

where \underline{Y} is the diagonal matrix of eigenvalues. The transformation matrix is

$$(3) \quad \underline{Q} = \underline{P} \underline{Y}'.$$

The confirmatory Procrustes solution is given by

$$(4) \quad \underline{T}^* = \underline{Q} \underline{L}.$$

Since \underline{Q} is chosen such that the matrix of errors ($\underline{E} = \underline{T} - \underline{T}^*$) is minimized in a least squares fashion, the solution is unique and may be tested for convergence (Fornell et al. 1981). To assess the similarity of \underline{T} and \underline{T}^* , the coefficient of congruence (CC), as suggested by Wrigley and Newhaus (1955), is used. This measure is sensitive to pattern as well as magnitude differences in the two matrices. Values of CC will range from -1 to +1 and will be high when there is a high degree of fit between the observed loading matrix (\underline{T}) and the expected loading matrix (\underline{T}^*).

Table 1

Target Matrix: Wells Reaction Profile

<u>Variable</u>	<u>Attractiveness</u>	<u>Meaningfulness</u>	<u>Vitality</u>
Beautiful/Ugly	1.0	0	0
Pleasant/Unpleasant	1.0	0	0
Gentle/Harsh	1.0	0	0
Appealing/Unappealing	1.0	0	0
Attractive/Unattractive	1.0	0	0
In good taste/In poor taste	1.0	0	0
Exciting/Unexciting	1.0	0	0
Interesting/Uninteresting	1.0	0	0
Worth looking at/Not worth looking at	1.0	0	0
Comforting/Frightening	1.0	0	0
Colorful/Colorless	1.0	0	1.0
Fascinating/Boring	1.0	0	0
Meaningful/Meaningless	0	1.0	0
Convincing/Unconvincing	0	1.0	0
Important to me/Unimportant to me	0	1.0	0
Strong/Weak	0	1.0	0
Honest/Dishonest	0	1.0	0
Easy to remember/Hard to remember	0	1.0	0
Easy to understand/Hard to understand	0	1.0	0
Worth remembering/Not worth remembering	0	1.0	0
Simple/Complicated	0	1.0	0
New/Ordinary	0	0	1.0
Fresh/Stale	0	0	1.0
Lively/Lifeless	0	0	1.0
Sharp/Washed out	0	0	1.0

Table 2

Target Matrix: Leavitt's Commercial Profile

<u>Variable</u>	<u>Energetic and Amusing</u>	<u>Personal Relevance</u>	<u>Sensual</u>	<u>Familiar</u>
Lively	1.0	0	0	0
Exhilarated	1.0	0	0	0
Vigorous	1.0	0	0	0
Enthusiastic	1.0	0	0	0
Energetic	1.0	0	0	0
Excited	1.0	0	0	0
Merry	1.0	0	0	0
Jolly	1.0	0	0	0
Playful	1.0	0	0	0
Joyful	1.0	0	0	0
Amusing	1.0	0	0	0
Humorous	1.0	0	0	0
Important for me	0	1.0	0	0
Helpful	0	1.0	0	0
Valuable	0	1.0	0	0
Meaningful for me	0	1.0	0	0
Worth remembering	0	1.0	0	0
Convincing	0	1.0	0	0
Lovely	0	0	1.0	0
Beautiful	0	0	1.0	0
Gentle	0	0	1.0	0
Serene	0	0	1.0	0
Tender	0	0	1.0	0
Sensitive	0	0	1.0	0
Familiar	0	0	0	1.0
Well-known	0	0	0	1.0
Saw before	0	0	0	1.0

Table 3

Target Analysis Results: Leavitt's Commercial Profile

<u>Variable</u>	<u>Energetic and Amusing</u>	<u>Personal Relevance</u>	<u>Sensual</u>	<u>Familiar</u>	<u>Communality</u>
Lively	.650	.399	-.289	.110	.678
Exhilarated	.636	.483	-.285	.142	.740
Vigorous	.573	.488	-.298	.150	.678
Enthusiastic	.479	.230	-.121	.199	.337
Energetic	.624	.378	-.198	.215	.617
Excited	.336	.140	-.244	.066	.196
Merry	.647	.181	-.300	.043	.543
Jolly	.718	.208	-.325	.075	.670
Playful	.448	.079	-.270	.001	.280
Joyful	.609	.169	-.186	.055	.437
Amusing	.726	.199	-.278	.055	.647
Humorous	.651	.247	-.318	-.004	.586
Important for me	.605	.322	.426	-.161	.677
Helpful	.674	.346	.489	-.207	.857
Valuable	.604	.296	.552	-.211	.801
Meaningful for me	.544	.252	.431	-.005	.545
Worth remembering	.625	.366	.539	-.042	.816
Convincing	.323	.041	.287	-.046	.191
Lovely	.557	-.520	.233	-.105	.646
Beautiful	.669	-.566	.250	-.147	.852
Gentle	.642	-.515	.284	-.142	.778
Serene	.543	-.466	.318	.710	.618
Tender	.711	-.468	.234	.107	.779
Sensitive	.513	-.354	.186	-.128	.439
Familiar	.265	-.183	.166	.613	.506
Well-known	.315	-.257	.153	.682	.654
Saw before	.354	-.021	.088	.639	.542
Sum of Squares	8.847	3.084	2.581	1.599	
Cumulative Per- cent of Variance Explained	32.8	44.2	53.7	59.7	

Coefficient of Congruence = .583

Table 4

Target Analysis Results: Wells' Reaction Profile

<u>Variable</u>	<u>Attractiveness</u>	<u>Meaningfulness</u>	<u>Vitality</u>	<u>Communality</u>
Beautiful	.584	.179	-.018	.374
Pleasant	.805	.201	-.007	.689
Gentle	.779	.172	.035	.637
Appealing	.781	.014	.089	.617
Attractive	.758	.169	.070	.609
In good taste	.559	.160	-.045	.340
Exciting	.441	.105	-.105	.216
Interesting	.720	.081	.138	.545
Worth looking at	.686	.084	.076	.484
Comforting	.730	.173	-.023	.563
Colorful	.437	.101	.137	.220
Fascinating	.721	-.077	.143	.547
Meaningful	.126	.788	-.054	.640
Convincing	-.061	.802	-.099	.657
Important to me	.205	.750	-.006	.604
Strong	.035	.698	-.003	.488
Honest	.133	.501	.126	.284
Easy to remember	.042	.659	.026	.436
Easy to understand	.312	.593	-.041	.451
Worth remembering	.290	.605	.124	.466
Simple	.307	.594	.019	.447
New	-.179	.032	.857	.768
Fresh	-.095	-.071	.699	.503
Lively	-.083	.025	.795	.639
Sharp	.097	.094	.568	.341
Sum of Squares	5.937	4.312	2.316	
Cumulative Per- cent of Variance Explained	23.7	41.0	50.3	

Coefficient of Congruence = .943

Table 5

The Relationship of the Profile Dimensions to Measures of Advertising Effectiveness
WELLS' REACTION PROFILE

Predictor Variables	Criterion: Att _B			Criterion: PI _b		
	Standardized	$\beta_1\gamma_1$	t	Standardized	$\beta_1\gamma_1$	t
	R ² = .324 F = 63.27a p < .001			R ² = .596 F = 20.86b p < .001		
	Beta Weight		p <	Beta Weight		p <
Attractive	.546	30.0%	13.65	.292	17.5%	7.68
Meaningful	.144	2.3%	3.51	.042	.8%	1.31
Vitality	.008	.1%	.20	.026	.1%	0.84
Att _B	--	--	--	.565	41.2%	14.49

LEAVITT'S COMMERCIAL PROFILE

Predictor Variables	Criterion: Att _B			Criterion: PI _b		
	Standardized	$\beta_1\gamma_1$	t	Standardized	$\beta_1\gamma_1$	t
	R ² = .315 F = 45.43a p < .001			R ² = .265 F = 3.35b p < .001		
	Beta Weight		p <	Beta Weight		p <
Energetic	.367	13.8%	8.53	.111	3.1%	2.36
Relevance	.128	1.7%	3.05	.106	1.7%	2.41
Familiar	-.235	5.8%	-5.60	-.011	.1%	-0.24
Sensual	.311	10.2%	7.59	.026	.3%	0.57
Att _B	--	--	--	.444	21.3%	8.54

Notes

aOverall F test

bF test to examine the contribution of the profile dimensions, over and above what Att_B can explain.

REFERENCES

- Acito, Franklin, Ronald D. Anderson, and Jack L. Engledow (1980). "A Simulation Study of Methods for Hypothesis Testing in Factor Analysis," Journal of Consumer Research, 7 (September), 141-50.
- Cliff, N. (1966). "Orthogonal Rotation to Congruence," Psychometrika, 31, 33-42.
- Fornell, C., G. John, L. W. Stern, & M. Triki (1981). "The Role Strain-Performance Relationship in Industrial Selling: A Process Analysis," Working Paper, Northwestern University.
- Fornell, C. (1983). "Issues in the Application of Covariance Structure Analysis: A Comment," Journal of Consumer Research, March, 443-48.
- Green, B. F. (1952). "The Orthogonal Approximation of an Oblique Structure in Factor Analysis," Psychometrika, 17, 429-40.
- Horn, John L. (1967). "On Subjectivity in Factor Analysis," Educational and Psychological Measurement, 27, 811-20.
- Humphreys, Lloyd G., Daniel Ilgen, Diane McGrath, and Richard Montanelli (1969). "Capitalization on Chance in Rotation of Factors," Educational and Psychological Measurement, 29, 259-71.
- Leavitt, C. (1970). "A Multidimensional Set of Rating Scales for Television Commercials," Journal of Applied Psychology, 54, 427-29.
- Meyer-Hertschel, Gundolf (1983). "An Arousal Profile for Print Ads," Working Paper, Institute for Consumer and Behavioral Research, University of the Saarland.
- Nunnally, J. C. (1978). Psychometric Theory, New York: McGraw-Hill.
- Schlinger, M. J. (1979). "A Profile of Responses to Commercials," Journal of Advertising Research, 19, 37-46.
- Schönemann, P. H. (1966). "A Generalized Solution of the Orthogonal Procrustes Problem," Psychometrika, 31, 1-10.
- Wells, W. D. (1964). "EQ, Son of EQ, and the Reaction Profile," Journal of Marketing, 28, 45-52.
- Wells, W. D., C. Leavitt, and M. McConville (1971). "A Reaction Profile for TV Commercials," Journal of Advertising Research, 11, 11-17.
- Wrigley, C., and J. Newhaus (1955). "The Matching of Two Sets of Factors," American Psychologist, 10, 418-19.