

## INDUSTRIAL PURCHASING BEHAVIOR: A REAPPRAISAL

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### *Introduction*

A number of recent marketing texts [2, pp. 110-111; 7, p. 658; 10, p. 48] emphasize the role of company prestige in contributing to the success of industrial salesmen, citing as the major empirical basis for this conclusion the well-known experimental study by Levitt [8, 9] of industrial purchasing behavior. Kotler [7, p. 658], for example, concludes from Levitt's work that "A company's generalized reputation (the source effect) has a positive influence on sales prospects in improving the chances of (a) getting a favorable first hearing and (b) getting early adoption of the product." This conclusion, if valid, contains vitally important implications for industrial marketers, suggesting a key role in the marketing mix for corporate advertising to build up a company's image in the eyes of purchasing agents. A study so relevant for decision making clearly requires careful evaluation by both marketing scholars and managers.

The conceptual roots of Levitt's study lie in the research on communication performed by the Yale group in the early fifties. Hovland and his colleagues [3, 4] showed that messages attributed to high credibility sources generated more opinion change in the direction advocated than those attributed to low credibility sources. Levitt placed this relationship in the context of the industrial sales interview wherein the company itself is viewed as the source and the salesman's presentation taken as the message. Levitt also examined the effects of presentation quality, type of audience, and risk of decision and investigated the ' sleeper effect ' — that is, the tendency observed by the Yale group for opinion change to increase over time.

This paper will demonstrate that, in spite of the considerable theoretical interest attached to Levitt's research, few prescriptions for managerial action can

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safely be drawn from his study. Weaknesses in the design and implementation of his experiment and in his analysis of the data combine to invalidate many of Levitt's inferences. Most saliently, a reanalysis of this study leaves us with no reason to believe that a company's generalized reputation is at all important in securing a first hearing or early adoption of its products.

#### *Summary of the Research Design*

Levitt's research design relates directly to the familiar communications paradigm of source-message-and-receiver. Levitt employed three sources with varying credibility: the Monsanto Chemical Company, the fictitious Denver Chemical Company, and an anonymous company – which he viewed as high, medium, and low in credibility respectively. Films of a 'salesman' giving either a good or bad presentation served as the message and were attributed to one of the three sources by introductory instructions. Subjects acting as receivers came from three populations: purchasing agents, chemists, and graduate students.

#### *Problems in Research Design, Implementation, and Analysis*

The degree to which experimental results permit generalization to real-life situations of interest depends upon the extent to which operational definitions, treatment manipulations, and subject samples are representative of those situations. Regretably, Levitt's experimental design veered drastically from realism on one crucial dimension: unlike real sales interviews, it did not involve interpersonal communication [5, p. 32]. Levitt's filmed presentation bore little resemblance to the kind of two-way social interaction involved in selling. His study therefore fits squarely in the tradition of mass communications research with only tangential applicability to the selling process.

Nor may we assume that Levitt's credibility manipulation can safely be related to the external world. For external validity, we would require that Levitt's manipulations actually achieved the intended differences in perceived source credibility; yet Levitt's discussion does not confirm that such differences occurred. Levitt presents no data confirming his contention that a pre-measure indicated the lower reputation of Denver [8, p. 49]; nor does he report any such pre-measure for the anonymous company. He does cite some post-measure data [8, p. 127], which he believes "measures source credibility in a relatively clean way" [8, p. 120]. This measure, however, indicated in eleven cells out of twelve that the anonymous company exceeded Denver in credibility. Such evidence presents little justification for Levitt's consistent treatment of the anonymous company as lowest in credibility, though it partially legitimates his willingness to explain anomalous results by viewing it as medium in credibility [8, p. 83] and helps justify the author's otherwise baffling assertion that the anonymous company "is, to the audience, an enigma. It has qualities of being a neutral source, a low credibility source and perhaps even a high credibility source" [8, p. 49]. In contrast to Levitt, the analysis which follows will eliminate the anonymous company treatment condition from consideration on grounds of its 'enigmatic' status.

Further serious reservations concerning Levitt's study, however, arise with respect to his statistical analysis. Levitt analyzed his data using a binomial test of

significance, a test which (as he himself points out [8, p. 53]) deals only with the direction and not the magnitude of differences, giving equal weight, for example, to proportions of 21/40 and 40/40 and completely disregarding sample sizes within cells. More appropriate, of course, is the familiar chi-square test, which utilizes both magnitudes of difference and sample sizes (or the Fisher exact probability test in the case of small expected cell sizes) [see, 11, pp. 96-111]. Use of such tests requires the availability of cell frequencies rather than percentages. Such frequencies have been computed from Levitt's data [8, pp. 48, 89 and 94]. They appear in Table 1 and will serve as the basis for the statistical reanalysis which follows.

#### *A Re-appraisal of the Findings*

##### *Source Effect*

The source effect may be tested in Levitt's data by comparing the proportion of positive responses between Monsanto and Denver source conditions. Table 2 presents the results of this analysis for both the referral and adoption questions. In the overall group of 24 tests possible at various degrees of aggregation, only one is significant at the  $p < .10$  level – an even lower figure than one would expect on the basis of chance alone. Moreover, the direction of these insignificant relationships contradicts the source effect in five out of twelve cases; and for the purchasing agents themselves (presumably the sample of greatest interest managerially) three out of four cells exhibit differences in the direction opposite to that predicted. Clearly, it would be an understatement to point out that these data offer no support for Levitt's conclusion that "the source effect is clearly visible" [8, p. 73].

##### *Audience Effect*

Since some researchers [6, p. 159] and Levitt [8, pp. 97-98] in particular advise caution in dealing with responses from students, audience effects have been reanalyzed with and without students' responses. The results, shown in Table 3, indicate a number of significant differences between students and purchasing agents or chemists, but only one significant difference (at  $p < .10$ ) between the two latter groups, which may in fact be attributable to variations between these two groups in the wording of the referral question [8, p. 71]. This similarity between purchasing agents and chemists might be expected intuitively since neither group had an opportunity actively to question the salesman for the kinds of information which might have led to different decisions.

##### *Presentation and Risk Effects*

The analysis of presentation effect seen in Table 4 confirms Levitt's conclusion that this effect was greater for adoption (vs. referral) decisions and for purchasing agents and students (vs. chemists) and that for all groups the decision to adopt occurred less frequently than decision to refer [8, pp. 87-89].

##### *Sleeper Effect*

Hovland and co-workers [3] found that opinions measured several weeks after a communication sometimes evidenced more agreement with the

**TABLE 1**  
**Audience Responses by Source,**  
**Presentation Quality and Risk of Decision**

Source	Referral <sup>a</sup>				Adoption <sup>b</sup>								
	Good Presentation		Poor Presentation		Good Presentation		Poor Presentation						
	Pur- chasing Agents	Chemists	Students	Agents	Pur- chasing Agents	Chemists	Students	Agents					
Monsanto	Yes	22	24	23	13	18	17	8	10	16	2	6	5
	No	1	1	1	4	3	3	15	15	8	15	15	15
Denver	Yes	20	17 <sup>a</sup>	24	16	12	21	10	7	12	3	3	3
	No	1	3 <sup>a</sup>	0	3	8	0	11	13	12	16	17	18

a) There is an inconsistency between Levitt's Exhibit 4-6 (Industrial Purchasing Behavior, same reference as footnote 1, p. 89) and Exhibit 4-3 (p. 78) for this cell. Since the text provides independent verification for this cell (Levitt, Industrial Purchasing Behavior, same reference as footnote 1, p. 79) as is shown in Exhibit 4-3, these figures were used.

b) Figures in this part of the table represent those from the total sample who would or would not adopt. Levitt's presentation uses those from the group willing to refer who would or would not adopt. The difference is small, but the presentation of Table 2 tends to show more significance and provides a better basis for comparison of referral and adoption responses.

**TABLE 2**  
**Significance Tests for the Source Effect:**  
**Monsanto vs. Denver**

Groupings of Data	Sample Size (N)	Referral		Adoption	
		X <sup>2</sup> Statistic	Significance	X <sup>2</sup> Statistic	Significance
<u>All Data</u>	255	0.10	NS <sup>a</sup>	0.71	NS <sup>a</sup>
<u>Presentation--Good</u>	137	0.02	NS	0.02	NS
--Poor	118	0.01	NS	0.64	NS
<u>Audience--Purchasing</u>	80	0.0	NS	0.24	NS
Agents	86	4.03	p < .05	0.56	NS
Chemists	89	2.43	NS	1.36	NS
Students					
<u>Presentation--Good: Audience - Purchasing</u>					
Agents	44	0.43	NS	0.31	NS
Chemists	45	0.58	NS	0.0	NS
Students	48	0.0	NS	0.77	NS
<u>--Poor: Audience - Purchasing</u>					
Agents	36	FisherTest	NS	FisherTest	NS
Chemists	41	2.26	NS	0.45	NS
Students	41	1.55	NS	0.22	NS

<sup>a</sup> Not significant at the p < .10 level

TABLE 3  
Significance Tests for the Audience Effect

Groupings of Data	Purchase Agents vs. Chemists				Purchase Agents vs. Students				Chemists vs. Students						
	Sample Size (N)	X <sup>2</sup> Statistic	Significance	Referral	Sample Size (N)	X <sup>2</sup> Statistic	Significance	Referral	Sample Size (N)	X <sup>2</sup> Statistic	Significance	Referral	Sample Size (N)	X <sup>2</sup> Statistic	Significance
All Data	166	0.83	NS <sup>a</sup>	0.0	169	1.84	NS <sup>a</sup>	2.05	175	6.3	p < .05	1.57	NS <sup>a</sup>		
Presentation-Good	89	0.16	NS	0.01	92	0.01	NS	2.13	93	0.99	NS	3.15	p < .10		
-Poor	77	0.24	NS	0.38	77	1.54	NS	0.12	82	4.22	p < .05	0.0	NS		
Source - Monsanto	86	0.05	NS	0.56	84	0.02	NS	3.72	90	0.09	NS	1.07	NS		
- Denver	80	2.95	p < .10	0.24	85	2.76	p < .10	0.02	85	11.88	p < .01	0.36	NS		
Presentation-Good:															
Source															
Monsanto	48	0.44	NS	0.01	47	0.48	NS	3.59	49	0.48	NS	2.51	NS		
Denver	41	0.33	NS	0.25	45	0.0	NS	0.02	44	1.86	NS	0.48	NS		
-Poor:															
Source															
Monsanto	38	FisherTest	NS	FisherTest	NS	FisherTest	NS	FisherTest	NS	FisherTest	NS	FisherTest	NS		
Denver	39	FisherTest	p < .10	FisherTest	NS	FisherTest	p < .10	FisherTest	NS	FisherTest	p < .01	FisherTest	NS		

<sup>a</sup> Not significant at the p < .10 level.

**TABLE 4**  
**Significance Tests for the Presentation Effect:**  
**Good vs. Poor**

Groupings of Data	Sample Size (N)	Referral		Adoption	
		X <sup>2</sup> Statistic	Significance	X <sup>2</sup> Statistic	Significance
<u>All Data</u>	255	8.69	p < .01	20.11	p < .01
<u>Source - Monsanto</u>	130	4.74	p < .05	7.52	p < .01
Denver	125	2.23	NS <sup>a</sup>	11.57	p < .01
<u>Audience - Purchasing</u>	80	1.19	NS	5.80	p < .05
Agents	86	3.63	p < .10	1.85	NS <sup>a</sup>
Chemists	89	0.46	NS	12.27	p < .01
<u>Source - Monsanto: Audience - Purchasing</u>	40	FisherTest	p < .10	FisherTest	p < .10
Agents	46	0.50	NS	0.25	NS
Chemists	44	0.52	NS	6.01	p < .05
<u>- Denver: Audience - Purchasing</u>	40	FisherTest	NS	3.27	p < .05
Agents	40	2.01	NS	1.20	NS
Chemists	45	0.0	NS	4.92	p < .05

<sup>a</sup> Not significant at the p < .10 level.

communication than opinions measured soon afterwards. They termed this phenomenon the "sleeper" effect. Hovland and Weiss [4] tested the effect of source credibility on opinion change over time. They claimed that opinion change increased over time in the direction advocated by the communication when a low credibility source was used. A recent review [1] suggests, however, that the sleeper effect may be illusory.

Levitt provides only limited data with which to test for the sleeper effect. Whereas referral and adoption questions were asked in the first post-questionnaire, the second post-questionnaire included only a referral question. Further, data are not presented by audience, thus preventing analysis on this dimension.

Using data from Levitt's Exhibit 4-7 [8, p. 94], analysis shows that 86.5% referred immediately after the presentation compared to 80.5% who referred after several weeks. But this overall result directly contradicts the sleeper effect, which would require an increased referral over time. Furthermore, the McNemar test for significance of changes [11, pp. 61-67] shows that the contradictory change is significant at the  $p < .05$  level. This statistically significant net effect is comprised of 32 persons who changed from referral to non-referral, as opposed to 13 who shifted in the opposite direction. The net effect alone is relevant, as shifts will always occur within isolated subgroups because of statistical regression.

Levitt's Exhibit 4-8 [8, p. 96] provides data by presentation and by source. However, despite Levitt's use of this Exhibit to discuss the sleeper effect, the data represent only those respondents who initially referred. Any sleeper effect analysis is therefore impossible in this case, since an *increased* referral can only be shown for respondents who originally did *not* refer.

### **Conclusions**

Several studies have provided general support for the source and sleeper effects, but Levitt's research, which was unique in attempting to apply these concepts to industrial marketing, is clearly not one of them. More broadly, this example sounds a warning to those wishing to apply the findings of any empirical study. Such applications urgently require the careful consideration of several searching questions. Such questions include the external validity of the study (the extent to which it represents the real world to which its findings might be generalized), its internal validity (the extent to which it rules out competing hypotheses for the effects obtained and provides insurance that the experimental treatments had the effects intended), and the reliability of the statistical analyses upon which its conclusions are based. This paper has illustrated some of the potential pitfalls encountered in answering these questions and has emphasized the importance of personally evaluating research before applying its findings to real problems. Certainly the widespread quotation of results in the business literature provides little assurance of their validity.



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