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Hypotheses in marketing science: literature review and publication audit

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Comments

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Hypotheses in Marketing Science: Literature Review and Publication Audit

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Abstract

We examined three approaches to research in marketing: exploratory hypotheses, dominant hypothesis, and competing hypotheses. Our review of empirical studies on scientific methodology suggests that the use of a single dominant hypothesis lacks objectivity relative to the use of exploratory and competing hypotheses approaches. We then conducted a publication audit of over 1,700 empirical papers in six leading marketing journals during 1984-1999. Of these, 74% used the dominant hypothesis approach, while 13 % used multiple competing hypotheses, and 13% were exploratory. Competing hypotheses were more commonly used for studying methods (25%) than models (17%) and phenomena (7%). Changes in the approach to hypotheses since 1984 have been modest; there was a slight decrease in the percentage of competing hypotheses to 11%, which is explained primarily by an increasing proportion of papers on phenomena. Of the studies based on hypothesis testing, only 11 % described the conditions under which the hypotheses would apply, and dominant hypotheses were below competing hypotheses in this regard. Marketing scientists differed substantially in their opinions about what types of studies should be published and what was published. On average, they did not think dominant hypotheses should be used as often as they were, and they underestimated their use.

1. Introduction

Some researchers have criticized the rate of progress in marketing science. Leone and Schultz (1980) concluded that few generalizations could be drawn from research in marketing. Hubbard and Armstrong (1994) found that few marketing findings were replicated or extended, thus limiting the ability to generalize; furthermore, when studies were replicated or extended, the findings often differed from those in the original studies. Anderson (1994) criticized the ability of marketing science to deliver solutions to business problems. Additional concerns have been expressed by the AMA Task Force on Marketing (1988), Bloom's (1987) review of the quality of research on marketing, a special issue in the *Journal of the Academy of Marketing Science* in 1992, Wells' (1993) assessment of progress in consumer research, and Bass' (1993) assessment of marketing science.

Why is it that progress in some sciences is more rapid than in others? Chamberlin addressed this issue in an 1890 paper (reprinted in Chamberlin, 1965). He concluded that the formulation of hypotheses has important effects on progress. His contention was that the more successful sciences used the method of multiple competing hypotheses. Platt (1964) examined scientific progress in molecular biology and concluded that Chamberlin was correct (he used the term "strong inference" for such studies). In contrast, McDonald (1992) argued that strong inference offers no advantages over testing single hypotheses.

We provide an exploratory study that first summarizes evidence on different approaches to the use of hypotheses. We then provide results from an audit of marketing science publications. Our purpose is to provide a basis for discussion on these topics. As we show, marketing scientists differ substantially in their beliefs about what should be published and what was being published.

2. Empirical Studies on the Use of Hypotheses

Following the scheme in Armstrong (1979), we discuss three approaches to the formulation of hypotheses: exploratory (inductive), a dominant (single) hypothesis, and multiple competing hypotheses. We searched for evidence on the effectiveness of these approaches. Because little evidence related solely to marketing studies, this search covered various areas of science.

2.1. Exploratory Approach

Exploratory (inductive) studies start with no formally stated hypotheses. This is appropriate when one has little explicit knowledge about a phenomenon. The purpose is to develop hypotheses as a result of the study. It might also be relevant for discovering alternative explanations in areas where much previous work has been done. This approach allows for a broad search for hypotheses and theories, and may serve to aid a researcher's objectivity. However, this is not to say that it ensures objectivity because a researcher might have unstated or subconscious beliefs that affect the search for evidence and its interpretation. Also on the negative side, the exploratory approach can be inefficient because it may not be clear as to what data to collect or how to do the analysis.

2.2. Dominant Hypothesis

A hypothesis provides a structure for the collection and analysis of data. It also aids in the cumulative development of knowledge by summarizing evidence from previous studies. One could argue that the use of a dominant hypothesis might be appropriate under the following conditions: a) after the exploratory phase to help refine a plausible hypothesis on a topic; b) when it may not be feasible to develop competing hypotheses; c) when it may be too costly to test alternatives; d) when an efficient "market" for ideas exists, such as when parallel teams pursue solutions to the same problem at the same time, with well-established criteria for evaluation and good communication among teams; e) where the task is to clarify the conditions under which an accepted hypothesis holds.

The dominant hypothesis, designed to rule out a null hypothesis, often becomes a search for evidence to support a favored hypothesis. Null hypotheses are often selected to represent the absence of a relationship (or the ineffectiveness of a model or method) even when this is unreasonable. For example, studies have tested the null hypothesis that the purchase of automobiles is unrelated to the income of consumers. Cohen (1994) calls such an unreasonable null hypothesis a "nil hypothesis." That said there are many occasions when a traditional null hypothesis is reasonable.

Our consideration of the dominant hypothesis includes variations on a theme, such as minor variations in a model. We also include the use of conditional nested hypotheses by which a researcher tests the conditions under which the dominant hypothesis holds. Dunbar (1993) and Klayman and Ha (1989) show that comparisons of conditional nested hypotheses can be misleading. One might find that a hypothesis is more appropriate under certain conditions, while an excluded hypothesis might be superior for other conditions.

People often have difficulty in making valid generalizations from data. One reason for the difficulty is that subjects pick a hypothesis and then look only for confirming evidence. Bruner and Potter (1964) demonstrated this in their well-known experiment in which subjects tried to describe the image on a poorly focused slide. The clarity of the initial slide was varied such that one group received slides that were in very poor focus, another group received slides that were in moderately poor focus, and the third received slides in medium focus. The experimenter then gradually improved the focus until it reached a level that pretest subjects could identify 75% of the time. The group that started with poorest focus tended to cling to their initial impressions such that by the end of the study they could recognize only 23% of the items. Those with moderately poor focus raised their scores to 45% and those with medium focus raised theirs to 60%. Note that all three groups were hindered by their prior hypotheses because the pretest subjects were correct for 75% of the slides. When subjects were given more time to study the slides, those who started with the very blurred slide benefited least. One might think of this as an analogy to the discovery

process in science. One starts with little evidence, develops a hypothesis, then obtains better evidence. But if the additional evidence is subject to interpretation, one might cling to the original hypothesis.

Wason (1960; 1968) conducted experiments in which subjects had to determine the rule that an experimenter was using to generate sets of three numbers. The subjects tried “experiments” whereby they proposed new sets of three numbers and then received feedback on whether the data agreed with the rule. Subjects typically tried to confirm a favored hypothesis and were generally unsuccessful at learning the rule. Wason concluded that bias is introduced by the strategies people use to examine evidence. These studies, known as the “24-6” studies, have been widely replicated and extended.

Mynatt, Doherty, and Tweney (1978) showed that subjects seldom sought disconfirmation of their favored theories and they often ignored information that falsified their theories. Other studies have shown the use of a single hypothesis leads to a bias in the way that people evaluate evidence (Lord, Ross, and Lepper 1979; Jones and Russell 1980; Chapman and Chapman 1969).

The preceding studies in this section were done primarily with students. However, as shown below, many studies have been done using professionals and researchers.

Ben-Shakhar et al. (1998) provided clinicians with a battery of psychodiagnostic tests from the records of a Jerusalem hospital. They were asked to identify which patients were suffering from Paranoid Personality (PP) and which from Borderline Personality (BP). Most of the clinicians required several hours to make their judgments and they were paid about \$200 to do so. Half of the clinicians received a suggestion that the patient was suffering from PP and half were told that it was BP. The battery of tests was designed to be neutral. The experts' conclusions showed strong agreement with the suggestion they had been given earlier.

Elaad, Ginton, and Ben-Shakar (1994) found that prior expectations affected conclusions by polygraph examiners. As might be expected, this only occurred when the results contained some ambiguity.

Goldfarb (1995) concluded that the dominant hypothesis has detrimental effects on research in economics. He used an example from industrial organization to illustrate the problem. Before 1974, many researchers had concluded that industrial concentration raised profits. Demsetz (1974) published an influential attack and hypothesized that the superior efficiency of large firms was the cause of high profits. After this, the published regression results changed; they supported Demsetz, who called this phenomena “believing is seeing.”

Studies of scientific practice also suggest that the dominant hypothesis does not effectively promote objectivity. Greenwald et al. (1986) reviewed evidence from psychology and concluded that researchers display a confirmation bias that leads them to revise their procedures until they achieve a desired result. In some notorious cases, such as that of Cyril Burt, eminent researchers altered data to support their hypotheses (for a review, see Broad and Wade 1982).

The success of the dominant hypothesis approach in contributing to scientific generalizations rests upon the assumption that other scientists will develop competing hypotheses, and the “marketplace of ideas” will, over time, lead to the selection of the best hypothesis. Mitroff (1972) studied procedures used by space scientists and concluded that the dominant hypothesis was beneficial to scientific advancement because the best idea will win in this market. However, Armstrong (1980) argued that Mitroff's conclusion did not follow logically from his evidence. The “marketplace” may not operate effectively. For example, Pollay (1984) concluded that no consensus arose after a decade of research using the Lydia Pinkham data to investigate the duration of the carry-over effect of advertising.

Rodgers and Hunter (1994) found that researchers investigating a favored hypothesis selectively delete studies from a meta-analysis. Studies in medical research by Begg and Berlin (1989) and in marketing by Rust, Lehmann, and Farley (1990) show how such a bias can adversely affect meta-analyses. Coursol and Wagner's (1986) analysis suggests that researchers in psychology are less likely to submit (and journal editors less likely to publish) studies that do not support a favored hypothesis.

2.3. Competing Hypotheses

For competing hypotheses, the researcher examines evidence on two or more plausible hypotheses. This enhances objectivity because the role of the scientist is changed from advocating a single hypothesis to evaluating which of a number of competing hypotheses is best. Of course, in practice, researchers might start with a favorable view of one of the hypotheses or they may reach a premature conclusion. Sawyer and Peter (1983) claimed that competing hypotheses are useful in marketing, and they cite studies by Cialdini et al. (1978), Burger and Petty (1981), and Bettman et al. (1975) as successful illustrations.

Research on the scientific method shows that the method of competing hypotheses can aid objectivity. Using laboratory studies, Klayman and Ha (1987) and Dunbar (1993) found that subjects who thought of explicit alternatives to their best guess were most successful at discovering generalizations. Farris and Revlin (1989), in a laboratory study, found that competing hypotheses aided the discovery of correct hypotheses. Gorman and Gorman (1984) found that when subjects actively searched for and obtained more disconfirming information, they were more likely to discover correct explanations.

By structuring alternative hypotheses, researchers may be better able to judge how the evidence relates to each. McKenzie (1998) found support when he reviewed relevant studies.

Dunbar (1995) studied the behavior of scientists in four biology laboratories. He found that scientists were quick to modify their hypotheses when they received inconsistent evidence. If the evidence called for major changes in hypothesis, they tended to be resistant when working alone. Peer review proved useful in getting them to consider alternate hypotheses.

2.4. When to Use Which Approach

We expected that the value of the different approaches would depend upon the focus of the study and the amount of prior knowledge. To examine focus, we classified research into three categories: studies of phenomena (e.g., X is related to Y), models (e.g., model A accurately describes a situation), and methods (e.g., method K will provide efficient and unbiased results).

We speculated that the approach to specifying hypotheses might depend on the focus of the study. The exploratory approach seems most appropriate where there is little prior research; it might also be used to expand thinking for an area where prior information is available. A dominant hypothesis would not seem relevant where one has little prior knowledge; it might help to better define the conditions where an accepted hypothesis is most useful or to refine a model or an explanation. Competing hypotheses are expected to be most relevant where prior knowledge leads to two or more reasonable explanations (or models, or methods).

3. Publication Audit

We studied the extent to which the three scientific approaches were employed in six prestigious marketing journals: *International Journal of Research in Marketing (IJRM)*, *Journal of Consumer Research (JCR)*, *Journal of Marketing (JM)*; *Journal of Marketing Research (JMR)*; *Marketing Letters (ML)*, and *Marketing Science (MS)*. We analyzed all papers published from 1984 through 1999.

3.1. Coding

Four postgraduate business students did the initial coding. They examined all studies published by the *JM*, *JCR*, *JMR*, and *MS* from 1984 to 1993. Each study was independently coded by two of them using a set of instructions. It was first coded as to whether it was empirical. Empirical studies were categorized based on whether they focused primarily on phenomena, models, or methods. Within each category, studies were then coded as exploratory (induction), single dominant hypothesis, or multiple competing hypotheses. Where differences

occurred, an author coded it. Dominant and competing hypotheses studies were also coded for whether they explicitly stated conditions under which the hypotheses would hold.

Inter-rater reliability was high with respect to coding whether the approach was exploratory, dominant hypothesis, or competing hypotheses. The original two coders agreed on 95% of their codings. Sampling error did not pose a problem because we analyzed the total population of papers.

Given the good reliability on the coding of the first four journals and budget limitations, the coding of the other journals as well as the coding from 1994 through 1999 was done by the authors, using one coder per paper.

3.2. Publication Audit Results

We coded all 2,240 papers in the six journals. Of these, 79.3% (1,729) were empirical studies. Of the empirical studies, 58% focused on phenomena, 15% on models, and 16% on methods. The remaining 11 % had more than one focus (e.g., phenomena and method) and we labeled these as combined. The journals differed in their emphasis. Most of the papers in the *IJRM*, *JCR*, *ML* and *JM* focused on phenomena, *JMR* was split evenly among the three areas, and *MS* emphasized models (Table 1).

Table 1. Focus of Empirical Studies: Percentages by Journal for the Period 1984-1999 (Number of Studies)

| | <i>IJRM</i> (257) | <i>JCR</i> (377) | <i>IM</i> (268) | <i>JMR</i> (380) | <i>ML</i> (225) | <i>MS</i> (222) | Total (1729) |
|-------------|----------------------|---------------------|--------------------|---------------------|--------------------|--------------------|-----------------|
| Phenomena | 59.9 | 80.1 | 73.6 | 42.9 | 61.8 | 21.6 | 58.0 |
| Models | 9.3 | 6.7 | 9.3 | 21.3 | 8.9 | 38.8 | 15.0 |
| Methods | 12.5 | 6.6 | 6.3 | 23.7 | 24.9 | 23.4 | 16.0 |
| Combination | 18.3 | 6.6 | 10.8 | 12.1 | 4.4 | 16.2 | 11.0 |
| | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

We were able to classify all but 28 of the empirical papers as to their approach to hypotheses. The excluded studies had more than one approach (i.e., some aspects of the study were exploratory and other aspects involved dominant or competing hypotheses). Table 2 summarizes the findings: 74.4% used the single dominant hypothesis, 12.6% were exploratory, and 13.0% used the method of competing hypotheses.

Table 2. Hypothesis Approach by Focus of Study: Percentage of Empirical Studies (Number of Studies)

| | Phenomena (987) | Models (259) | Methods (266) | Combination (189) | All (1701) |
|-------------|--------------------|-----------------|------------------|----------------------|---------------|
| Exploratory | 18.3 | 4.2 | 5.3 | 4.8 | 12.6 |
| Dominant | 74.7 | 79.2 | 68.8 | 74.6 | 74.4 |
| Competing | 7.0 | 16.6 | 25.9 | 20.6 | 13.0 |
| | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

The approach varied depending upon the focus of the study. For example, the proportion of studies using competing hypotheses was considerably higher for those that focused on methods (25.9%), than for those that focused on models (16.6%), or phenomena (7.0%).

While 65.5% of the empirical studies discussed conditions at some point in the paper, only 10.7% had incorporated conditions directly into the hypotheses. That is, few studies tested conditions. The popularity of the dominant hypothesis approach cannot be explained by claiming that it is due to an interest in testing the conditions under which a hypothesis is most relevant; only 9.8% of the dominant hypothesis studies tested for conditions. Studies using competing hypotheses were somewhat more likely to test conditions (14.2%).

3.3. Comparisons Across Journals

There were substantial differences among journals for competing hypotheses. At the low end only 6.3% of *ML* papers tested competing hypotheses. At the high end, the *JMR* had 19.2%. Controlling for the mix of the type of studies (i.e., phenomena versus models versus measurement methods), there was little difference across journals for phenomena; the *JM* and *ML* had lower percentages for models and methods, while *IJRM* had the highest (Table 3).

Table 3. Percentage of Competing Hypothesis Studies by Focus by Journal

| | <i>IJRM</i> (41) | <i>JCR</i> (31) | <i>JM</i> (22) | <i>JMR</i> (73) | <i>ML</i> (14) | <i>MS</i> (39) | All (220) |
|-------------|---------------------|--------------------|-------------------|--------------------|-------------------|-------------------|--------------|
| Phenomena | 6.5 | 5.3 | 7.7 | 10.4 | 4.3 | 10.4 | 6.9 |
| Models | 34.8 | 12.0 | 8.0 | 21.0 | 0.0 | 15.1 | 16.5 |
| Methods | 31.3 | 24.0 | 11.8 | 32.2 | 10.7 | 30.8 | 25.4 |
| Combination | 27.7 | 24.0 | 10.3 | 21.7 | 20.0 | 13.9 | 20.2 |
| Average | 16.0 | 8.2 | 8.2 | 19.2 | 6.3 | 17.6 | 13.0 |

3.4. Changes Over Time

One can propose different reasons why the use of the dominant hypothesis would change over time. As a field develops and reputations of scientists become established, the proportion of papers using dominant hypotheses might increase if well-known scientists try to protect their favored hypotheses. On the other hand, as knowledge in the field develops, one might expect a variety of competing hypotheses to be developed, and, consequently, more studies would examine the relative merits of the competing hypotheses.

To determine whether the situation changed over time, we compared the approaches used in the periods 1984-89, 1990-94, and 1995-99 for each journal. The proportion of dominant hypothesis studies went up from 54% in the first five years to 65% in the last five. However, despite a slight increase in competing hypotheses during 1989-1994, the percentage of competing hypotheses dropped to 10.4%. (Table 4).

Table 4. Percentages of Papers by Type of Hypotheses for Three Time Periods

| | 1984-89 | 1989-94 | 1995-99 | Total |
|-------------|---------|---------|---------|-------|
| Exploratory | 10.2 | 13.4 | 13.5 | 12.4 |
| Dominant | 76.1 | 71.6 | 76.1 | 74.4 |
| Competing | 13.7 | 15.0 | 10.4 | 13.2 |
| | 100.0 | 100.0 | 100.0 | 100.0 |

The decrease in the percentage of studies with competing hypotheses is mostly explained by the shift towards studies in phenomena, where the dominant hypothesis is more common. This shift has been accompanied by decreases in studies involving methods and models (Table 5).

Table 5. Percentages of Papers by Focus of Study for Three Time Periods.

| | 1984-89 | 1989-94 | 1995-99 | Total |
|-------------|---------|---------|---------|-------|
| Phenomena | 54.0 | 55.8 | 64.8 | 58.0 |
| Models | 17.4 | 15.0 | 12.9 | 15.1 |
| Methods | 17.0 | 17.2 | 12.5 | 15.7 |
| Combination | 11.6 | 12.0 | 9.8 | 11.2 |
| | 100.0 | 100.0 | 100.0 | 100.0 |

4. Marketing Scientists' Opinions

To what extent do the beliefs of marketing scientists conform with the above findings about the most appropriate ways to formulate hypotheses, and are they aware of what is currently being published? To assess these issues, we solicited their opinions on four occasions.¹

We obtained opinions from those attending the Marketing Science Conference in Tucson, Arizona in March 1994. The instrument, Version One, was inserted into each registration packet (see Appendix 1). It asked which scientific approach represents the “better quality of science.”

Next, we administered Version One at the European Marketing Conference in Maastricht, The Netherlands in May 1994. We made minor modifications in Version One because of a concern that some of our original items might have been biased. Initially we had used the term “advocacy” and defined it as using “a null hypothesis that is not reasonable.” The definition was changed to “the null hypothesis is not a leading alternative hypothesis.” The phrase asking which approach represents the “better quality of science” was changed to “better scientific practice in marketing.” We also modified the administration in that all those who attended the session at which this paper was to be presented were asked to complete and return the questionnaire before the talk.

Despite differences in administration and wording, the responses by 16 American and 26 European marketing scientists were similar so we combined them. Exploratory studies were preferred to the dominant hypothesis (19 to 14 with 9 undecided). There was a preference for competing hypotheses over induction (23 to 11 with 8 undecided). There was a stronger preference for competing hypotheses over the dominant hypothesis (30 to 6 with 6 undecided).

Version Two (see Appendix 1) was administered in November 1994 and February 1996 to those attending sessions where our paper was presented at the New Zealand and Australian Marketing Educators conferences. This version eliminated the word “advocacy” and asked how prior information would affect their recommendation. When little prior information was available, 68% had a preference for induction. When some relevant prior information was available, 60% of them preferred competing hypotheses. When there was considerable prior information, 82% favored competing hypotheses. These results are summarized in Table 6.

Table 6. Marketing Scientists' Preferred Approaches for Different Levels of Information (Percentages based on 38 marketing scientists)

| | Very little information | Some information | Considerable information |
|----------------------|-------------------------|------------------|--------------------------|
| Exploratory | 68 | 3 | 0 |
| Dominant Hypothesis | 13 | 37 | 18 |
| Competing Hypotheses | 19 | 60 | 82 |
| | 100 | 100 | 100 |

Although there was considerable diversity of opinions among the marketing scientists, the typical responses were consistent with findings from research on the most effective ways to formulate scientific hypotheses. There was a strong preference (82%) that the field should move toward competing hypotheses as knowledge developed.

We also asked the marketing scientists about their perceptions of what was published in leading marketing journals. Considerable diversity existed among the 80 respondents. Their estimates ranged from 1% to 60% for exploratory studies, from 30% to 90% for dominant hypotheses, and from 5% to 45% for competing hypotheses. The averages were 23% exploratory, 53% dominant hypothesis, and 24% competing hypotheses, as compared with the audit results of 13%, 74%, and 13%, respectively. In other words, there were many more dominant hypothesis studies than expected, fewer exploratory studies, and fewer studies with multiple hypotheses.

¹ Few respondents are needed when using expert opinions. Hogarth (1978) concluded that the number of experts should be between 6 and 20, while Libby and Blashfield (1978) concluded it should be between 5 and 9.

5. Limitations

The coders had been instructed to examine whether a null hypothesis was reasonable. This coding was not highly reliable. For example, in Armstrong (1991) the null hypothesis (that experts in the area of consumer behavior could not make better predictions than could novices about the outcomes of studies on consumer behavior) had little face validity. As a result, our coders classified this study as having a single dominant hypothesis. However, the evidence was consistent with the null hypothesis, so it was a reasonable null hypothesis.

To address this coding problem, the 165 studies with competing hypotheses from the *JM*, *JCR*, *JMR*, and *MS* were subjected to further analysis. The competing hypotheses were independently coded by the first two authors as to whether they were (1) not reasonable, (2) reasonable, but with minor variations that were not independent of one another, (3) reasonable and major variations, that were not independent of one another; or (4) reasonable and major variations that were independent of one another. Discrepancies were found for 35% of the papers, in which case they were blind-coded by the third author. Thirty-three papers were coded as having no reasonable competing hypotheses, so they were reclassified as dominant hypothesis studies. Of the remaining 132 studies, 60% were coded as “minor variations,” 22% were coded as “major variations of related hypotheses,” and 18% (24) were coded as “major variations with independent hypotheses.”² The 24 competing hypotheses studies that were coded as having “major variations with independent hypotheses” represented less than three percent of the 1,100 empirical papers.

Researchers may not fully and accurately disclose their methods. For example, they might start with an exploratory approach, but report it as a dominant hypothesis study because they believe that reviewers expect this. This might be due to self-deception or poor scientific practice. That is, researchers could perceive that the proper way to report their studies is to cast them in the dominant hypothesis mode. Alternatively, as has happened to us on other occasions, referees have suggested that hypotheses should be added, removed, or revised after a study was completed. Such practices would be misleading if not fully reported, because the confidence that one places in a hypothesis should be lower if the hypothesis arose solely from the data.

6. Discussion

It might be useful to study why the dominant hypothesis is so widely used. One possible explanation is that it is due to the role played by tests of statistical significance in journals' publication decisions. Marketing, like other fields such as the social and biomedical sciences, seems to demand statistically significant results. Of the 692 papers with statistical significance tests in major marketing journals between 1974 and 1989, only 7.8% failed to reject the null hypothesis (Hubbard and Armstrong 1992). The percentage has decreased over time. Many leading researchers have been suggesting that tests of statistical significance be banned from journal articles because the tests are so widely misused (e.g., see the studies in the Special Section of *Psychological Science*, 1997, Volume 8, No. 1; for a similar conclusion in economics, see McCloskey and Ziliak 1996).

It might also be interesting to study why the use of competing hypotheses is low. One possible explanation is that studies with competing hypotheses might be more likely to produce controversial findings. Koehler (1993) concluded that papers supporting existing beliefs are more favorably reviewed. Papers that challenge existing theories are more likely to be rejected, according to experiments by Goodstein and Brazis (1970); Abramowitz, Gomes, and Abramowitz (1975) and Mahoney (1977). A survey of editors of 16 psychology journals revealed that studies with controversial findings are seldom published (Armstrong and Hubbard 1991).

Journals could make changes in the reviewer's rating sheet to encourage the publication of papers that use competing hypotheses. To judge how reasonable a null hypothesis is, reviewers could be asked if they can imagine other hypotheses that might explain the result. Editors could then favor publication of papers with competing hypotheses. Such procedures have been used by the *Journal of Forecasting* and the *International Journal of Forecasting*. To examine this, Armstrong (1988) coded a sample of 105 empirical papers from these journals and

² Details about the coding of these studies are available from the second author.

found that 58% used the method of competing hypotheses. This percentage is much higher than that in the current audit, even after adjusting for the fact that these journals focus heavily on methods and models.

Few scientific generalizations are universal. Typically, they depend upon conditions. For example, the effectiveness of a two-sided argument in an advertisement would depend upon the product and the characteristics of the target market. However, in our audit of marketing journals, only 10.7% of the studies included conditions in the hypotheses. A rating sheet might be used to direct the reviewers' attention to conditions.

Further research could assess whether changes should be made in the way marketing scientists specify hypotheses. This might involve such questions as: Do researchers consider using competing hypotheses? Are researchers deterred from using competing hypotheses because they perceive the approach as being too difficult or too expensive? Do editorial practices of marketing journals favor papers that use a dominant hypothesis? Is there something about marketing problems that calls for use of the dominant hypothesis?

Some researchers have been successful in their use of competing hypotheses for marketing problems. A selection of such studies is provided in Appendix 2. These include examples of studies where the focus is on phenomena, models, and methods.

It might be useful for authors to reveal how they generated hypotheses in their research. Reviewers could be asked to consider whether this aspect of methodology is proper for the problem. This might aid readers in assessing how much confidence to place on the results.

Further research might also examine the focus of studies. Which areas have provided the more important advances in marketing, those on phenomena, models, or methods? Only one-sixth of the studies are directed at methodology, whereas most focus on phenomena. Is this optimal? You might ask yourself what is the source of the most useful findings. In informal surveys, our colleagues find it easier to think of advances in methodology than in phenomena.

7. Conclusions

Studies on the scientific method led us to conclude that the exploratory approach is relevant in certain situations. Laboratory and field studies indicated that use of a single dominant hypothesis is likely to reduce a researcher's objectivity and that the method of competing hypotheses would be the most effective approach if one has some prior knowledge.

Our audit of empirical papers published in five leading marketing journals concluded that 74% were based on dominant hypotheses. This was most common for papers dealing with phenomena. Only 13% of the empirical papers involved competing hypotheses, and less than three percent of these used hypotheses that differed substantially from one another. Researchers who studied methods are most likely to employ the method of competing hypotheses (26%), while those studying phenomena were least likely (7%).

The marketing scientists in our study did not believe dominant hypotheses to be an effective approach for marketing, especially as the field develops. On average, they thought that dominant hypothesis would be appropriate for 23% of the studies in marketing. This assessment of expert opinion revealed enormous differences in perceptions of what was being published. On average, the marketing scientists substantially underestimated the extent to which the dominant hypothesis was used.

Our paper is an exploratory study. We cannot say what is the ideal mix of approaches. Our own beliefs are that there should be a greater use of exploratory approaches, especially in the early stages of research to identify a set of reasonable hypotheses. In addition, an increased use of the method of competing hypotheses seems warranted. Said another way; too many resources seem to be going into studies using a dominant hypothesis. Greater attention should be given to describing the conditions under which hypotheses should apply. This was especially lacking for studies using the dominant hypothesis, where less than ten percent examined conditions as part of the hypotheses. Finally, we think there should be more studies comparing hypotheses that differ substantially.

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Appendix 1: Items Used to Assess Expert Opinions

One way of viewing empirically-oriented scientific research is in terms of the hypotheses. In the following questions, the term “hypotheses” refers to prior statements about phenomena, methods, or models. Studies can be divided into three categories:

Version One

- Inductive or exploratory studies: No prior hypotheses
Advocacy: A dominant prior hypothesis, with a null hypothesis that is not a leading alternative hypothesis.
- Competing hypotheses: At least two reasonable competing prior hypotheses
Which of these approaches represents the better scientific practice in marketing? Circle the number nearest the approach that reflects your preference in each pair. Please answer each question. If undecided, circle “0”.

| | | | | | | |
|--------------------------|---|---|---|---|---|----------------------|
| Q1. Inductive | 2 | 1 | 0 | 1 | 2 | Advocacy |
| Q2. Advocacy | 2 | 1 | 0 | 1 | 2 | Competing hypotheses |
| Q3. Competing hypotheses | 2 | 1 | 0 | 1 | 2 | Inductive |

Version Two

- No prior hypotheses: The purpose of the study is to generate hypotheses (exploratory and inductive studies).
- Testing a single major hypothesis: or minor variations on the major hypothesis. A dominant major hypothesis where the null hypothesis is not a leading alternative hypothesis.
- Testing competing hypotheses: At least two reasonable competing prior hypotheses.

Which of these approaches represents the better scientific practice in marketing?

- a. For situations where one has very little or no prior information
() No Prior Hypotheses () Single Hypothesis () Competing Hypotheses
- b. For situations where one has some relevant prior information
() No Prior Hypotheses () Single Hypothesis () Competing Hypotheses
- c. For situations where one has considerable prior information
() No Prior Hypotheses () Single Hypothesis () Competing Hypotheses

Versions One and Two each asked:

What percent of the empirical research in the *JCR*, *JM*, *JMR*, and *Mkt. Sci.* do you think is represented by each category (over the last decade)?

| | |
|----------------------|-------|
| No Prior Hypotheses | _____ |
| Single Hypotheses | _____ |
| Competing Hypotheses | _____ |
| | 100% |

Appendix 2: Illustrations of Competing Hypotheses, Models, or Methods

| Focus | Paper | Description |
|-------------|---------------------------------------|---|
| Measurement | Szymanski, Tory, and Bharadway (1995) | After using meta-analysis to bring into focus, diverse findings on pioneering advantage, the authors look at the contingency versus main-effect perspective to pioneering advantage |
| | Pechmarm & Shih (1999) | Put forward two competing theories – excitation transfer theory versus forbidden fruit thesis-support for the latter being established |
| Models | Fockens, Leeflang, and Wittink (1997) | Different hierarchical models, different possible hierarchies and nonhierarchical specifications |
| | Mittal, Kumar and Tsiros (1999) | Compare their proposed dual-mediation model with two conceptually rival models – a direct model and an alternative mediation model tested in prior research by other |
| | Naik, Mantrala, and Sawyer (1998) | Planning media schedules modeling where their proposed model is put up against several competing well known advertising models |
| | Johnson, Anderson, and Fennell (1995) | Develop and test alternative models of market level expectations, perceived product performance, and customer satisfaction |
| Methods | Krafft (1999) | As part of examining eleven hypotheses boom agency theory, transaction cost analysis and Ouchi's theoretical approach, the author derives and tests two opposing hypotheses, with the one derived from Ouchi's approach supported, the TCA one rejected |
| | Bult and Wonsbeek (1995) | Test competing methods for selection of targets loom a direct mailing list – CH-AID, Gains Chart Analysis, Parametric PM-approach, and Semi-parametric PM-approach – the parametric PM-approach being found to lead to a higher net return |
| | Agarwal and Rao (1996) | Tests eleven competing consumer-based brand equity measures, showing measures based on dollar metric and discrete choice methodology predict choices well |

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