

# The Intellectual Structure of Consumer Research: A Bibliometric Study of Author Cocitations in the First 15 Years of the *Journal of Consumer Research*

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This study explores the analysis of citations in the *Journal of Consumer Research (JCR)* during its first 15 years of publication. We review previous work on citation analysis in marketing and consumer research, and we argue for the value of a more complex approach based on patterns of cocitation. Toward this end, we develop a data base that draws on the work of the 42 most frequently published authors in *JCR* in the first 15 years. We introduce a new, two-stage procedure to investigate the underlying structure in the from-versus-to or citing-cited matrix based on numbers of references among these authors. Our procedure yields a scale of citing-cited asymmetry for the 42 consumer researchers, a "citation-similarity space" showing patterns of symmetric citation among the researchers, and measures of research atypicality. These separate yet complementary results give interesting insights into patterns of cocitation among consumer behavior researchers and thereby appear to reflect the intellectual structure of consumer research.

The development, dissemination, and utilization of knowledge in any academic field of inquiry depends on the circulation of ideas through the publications that appear in scholarly books and journals. Hence, research in marketing and consumer behavior depends for its lifeblood on the flow of information through the publications of people working in the field. The imprint of the process wherein this circulatory system nourishes the intellectual growth of the discipline appears in the evidence and documentation left by the network of references and citations that trace the underlying paths of ideas.

In other disciplines, the importance of the visible traces of shared ideas has often received formal study via a focus on "invisible colleges" or "scientific communities" in which members of the academic field interact and draw on each others' intellectual products

(Crane 1972; Price [1963] 1986). Price (1986) credits Merton's (1973) sociology of science and Garfield's (1979) citation indexing as key influences on his initial explorations concerning the diffusion of ideas. He refers to the formal study of bibliographic citations as "bibliometrics" (p. vii) and sees the systematic analysis of "networks of science" (p. x) as the key to unlocking the shape and dynamics of invisible colleges (p. viii). More recent scholars such as Borgman (1990) and Lievrouw (1990) have adopted Pritchard's (1969, p. 349) definition of bibliometrics as "the application of mathematics and statistical methods to books and other media of communication." Meanwhile, Lievrouw (1990, p. 66) defines the invisible college as "a set of informal communication relations among scholars or researchers who share a specific common interest or goal."

Price (1986) himself pioneered in the study of the linkages among scholars that appear in their records of publications, citations, and references to one another's work. His research in this direction has proven quite influential. Thus, for example, Kuhn (1970, pp. 252-253; 1977, pp. 294-295) describes the scientific community in terms of linkages among citations and credits Price's work on invisible colleges or the "science of science" as the seminal work in this area.

In a similar vein, Paisley (1984, p. 14) suggests that "journal citations are strong indicators of the flow of

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information to, within, and from a scientific discipline." Paisley (1990a, p. 284) describes this stage of bibliometric research as follows: "Scientists communicate with relatively small numbers of colleagues who constitute a scientific community. . . . It seemed that citation measures could be used to define the communities." (For reviews of the historical roles played by Merton, Garfield, Price, Kuhn, and others, see Griffith [1990] and Paisley [1989, 1990a]; for a historical overview of post-Pritchard definitions of bibliometrics, see Broadus [1987].)

In reviewing the state of the art in the bibliometric study of scholarly communities, Lievrouw (1990) takes special pains to point out the important distinction between studies of *structure* (e.g., via bibliometrics) and concepts of *process* (e.g., the invisible college). In Lievrouw's view, bibliometrics is well suited to study the *structure* of communication among researchers. Hence, the "patterns of references" can be "interpreted as networks of interpersonal contacts" (p. 61). As Lievrouw emphasizes, however, such bibliographic structures do not necessarily correspond to the occurrence of "communication processes" (p. 63) and say little about "the nature of those relations" or about "specific types of communicative acts" (p. 63). Thus, like some sociometric analyses, they tend to leave "the nature of the interaction as an open question" (p. 65). In short, "paradoxically, the term *invisible college* denotes an informal communication process, yet researchers look for it in formal social structures and documents" (p. 66).

In the end, then, Lievrouw (1990, p. 69) suggests that both "the bibliographic map and its ethnographic interpretation are necessary to move through the territory of scholarly communication." Given this conception, "bibliometric links among publications . . . may provide clues about the existence of an invisible college" (p. 67). The purpose of the present study is to look for such clues in the case of consumer researchers in general and contributors to the *Journal of Consumer Research (JCR)* in particular.

## Bibliometrics in Marketing and Consumer Research

Students of marketing and consumer research have recognized the importance of publications, references, and citations in tracing the intellectual growth of their field. Thus, several investigators have examined various aspects of the quantifiable contributions that underlie the development of the literature in their discipline. Following the typical pattern of historical evolution suggested by Borgman (1990) and Paisley (1990a), these investigations may be characterized as pursuing different levels of complexity, depending on the degree of structure and patterning that they reveal. Here, we do not intend the term "complexity" as the basis for invidious comparisons. All levels of complexity are needed to understand the progress of the discipline.

1. *Counts of Publication Frequency by Author.* The most basic level of analysis simply counts the frequencies with which various authors have appeared in print as a measure of auctorial activity or dominance. Well-known examples of this approach would include Wheatley and Wilson's (1987) tabulation of frequencies of publication in the journals of the American Marketing Association, Kassarijian and Orsini's (1980) indexing and enumeration of publications in the proceedings of the Association for Consumer Research, and Yalch's (1988, 1990) periodic compilations of publication frequency by various authors in *JCR*.

2. *Enumeration of Citation Frequencies by Author.* The next level of analysis makes use of data that are more difficult to obtain but perhaps more indicative of intellectual impact—namely, those pertaining to the frequency with which various authors are cited in the literature. Such counts of citation frequencies—often with the help of the *Social Science Citation Index*—sometimes serve as a basis for the evaluation of candidates at the time of their tenure or promotion decisions (AMA Task Force 1988; Bloom 1987).

3. *Frequencies of Citations of Journals.* Some students of citation frequencies have aggregated frequency counts by various categories of interest such as those that characterize the key journals in the discipline. In marketing, for example, Goldman (1979) examined the number of times that authors in the *Journal of Marketing (JM)* and the *Journal of Marketing Research (JMR)* referred to work from other disciplines in general and to that published by other journals in particular. Similarly, Leong (1989, 1990) has studied references to various disciplines and journals by the authors published in *JCR* (Leong 1989) and in *Marketing Science* (Leong 1990). Using a comparable approach, Zinkhan et al. (1990) have investigated the references to other disciplines and journals found in papers appearing in the *Proceedings of the Association for Consumer Research (ACR)*.

With special relevance to *JCR*, for example, Leong (1989) focused on the frequency in articles published by *JCR* of citing work from various other disciplines. Based on articles from five volumes of *JCR* (covering the years 1974–1988), Leong's analysis counted the number of references to work in other areas and found a "heavy concentration of citations to sources in psychology (26.8 percent), marketing (20.4 percent), and . . . consumer behavior itself (18 percent)" (p. 493). It is interesting, however, that the "compactness" of consumer research (31.8 percent) was less than that for marketing (35.9), management science (50), economics (36), or finance (36)—but higher than that for sociology (22)—suggesting that "*JCR* authors . . . show a rather eclectic taste in reading and scientific interest" (p. 497).

4. *Numbers of Citations from Journals.* From the converse point of view, several studies have focused on

the number of references to various consumer or marketing journals found in articles from different publications. These include analyses by Anderson and Haley (1984), Cote, Leong, and Cote (1990, 1991), Jobber and Simpson (1988), Lutz (1989), Muehling et al. (1987), Robinson and Adler (1981), and Zinkhan et al. (1990). For example, Anderson and Haley (1984) compared the frequency of references to ACR *Proceedings* papers as opposed to papers in other marketing-related proceedings found in *JCR*, *JM*, and *JMR*. More ambitiously, Cote et al. (1990) investigated the frequencies with which the same three marketing- and consumer-related journals in general (*JM*, *JMR*, and *JCR*) and various marketing and consumer researchers in particular are cited in the journals from the disciplines represented by the *Social Science Citation Index* (1969–1988), which covers about 1,400 journals in all. The study by Zinkhan et al. (1990) pursued a similar focus with respect to the ACR *Proceedings*.

In an application with *JCR*, Cote et al. (1991) investigated the frequencies with which *JCR* is cited by journals in other disciplines. Using the *Social Science Citations Index* (1974–1989), they traced the flow of knowledge from *JCR* to other disciplines via frequency counts of references to *JCR* in journals from the various fields. Their analysis suggests that “*JCR* does have an influence” (p. 404) in terms of the frequency with which its articles are cited (averages of 13.3 citations per article and 1.7 citations per year); that this influence extends primarily to the fields of consumer research (40.2 percent of the citations), marketing (25.4 percent), psychology (7.8 percent), and other social sciences (7.6 percent); that, besides *JCR* itself (1,725 citations), the journals most frequently citing *JCR* are the ACR *Proceedings* (1,157 citations), *JMR* (677 citations), and *JM* (409 citations); and that a healthy number of *JCR* articles can be regarded as “classics” (p. 406) or “seminal works that continue to be cited over time” (p. 409).

*Conceptualization and Classification.* Conceptually, we can envision the types of analyses just described as different ways of aggregating data in an  $m \times n$  “from-versus-to” matrix in which  $m$  articles by various authors in different journals cite  $n$  articles by the same or some other set of authors in the same or some other set of journals. In such a matrix, the cells are coded 0 or 1 to indicate whether those citing do or do not refer to the items cited. The  $m$  rows represent sources citing; the  $n$  columns represent the targets cited; the cells, coded 0 or 1, indicate the absence or presence of a citing-cited linkage.

Given this description, we can classify the four analytic approaches as follows: (1) counts of publication frequency by author simply count the number of times that each author appears in the left-hand column representing the names of the various rows; (2) enumeration of citation frequencies by author takes the marginal totals for each column and aggregates by authors across

columns; (3) frequencies of citations to journals aggregate the column totals for various journals (or authors) grouped by some set categories such as the relevant disciplines of interest; (4) numbers of citations from journals aggregate the row totals for various journals (or authors) grouped by some set of categories such as the relevant disciplines of interest.

Clearly, all these approaches have provided insights into the patterns of influence that prevail within marketing and consumer research and between these marketing- and consumer-related fields and other academic disciplines. Yet, as noted by Leong (1989), the analytic approaches described thus far have tended to neglect the *structure* of influence within the fields of marketing and consumer research. As revealed by the underlying interrelationships embedded in the from-versus-to or citing-cited data, such patterns or structures appear more clearly in various types of cocitation analyses (Small and Griffith 1974; White and Griffith 1981, 1982).

### Cocitation Analysis

First developed in 1968 under the name of “co-mentions analysis” by Rosengren (1968; 1990, p. 110), cocitation analyses have since then approached the aforementioned  $m \times n$  from-versus-to, citing-cited, or sources-targets matrix in various ways. Small (1973) generated the method in which a linkage between articles is constructed based on their cocitation relation. Two articles are cocited when they are jointly cited in one or more subsequent articles. As noted by White (1990, p. 84), the purpose of cocitation analysis is to study “the intellectual structure of scholarly fields.” Similarly, McCain (1990, p. 213) suggests that “co-cited author maps can provide a general historical view of the intellectual structure of a research area.” Again, we can distinguish these methods along a hierarchy of complexity (keeping in mind that all such methods explore aspects of the underlying data structure in ways that are inherently more complex than the simpler counting rules described in the previous section).

*Symmetric Proximity Analysis.* The simplest level of cocitation analysis decomposes distance-based proximities between rows or columns of the data matrix via principal components analysis, factor analysis, multidimensional scaling, or cluster analysis. The result is a set of underlying dimensions that graphically represent the citation similarities among such units of interest as authors (Culnan 1986; McCain 1990; Paisley 1990b; White and Griffith 1981), articles (Small and Greenlee 1990; Small and Griffith 1974), or journals (Noma 1982c; Rice 1990). A review by White (1990, pp. 88, 98) suggests that there is “nothing better for reconnoitering ‘macro-level’ intellectual structure as it evolves in fields of science and scholarship. . . . The maps are essentially a new kind of graphics for revealing *inter-textual* relationships.” For example, Paisley (1990b)

found that, as a "multidiscipline," the field of communication tends to cite "exemplars" from other research specialties as much as or more than those authors are cited by their own disciplines. Clearly, this approach explores the underlying structure of linkages far more deeply than does any sort of simple frequency count. However, it suffers from the disadvantage of ignoring the asymmetry inherent in the distinction between citing and cited.

*Asymmetric Centroid Analysis.* As a way of exploiting the asymmetries contained in the basic citing-cited data, Noma (1982a, 1982b, 1984), Noma and Smith (1985), and Tijssen, de Leeuw, and van Raan (1987) have recommended variants of centroid scaling, collectively known as correspondence analysis (Hoffman and Franke 1986), in which citing references are placed as close as possible to the centroid of the references they cite and cited references are placed as close as possible to the centroid of the references that cite them. Noma has tended to take the article as his unit of analysis, but comparable approaches could be applied to authors or journals (Tobler 1976-1977). Correspondence analysis can be viewed as a multidimensional scaling (MDS) method, but primarily for asymmetric data (Hoffman and de Leeuw 1990, 1992).

### Cocitation Analysis in Marketing and Consumer Research

Unfortunately, although it possesses clear relevance to the problem of charting the pattern of influences, collaborations, and other intellectual affinities among scholars in the field, the method of cocitation analysis just described has received little use in studies of marketing and consumer behavior. Indeed, to the best of our knowledge, only two previous applications exist. The first, by Holbrook (1992), used references from chapters contained in just one book (Robertson and Kassarian 1991) to develop correlational proximity measures among most cited authors that were then submitted to principal components analysis to derive a spatial representation of the citation-based affinities among consumer researchers. The second, by Zinkhan, Saxton, and Roth (1992), performed an MDS of cocitation data to investigate the pattern in which articles from *JCR* cite journals from other disciplines.

Because the second study bears directly on *JCR*, we shall describe it in a bit more detail. In brief, Zinkhan et al. (1992) focused primarily on questions concerning the influence of knowledge flows among disciplines in general and between journals in consumer research (*JCR*) and other fields (e.g., economics, sociology, psychology, and marketing) in particular. Adopting a social exchange perspective and using citing-cited data from the *Social Science Citation Index* (1977-1988), they showed that the flow of knowledge from *JCR* to journals in economics and sociology appears to have been quite

minimal, that knowledge exchange between *JCR* and psychology displays a high degree of unilaterality (as measured by the receiving-sending ratio), and that only in the marketing area does a pattern of reciprocity seem to occur (with the citing-cited ratio between *JCR* and marketing journals close to one for many years). Most relevant to our present purposes, Zinkhan et al. (1992) performed an MDS on the citing-cited data. Their MDS map showed clusters of journals that appear to represent the areas of economics, sociology, psychology and behavior, and marketing and business. From the position of *JCR* in this map, the authors concluded that "*JCR* appears to play a bridging role between the behavioral and business journals" (p. 10). In other words, it appears that *JCR* borrows heavily from the behavioral sciences and feeds into managerial applications, thereby serving as "a conduit, perhaps, for psychological knowledge to flow through to marketing" (p. 12).

### Preview

Though cocitation analysis clearly offers insights beyond those available from more simple counting procedures, and though it has shown promise in the work by Holbrook (1992) and by Zinkhan et al. (1992) that has just been described, this approach has attracted relatively little attention in marketing and consumer research. Accordingly, the purpose of the present article is to use cocitation data to examine the intellectual structure of the field of consumer research in light of the affinities among various most frequently published authors that emerge from an analysis of citations found in *JCR* during the first 15 years of its publication. In this, our approach differs from those of Leong (1989) and Cote et al. (1991) in that we focus primary attention not on frequency counts but rather on patterns of citations among key authors in the field. It contrasts with that of Zinkhan et al. (1992) in that those authors dealt with data on cocitations among journals across disciplines, whereas we concentrate on the citing-cited data among authors within the field of consumer research itself, as represented by its leading journal, *JCR*. (For general discussions on the value of author cocitation studies within a field, see McCain [1990] and White [1990].)

To preview briefly, we proceed by constructing a data set to represent the references of each author to the work of the others (including self-references). Then, starting from the matrix of from-versus-to or citing-cited data, we use a new two-stage modeling procedure developed by Hoffman and de Leeuw (1991) to investigate the underlying structure in these data. The basic idea is first to correct for the asymmetry in cocitations. This results in a set of asymmetry estimates for the authors and a matrix of asymmetry-adjusted dissimilarities among all pairs of authors that can be interpreted as distances. The second stage involves scaling the dissimilarities with a restricted MDS model that introduces

an atypicality parameter for each author. The results of this stage are a map of the authors along with an estimate of atypicality for each researcher.

Our approach to modeling a cocitation matrix thus yields (1) a scale of citing-cited asymmetry for the most frequently cited *JCR* authors, (2) a citation-similarity space showing patterns of symmetric citation among these researchers, and (3) measures of author atypicality interpretable in terms of research distinctiveness or uniqueness. Thus, our two-stage model combines elements from both the symmetric and asymmetric approaches to cocitation analysis. As we shall see, these results give interesting insights into patterns of cocitation among consumer researchers.

## METHOD

### Sample of Authors

Our sample of authors consisted of the 42 consumer researchers who published four or more papers (not including comments and replies) in *JCR* during the first 15 years of its publication history (vols. 1–15, June 1974–March 1989). In general, we used the data on publication frequencies compiled by Yalch (1988), supplemented by updates concerning articles in the issues appearing after his compilation had been completed.<sup>1</sup> The resulting list of 42 authors with four or more articles in *JCR* between June 1974 and March 1989 (in alphabetical order) appears in the Appendix.

Several reasons account for our decision to select those authors with four or more *JCR* publications during its first 15 years. First, the study was intended specifically to focus on *JCR* during its first one and a half decades. The Journal has been widely regarded as an outlet for the highest quality consumer research in those years (Cote et al. 1991; Leong 1989; Zinkhan et al. 1992); it therefore appears reasonable to regard its most frequent authors as a set of important contributors to the field. Second, whereas the inclusion of those with fewer than four publications would have added many distinguished names to the list and would thereby have enabled us to consider a greater number of important researchers, it would have led to an unmanageably large citing-cited matrix. Third, because the *Social Science Citation Index* did not begin assessing *JCR* citations until 1977 (Zinkhan et al. 1992), the matrix of citing-cited data had to be constructed from scratch (via an extremely labor-intensive procedure of visual checking and manual tabulation). Other criteria for including authors, such as citation frequencies extending back to 1974, were not available; hence, the compilation completed by Yalch (1988) provided a useful independent criterion for a place to start in constructing the data set. Fourth, in accord with the aforementioned interest

in the intellectual structure among a community of scholars, we focused on the author rather than the article or journal as our unit of analysis; therefore, a selection of frequently published authors appeared a more natural place to start than would, say, a set of often-cited articles (such as that listed by Cote et al. 1991). In the latter connection, White (1990, pp. 99–100) concedes that “co-cited author maps . . . are only as good as the analyst’s choice of authors . . . and . . . depend very much on the analyst’s judgment of who should be included.” However, he also offers reassurance that “there are advantages to analysis at the author level”: “one needs only the names of prominent authors, which requires relatively little foreknowledge of a field and no detailed bibliographic information. Moreover, the author co-citation technique allows one to characterize an entire field with relatively few authors’ names—far fewer than the number of papers one would need to conduct an article-level analysis” (p. 85).

### Cocitation Data

For the consumer researchers listed in the Appendix, we reviewed all the articles authored or coauthored in *JCR* during the relevant time period (the rows in a disaggregate data matrix). For each of these author-article combinations, we then entered the number of citations for each relevant consumer researcher (including self-references) by counting the number of references to work authored or coauthored by each member of the aforementioned list (the columns in this disaggregate data matrix). We then aggregated these data across rows (i.e., across articles) for each author to obtain a  $42 \times 42$  from-versus-to matrix of the frequencies with which each most frequently published author cited each of the other most frequently published authors (with self-citations in the diagonals). (Though space limitations prohibit reproduction of the  $42 \times 42$  matrix here, it is available from the first author on request.)

### Model

The rationale for our approach, recently developed by Hoffman and de Leeuw (1991) for contingency tables, follows from considering the cocitation structure in terms of both its symmetric and asymmetric properties. The symmetric component assumes that author *i* cites author *j* as much as author *j* cites author *i*. The asymmetric component signifies an asymmetric relation in cocitation wherein author *i* cites author *j* more (or less) than the reverse. Hence, the symmetric component reflects reciprocal intellectual structure, whereas the asymmetric component presumably reflects some aspect of intellectual influence referred to by such terms as “prominence or visibility” (McCain 1990, p. 203), “importance” (Paisley 1990a, p. 296), or “eminence” (White 1990, p. 103).

In order to study both these aspects in detail, we first remove the effect of asymmetry. This allows us to ex-

<sup>1</sup> The authors thank Richard Yalch for sharing his raw data as the basis for their starting point.

amine asymmetric structure and also to adjust for its impact on symmetric patterns of cocitation. Once the asymmetry has been removed from the cocitation matrix, symmetry in cocitation is further decomposed into aspects due to (a) intellectual affinity among the authors and (b) research distinctiveness, uniqueness, or what we shall call atypicality.<sup>2</sup>

Specifically, the approach begins by fitting a special choice model with two sets of parameters to the matrix of citing-cited counts. The choice model corrects for asymmetry in the data and produces asymmetry-corrected dissimilarities. One set of parameters in the choice model estimates the degree of asymmetry in citation for each author. The other set of parameters may be interpreted as asymmetry-adjusted symmetric dissimilarities between pairs of authors. The dissimilarities among authors are collected into a matrix and subsequently scaled by a separate MDS model that produces both a map and estimates of author atypicality. Details follow.

*Correction for Asymmetry.* We first correct for any asymmetry in the cocitation matrix by applying Luce's choice model for stimulus detection (Luce 1963):

$$\pi_{j|i} = \frac{\eta_{ij}\beta_j}{\sum_k \eta_{ik}\beta_k}, \quad (1)$$

where  $\pi_{j|i}$  gives the probability that author  $j$  is cited by author  $i$ , with  $i = 1, \dots, m$  authors, with the similarity parameters  $\eta_{ij}$  symmetric (i.e.,  $\eta_{ij} = \eta_{ji}$ ) and  $\eta_{ii} = 1 \geq \eta_{ij}$  (for all  $i$  and  $j \neq i$ ) and with  $\sum \beta_j = 1$  (or  $\sum \ln \beta_j = 0$ ). Expression 1, which Takane and Shibayama (1986) call the unconstrained similarity-choice model, represents the proportion of times that author  $i$  cited author  $j$  on the basis of the intellectual similarity of authors  $i$  and  $j$  ( $\eta_{ij}$ : the similarity parameters) and the asymmetric influence of each author ( $\beta_j$ : the asymmetry parameters). When the intellectual similarity of a pair of authors is held constant, the model predicts that a more asymmetric author (higher  $\beta_j$ ) will be cited more often than a less asymmetric author. Thus,  $\beta_j$  measures the asymmetry arising from each author's "share" of citations. In this way, the  $\beta_j$ 's indicate the extent of asymmetry in cocitation (normalized for absolute frequency of citation) for each author. Note that the asymmetric aspect of cocitation depends only on  $\beta_j$ . If all authors are equally similar (i.e.,  $\eta_{ij} = 1$  for all  $i$  and  $j$ ), then  $\pi_{j|i} = \beta_j / \sum \beta_k = \beta_j$ , so that the probability that author  $i$  cites author  $j$  is determined solely by the asymmetric influence for author  $j$ .

*Multidimensional Scaling.* In the second stage, we construct a citation-similarity space. The development begins by noting that the  $\eta_{ij}$ 's can be interpreted as dis-

similarity measures. In addition, we assume that they are distances between vectors in multidimensional space (Luce 1963):

$$-\ln \eta_{ij} = d_{ij}(\mathbf{X}), \quad (2)$$

where  $\mathbf{X}$  is the  $m \times p$  matrix of coordinates for each author in  $p$ -dimensional space. Then, we relate the dissimilarities in Equation 2 to a distance model:

$$-\ln \eta_{ij} = [d_{ij}^2(\mathbf{Z}) + \delta_i^2 + \delta_j^2]^{1/2}. \quad (3)$$

The coordinate matrix  $\mathbf{X}$  now has  $p + m$  dimensions and has the form  $\mathbf{X} = |\mathbf{Z}|\Delta|$ , where  $\Delta$  is a diagonal matrix. This restricted MDS model is discussed by Bentler and Weeks (1978), by de Leeuw and Heiser (1980), and by Winsberg and Carroll (1989). Note that the specialized MDS model in Equation 3 introduces an atypicality parameter,  $\delta_i^2$ , for each author. These parameters are analogous to the uniqueness estimates in the common factor model.

*Atypicality Parameters.* The citation-similarity space derived from Equation 3 displays only the similarity aspect of cocitation in that authors near each other in the map are more likely to cite each other (in similar and symmetric fashion). Thus, the map reveals the intellectual structure of consumer research. The remaining component of cocitation is attributable to the distinctive characteristics of each author and is represented by  $\Delta$ . Here, the idea is that authors differ in intellectual similarity with respect to a set of common dimensions but may also differ on unique dimensions. As in factor analysis, our model focuses on that part of intellectual similarity that authors share with other authors (the "common" factors reflected in the citation-similarity space), but also allows for the possibility that some authors possess characteristics that differentiate them uniquely from all the other authors. We term this uniqueness *research atypicality*. If all authors were equally similar to each other with respect to the common patterns of cocitation, then atypicality, as represented by the  $\delta^2$  parameters in Equation 3, would completely determine overall similarity.

*Implementation.* We implement the two-stage procedure just described as follows. First, we fit the choice model in Equation 1 to the cocitation matrix via iterative proportional fitting (Bishop, Fienberg, and Holland 1975). Then we fit the estimated distances in Equation 3 according to the SMACOF algorithm outlined in de Leeuw and Heiser (1977, 1980). Both procedures have been programmed in the SAS IML procedure (SAS Institute 1985).

## RESULTS

### Author Asymmetry

The likelihood ratio chi-square ( $G^2$ ) for the choice model in Equation 1 equals 300.79 with 841  $df$  ( $p$

<sup>2</sup> For an approach that explicitly decomposes only the asymmetric components in the contingency table see Hoffman and van der Heijden (1991).

< .0001). The asymmetry estimates ( $\ln \beta$ ) for each author appear in Table 1. Here, as explained earlier, a higher value indicates a greater tendency for an author's work to be cited by the 42 researchers in the most-frequently-published list. The estimates in Table 1 therefore provide a scale of asymmetry associated with the cited authors. The scale is constrained to sum to zero. Positive values suggest, relatively speaking, that an author is cited more than he or she cites, negative values, that an author cites more than the reverse, and values near zero, that an author cites just about as much as he or she is cited.

The asymmetry estimates in Table 1 suggest that Jacoby has been cited most often by other authors on the list (with an influence estimate of 0.93), followed by Holbrook (0.85), Belk (0.83), Green (0.73), Moschis (0.62), Bettman (0.55), and Wright (0.55). In other words, those who published most often in *JCR* in the first 15 years have tended to cite these seven authors most frequently. (The reader should keep in mind that all 42 authors included here are, by definition, among those most frequently published. Thus, the asymmetry estimates merely order relative asymmetric citation frequencies among those who are already high in visibility.)

This finding corresponds reasonably well with intuition. For example, all but one of the authors just listed (Moschis) are among the researchers who published six or more papers in *JCR* during the period 1974-1988 covered by Yalch (1988). Hence, not surprisingly, it appears that publishing in *JCR* tends to lead toward being cited by other authors who publish frequently in *JCR*. The asymmetry scale reveals that the more frequently cited authors defy easy classification. We shall have more to say about this below when we examine the citation-similarity space.

### The Citation-Similarity Space

The spatial representation in Figure 1 presents the restricted MDS solution based on the asymmetry-adjusted dissimilarities among authors derived from their cocitation data. This two-dimensional solution has a stress value of 0.52. It appears to present a rather clear picture of intellectual structure in the field of consumer research as represented by cocitations among the most frequent contributors to *JCR*.

In this citation-similarity space, the horizontal axis appears to contrast authors on the basis of more macro or more sociological-anthropological approaches at the left end (Belk, Wallendorf, Hirschman) as opposed to those geared toward the more micro or more psychological study of individual behavior at the right end (Bettman, Park, Wright, Chakravarti, Biehal). Hence, it makes sense to find Robertson, Reilly, and Moschis fairly far to the left and Jacoby, Capon, Olshavsky, and Lynch fairly far to the right in the MDS space.

Meanwhile, the vertical dimension in Figure 1 appears to capture the continuum from research employing laboratory experiments at the bottom (Calder,

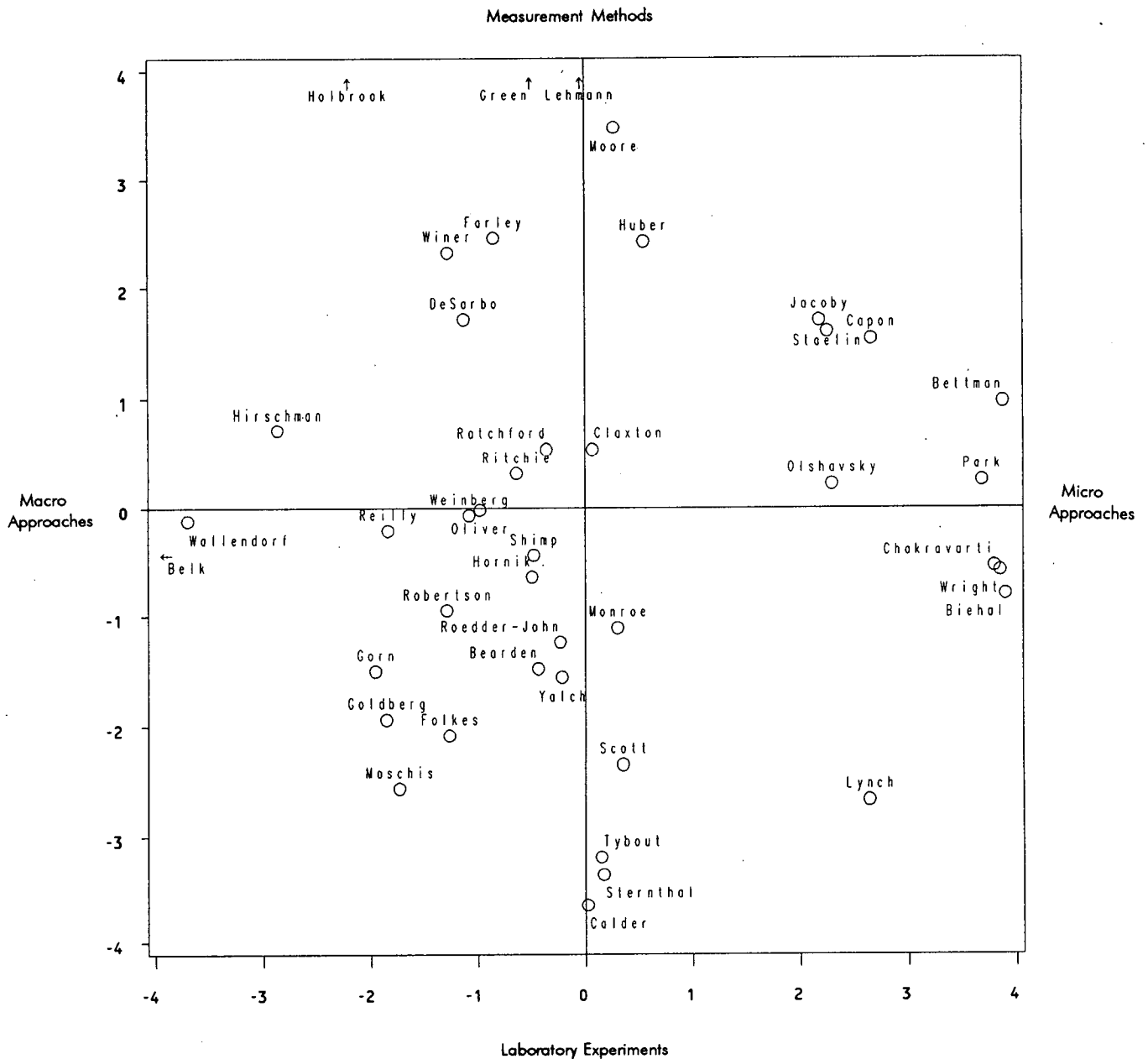
TABLE 1

ESTIMATED ASYMMETRIES AND ATYPICALITIES FOR THE 42 MOST FREQUENTLY PUBLISHED *JCR* AUTHORS, 1974-1989

| Author                  | Asymmetry<br>( $\ln \beta$ ) | Atypicality<br>( $\delta$ ) |
|-------------------------|------------------------------|-----------------------------|
| Bearden, William O.     | -.50                         | .26                         |
| Belk, Russell W.        | .83                          | .00                         |
| Bettman, James R.       | .55                          | .00                         |
| Biehal, Gabriel         | -.08                         | .65                         |
| Calder, Bobby J.        | .21                          | 1.90                        |
| Capon, Noel             | .23                          | 2.96                        |
| Chakravarti, Dipankar   | -.18                         | .08                         |
| Claxton, John D.        | -.08                         | 4.10                        |
| DeSarbo, Wayne S.       | -.25                         | 2.23                        |
| Farley, John U.         | .23                          | 3.84                        |
| Folkes, Valerie S.      | -.03                         | 3.29                        |
| Goldberg, Marvin E.     | .05                          | 3.56                        |
| Gorn, Gerald J.         | .05                          | 3.66                        |
| Green, Paul E.          | .73                          | 2.60                        |
| Hirschman, Elizabeth C. | .39                          | 3.82                        |
| Holbrook, Morris B.     | .85                          | 1.17                        |
| Hornik, Jacob           | -.50                         | 3.22                        |
| Huber, Joel             | -.18                         | 1.51                        |
| Jacoby, Jacob           | .93                          | 3.99                        |
| Lehmann, Donald R.      | .39                          | .92                         |
| Lynch, John G., Jr.     | -.13                         | .46                         |
| Monroe, Kent B.         | .15                          | 4.37                        |
| Moore, William L.       | -.08                         | .00                         |
| Moschis, George P.      | .62                          | 5.14                        |
| Oliver, Richard L.      | -.50                         | 1.99                        |
| Olshavsky, Richard W.   | .15                          | 3.04                        |
| Park, C. Whan           | .15                          | 1.72                        |
| Ratchford, Brian T.     | -.08                         | 4.37                        |
| Reilly, Michael D.      | -.80                         | 1.62                        |
| Ritchie, J. R. Brent    | -.32                         | 3.62                        |
| Robertson, Thomas S.    | .01                          | 3.21                        |
| Roedder-John, Deborah   | -.50                         | 2.25                        |
| Scott, Carol A.         | -.32                         | 1.87                        |
| Shimp, Terence A.       | -1.05                        | .00                         |
| Staelin, Richard        | .21                          | 3.14                        |
| Sternthal, Brian        | -.08                         | 1.09                        |
| Tybout, Alice M.        | -.18                         | .30                         |
| Wallendorf, Melanie     | -.18                         | .65                         |
| Weinberg, Charles B.    | -.18                         | 3.84                        |
| Winer, Russell S.       | -.25                         | 2.51                        |
| Wright, Peter           | .55                          | 2.49                        |
| Yalch, Richard F.       | -.80                         | .87                         |

Sternthal, Tybout) to those focusing more on studies of measurement methods at the top (Green, Holbrook, Lehmann). Hence, again, it appears reasonable that positions toward the lower end of this axis are occupied by Lynch, Scott, and Yalch, whereas those nearer the upper end are occupied by Moore, Farley, Winer, and Huber. Further, one might assume that there is a more-than-coincidental tendency for authors near the bottom of the space (with the exception of Lynch) to be closely associated with Northwestern University and for those nearer the top (except for Green and DeSarbo) to be linked with Columbia University. (As noted later, proximity along the vertical axis may also partially reflect coauthorship—e.g., Ritchie and Claxton or Reilly and Wallendorf.)

FIGURE 1  
THE CITATION-SIMILARITY SPACE FOR 42 JCR AUTHORS



### Research Atypicality

One advantage of the two-stage method pursued here is that it provides estimates of what we refer to as research atypicality. By virtue of tapping uniqueness or distinctiveness, these atypicality estimates may reflect a tendency toward the manifestation of programmatic, specialized research by an author. The atypicality estimate gives, for each author, the proportion of variance in cocitation not accounted for by the citation-similarity space. The larger the atypicality, the greater the degree

to which similarity in cocitation is not determined by the common dimensions of the citation similarity space, but by unique qualities or distinctive features of that particular author. Comparing the atypicality estimates across authors gives an indication of relative uniqueness or distinctiveness. We reproduce these estimates in Table 1.

It appears, in Table 1, that atypicality is greatest for Moschis (5.14), Monroe (4.37), Ratchford (4.37), and Claxton (4.10), all of whom may plausibly be regarded as researchers working programmatically in specialized



areas (e.g., adolescence, pricing, economics, energy) where their own prior work constitutes an important unique component of the research stream. This finding, when compared with the absence of Moschis from the list of most frequently published authors compiled by Yalch (1988), may help to account for the position of Moschis in the estimates of asymmetry reported in the preceding section. The apparently high atypicality of his work may reflect a clear programmatic focus that causes it to be often cited as a sort of paradigmatic example.

By contrast, low levels of atypicality appear for Belk (0.00), Bettman (0.00), Moore (0.00), Shimp (0.00), and Chakravarti (0.08). This suggests that such researchers may be described as drawing more widely and eclectically on the work of others, with the map explaining quite well their patterns of cocitation similarity.

We may also note that those with unique programmatic research streams, who tend to have larger atypicalities in Table 1, also tend to lie near the origin of the map in Figure 1. Thus, for example, Claxton (4.10), Monroe (4.37), and Ratchford (4.37) appear near the center of the space. This suggests, in general, that distinctive programmatic research might encourage a high atypicality score by discouraging strong intellectual identification with the extremes represented by the poles of the two dimensions in Figure 1. In other words, as one would expect, those with low proportions of variance in cocitations explained by the two spatial dimensions tend to fall toward the center of the space.

## DISCUSSION

### Limitations

Inevitably, the findings shown in Table 1 and Figure 1 are limited by certain caveats that deserve mention. First, as explained earlier, they represent only the most frequently published authors within a leading journal in the field of consumer research over a particular time period. Therefore, they do not reflect patterns of citations among other researchers published less frequently by that journal during the time period in question. For example, in this connection, one immediately notes the conspicuous absence of such influential names as John Howard, Jagdish Sheth, Franco Nicosia, and the team of James Engel, David Kollat, and Roger Blackwell from the list of authors studied because these key figures did not publish frequently in *JCR* during the relevant period. Similarly, such authors as Seenu Srinivasan, Richard Petty, John Cacioppo, David Schumann, Anthony Greenwald, Clark Leavitt, Eric Johnson, J. Russo, Robert Zajonc, Hazel Markus, Merrie Brucks, David Aaker, Douglas Stayman, Michael Hagerty, Don Granois, Julie Edell, Mita Sujjan, Rajeev Batra, Mike Ray, and Judy Zaichkowsky—all of whose names appeared among the authors of the fifteen *JCR* articles with the highest average annual citation rates (as reported by

Cote et al. [1991])—failed to appear on the most-frequently-published list, either because they have tended to publish primarily in other journals or because their careers started fairly late in the span of time between 1974 and 1989.

Second, because the present findings pertain only to work appearing in *JCR* during its first 15 years, they do not capture any diverging phenomena that might have characterized publications in the *Proceedings of the ACR*, in those of the American Psychological Association, Division 23, or in other marketing-related journals and proceedings.

Third, our findings rely on a unit of analysis (number of author-to-author citations across articles) that might be related to various factors in addition to those directly tied to an author's degree of intellectual influence. Thus, cocitation analysis tends to assume (1) that citation implies use, (2) that citation and use are based on merit or degree of influence, (3) that cocitation reflects similarity of content, merit, or influence, and (4) that all citations are equal (Pierce 1990, p. 48). Yet, with respect to these assumptions, it might happen that authors sometimes cite one another not so much because they have used each other's work as because they want to win favor politically (with senior colleagues), because they are asked to do so by reviewers (after the research has already been completed), because they want to impress readers (with a lengthy reference list), or because they want to attack the work of someone else, to discredit its validity, or to deny its importance.

Fourth, as mentioned in the beginning of this article, our findings present an analysis of structure rather than of process (Lievrouw 1990). In essence, as noted by Paisley (1990a, p. 288, italics added), "When bibliometric measures are used to describe the social system that produced publications . . . they become *surrogates* for social variables." Hence, even while giving insights into intellectual structure, citations may not necessarily reflect the actual process of interpersonal relations or real communication channels among authors. In other words, they may represent overall patterns of intellectual influence without revealing the mechanisms by which these influences occur (e.g., exchanges of working papers or preprints, telephone conversations, electronic mail networking, informal meetings, formal collaborations, etc.).

For summaries of these and other criticisms, see Lievrouw (1990) and Pierce (1990). For a defense based on the objectivity of cocitations, their success when validated against independently obtained external data, and the large sample sizes involved, see White (1990).

### Conclusions

Subject to potential limitations raised by the aforementioned issues, the present findings appear to suggest some important conclusions. Overall, the spatial representation shown in Figure 1 seems to provide a plau-

sible account of the intellectual poles that have characterized the field of consumer research, as reflected by the first 15 years of experience with publications in *JCR*. It appears that the primary intellectual structure of the field has formed along two key dimensions.

One dimension (the horizontal axis in Fig. 1) represents a disciplinary choice of focus that ranges from the more macro or social to the more micro or individual level of analysis. Thus, at one extreme, we find those who work primarily at the more macro level of sociology or anthropology. At the other, we find those concerned mostly with the more micro level of cognitive psychology. The second dimension (the vertical axis in Fig. 1) captures the distinction between researchers who lean toward laboratory studies employing experimental designs and those who care more about developing models of measurement, mapping, and related methods.

As support for the face validity of the spatial representation, the horizontal dimension just described seems to reflect "movements" that occurred during the 1970s as opposed to the 1980s. Thus, on the right, Bettman, Jacoby, and Wright, as well as others shown close to them in the space, tended to lead the cognitive revolution that emerged during the period from about 1965 to about 1980. By contrast, on the left, Belk, Wallendorf, and Hirschman helped to spearhead the more ethnographic, interpretive, and postpositivistic revolution that has gathered force from about 1980 to the present. We might also note that those who have studied children and adolescents (e.g., Roedder-John, Robertson, Goldberg, Gorn) tend to fall slightly to the left of the vertical axis despite the fact that much of their work deals with the individual level of psychological analysis. This might result in part from their tendency to be concerned with some of the larger societal issues of relevance to public policy.

Meanwhile, also in support of face validity, the vertical dimension may tend to capture memberships in contrasting schools of research with differing methodological orientations. Thus, on the bottom, Calder, Sternthal, and Tybout, as well as those shown close to them in the space, are closely identified with an experimental-laboratory-centered style of research that prevails at Northwestern University. By contrast, at the top, Holbrook, Lehmann, Moore, Farley, Winer, and Huber have all worked closely together at Columbia University on various sorts of models for measurement and scaling (drawing heavily on the work of Green at the nearby Wharton School). Hence, this dimension may indicate the importance of face-to-face relationships in encouraging common focal points among colleagues located in close physical proximity. Thus, during the period covered by the study (which largely preceded the era of Bitnet and other means of instant electronic access), it appears that intellectual structure may have depended in part on the frequency of interpersonal interactions. For example, it seems reasonable to suggest that perhaps "climates" of research styles

prevailed at places such as Northwestern or Columbia and that researchers located at those schools tended to get indoctrinated into their respective organizational cultures. Clearly, in such cases, the invisible college tends to become a visible scholarly community.

Notice that the horizontal axis tends more to reflect common interests than patterns of coauthorship. Thus, Bettman, Jacoby, and Wright have seldom worked together, while the same may be said for Belk, Wallendorf, and Hirschman prior to the end of the period covered by our sample of publications (after which collaborations between Belk and Wallendorf did in fact appear frequently in *JCR* and elsewhere). By contrast, the vertical axis does seem to reflect cases of close collaboration. Thus, the Northwestern researchers (Calder, Sternthal, Tybout, etc.) have frequently worked together, as have the colleagues from Columbia such as Holbrook, Lehmann, Moore, Farley, Winer, and Huber (in various combinations at various moments). Elsewhere in the space, proximity also appears to capture tendencies toward coauthorship (Goldberg and Gorn; Claxton and Ritchie; Reilly and Wallendorf; Bettman and Capon; Bettman and Park; Biehal and Chakravarti). Further, in at least one case, proximity appears to reflect a well-known debate between competing schools of thought (Lynch vs. the Northwestern researchers).

It is interesting to observe that both White (1990) and McCain (1990) have noted a general tendency for two dimensions comparable to those found in the present research to appear in studies based on cocitation analysis. White (1990, p. 103) calls these two dimensions (1) "subject" and (2) "style of work." McCain (1990, pp. 210-215) provides a description that might be characterized as (1) micro versus macro and (2) experimental or observational versus mathematical modeling. It should be clear that the present findings concerning the dimensions interpreted as (1) micro (psychology) versus macro (sociology-anthropology) and (2) laboratory experiments versus measurement methods in Figure 1 correspond quite closely to White's distinctions based on (1) subject and (2) style of work or to McCain's contrasts based on (1) micro versus macro and (2) experiment-observation versus mathematical modeling—where both White and McCain refer to work in the more general context of bibliometric research on cocitations. Hence, it seems fair to conclude that the results for authors in *JCR* support a general pattern of intellectual structure found in other disciplinary fields.

Finally, from a more general perspective, our findings concerning the two key dimensions just described receive additional reinforcement from the conceptual scheme proposed by Paisley (1984, p. 7) in his "matrix of social science disciplines." Paisley distinguishes between "level fields" in which the focus of differential description at one level is subsumed under an undifferentiated unit of analysis at the next highest level of the hierarchy (e.g., psychology-sociology-anthropology).

Further, he distinguishes among "variable fields" that "arise . . . from scholars' interest in important domains of human activity" (p. 31), that give their attention to "one category of behavior" (p. 6), and that cut across the level fields so as to span more than one level of analysis.

Paisley suggests that, within each intersection of level and variable fields, various "specialties" or "subdisciplines" will occur (1984, p. 7). In our case, consumer research would represent a variable field. Within this variable field, various levels exist, ranging from the more micro to the more macro (as indicated by the horizontal dimension in Fig. 1). Further, various specialties have tended to approach these issues from the vantage points of different subdisciplines, such as laboratory experiments, as contrasted with measurement models (as represented by the vertical dimension in Fig. 1). In short, it appears that our findings are consistent with the broader conceptual scheme proposed by Paisley (1984) and applied to bibliographic studies of work in the communication sciences.

In terms of future applications, our approach can contribute to further developments in the bibliometric analyses of consumer behavior research. For example, future work might attempt a broader assessment of the intellectual structure of the field by including emerging and recently influential authors, other journals, and explicit analysis of the time dimension to investigate the dynamics of the intellectual structure uncovered here.

## Summary

In sum, the present findings suggest that cocitation analysis provides a potentially illuminating and valid way to represent the patterns of intellectual affinity that characterize a field of study in general and the area of consumer research in particular. Specifically, we have examined a body of literature—drawn from *JCR* during the first 15 years of its publication history—that may be regarded as a near-definitive sample of thought in the discipline of consumer research during the last one and a half decades. We have focused on the 42 authors published most frequently in *JCR* during that time period and have compiled a set of data based on the frequencies with which those authors have referred to the work of one another (including self-references). Analysis of these data—by a two-stage method that represents cocitations while controlling for asymmetry and allowing for atypicality—has produced a two-dimensional MDS space that suggests two key underlying dimensions for the intellectual structure of the field. Most saliently, frequently published *JCR* authors seem to differ in their level of analysis (macro vs. micro) and in their methodological approach (experimental vs. measurement). Hence, these findings appear to indicate the potential usefulness of bibliometric studies in uncovering the intellectual structure of consumer research.

## APPENDIX

### The 42 Most Frequently Published *JCR* Authors, 1974–1989

|                        |                      |
|------------------------|----------------------|
| William O. Bearden     | Kent B. Monroe       |
| Russell W. Belk        | William L. Moore     |
| James R. Bettman       | George P. Moschis    |
| Gabriel Biehal         | Richard L. Oliver    |
| Bobby J. Calder        | Richard W. Olshavsky |
| Noel Capon             | C. Whan Park         |
| Dipankar Chakravarti   | Brian T. Ratchford   |
| John D. Claxton        | Michael D. Reilly    |
| Wayne S. DeSarbo       | J. R. Brent Ritchie  |
| John U. Farley         | Thomas S. Robertson  |
| Valerie S. Folkes      | Deborah Roedder-John |
| Marvin E. Goldberg     | Carol A. Scott       |
| Gerald J. Gorn         | Terence A. Shimp     |
| Paul E. Green          | Richard Staelin      |
| Elizabeth C. Hirschman | Brian Sternthal      |
| Morris B. Holbrook     | Alice M. Tybout      |
| Jacob Hornik           | Melanie Wallendorf   |
| Joel Huber             | Charles B. Weinberg  |
| Jacob Jacoby           | Russell S. Winer     |
| Donald R. Lehmann      | Peter Wright         |
| John G. Lynch, Jr.     | Richard F. Yalch     |

[Received January 1992. Revised April 1992.]

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