

SECONDARY AND TERTIARY CITING: A STUDY OF
REFERENCING BEHAVIOR IN THE LITERATURE
OF CITATION ANALYSIS DERIVING FROM THE
ORTEGA HYPOTHESIS OF COLE AND COLE¹

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This study examines a complex network of documents and citations relating to the literature of the Ortega Hypothesis (as defined by Jonathan R. Cole and Stephen Cole), demonstrating the tenacity of errors in details of and meaning attributed to individual citations. These errors provide evidence that secondary and tertiary citing occurs in the literature that assesses individual influence through the use of citations. Secondary and tertiary citing is defined as the inclusion of a citation in a reference list without examining the document being cited. The authors suggest that, in the absence of error, it is difficult to determine the amount of secondary and tertiary citing considered normative. Therefore, to increase understanding of the relationship between citations and patterns of influence, it is recommended that large-scale studies examine additional instances of citation error.

This study examines an aspect of citing behavior, secondary and tertiary citing, as evidenced by a pattern of citation errors and transformations in meaning related to the Ortega Hypothesis of Jonathan R. Cole and Stephen Cole [1–4]. We define *secondary citing* as the presence of a citation in a reference list that was taken from another reference list, arguably without the citing author's examining the document being cited.

1. An earlier version of this article was presented at an American Society for Information Science Miniconference, Bloomington, Indiana, April 24, 1993. The authors thank Stephen P. Harter for his encouragement and guidance and for reading many versions of this article. We would also like to thank Ai-Wei Weng and Somporn Puttapithakporn for their efforts in our early investigations. We thank also the *Library Quarterly* referees for their suggestions leading us to a much improved manuscript.
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[*Library Quarterly*, vol. 65, no. 4, pp. 415–434]

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0024-2519/95/6504-0004\$01.00

Tertiary citing takes this one step further. A citation in a reference list is taken from a secondary citation, again without examination of the document being cited.

Thirty years ago, Norman Kaplan said, "Little is known about the norms and behavior surrounding citation practices in science" [5, p. 179]. Twenty-eight years later, in an article discussing developments in documenting the complexities of citation practice, Mengxiong Liu states, "Little still is known about the norms and behaviours surrounding the citation practice" [6, p. 371]. As Jerry S. Kidd notes, "Referencing behavior constitutes the primal source of data in citation studies and needs to be understood in a comprehensive way as part of the total picture of scholarly communication. However, the subject of referencing has been addressed only very skit[t]ishly by bibliometricians" [7, p. 157].

What we have chosen to call secondary and tertiary citing has been very skittishly addressed indeed. Few studies have attempted to assess the prevalence of the practice or its possible effects on the results of bibliometric studies. It was not included in the survey of journal editors, by Judith Serebnick and Stephen P. Harter, assessing ethical practices [8]. It is not discussed in the anthology edited by Christine Borgman that "is intended to provide a comprehensive overview of current research and theory at the intersection of scholarly communication and bibliometrics" [9, p. 7].

We use the terms *secondary citing* and *tertiary citing* to avoid some of the ethical or normative implications by the language of other authors. The practice is called "lifting" [10, p. 159], "copying" [11, p. 105], "a form of petty dishonesty . . . common in scholarly publishing" [12, p. 299], and "swip[ing a] reference under false pretenses" [13, p. 134]. In letters to editors, Kenneth O. May called this practice "plagiarism of other people's citations without having actually used them" [14, p. 890], while David Davies called it a "fundamental law of reference giving—it is quite unnecessary to have read or even seen the reference yourself before quoting it" [15, p. 1358]. Although a close reading of Davies suggests that this hyperbolic statement may have been facetious, he is widely cited for the notion that a citation does not necessarily indicate examination of the cited document by the citer (for example, [10, 12–13, 16–20]).

Few studies specifically address the issue of secondary and tertiary citing or attempt to assess its prevalence. Error repetition is the chief factor used for evidence that the practice has occurred. Michael H. MacRoberts and Barbara R. MacRoberts [10] and James H. Sweetland [12] are among several authors who discuss the phenomenon by reviewing historic cases of "amusing, and long lasting, miscitation" [12, p. 293]. Robert N. Broadus combined the presence of miscitations with

co-citation analysis and concluded that "we still have some important but unknown factors in the way of making an estimate of how many writers, if any, lifted the reference . . . without consulting the original source" [13, p. 135]. Henk F. Moed and M. Vriens called repeated miscitations "multiple discrepancies" [11, p. 96] and performed a case study in which they tried to explain the phenomenon "on the basis of citation relationships, co-authorships or institutional cooperations" [11, p. 96]. Although both studies found numerous relationships among the articles containing the errors, they differed in their interpretations of the results. Broadus was conservative in his estimate of the prevalence of the practice, stating that "one writer may have done so, and that with another there is room for a measure of doubt" [13, p. 135], while Moed and Vriens were less chary. "Our results suggest that the authors citing our target erroneously have copied the particular reference from an important review paper containing the error for the first time. There is evidence that almost all authors had this particular review on their desks when they wrote their articles. We did not *prove* that the particular authors copied erroneous references from other articles. But in our view they may have done so" [11, p. 105].

Another form of evidence that secondary and tertiary citing may be occurring is called "evolved meaning" by MacRoberts and MacRoberts [10]. In their analyses "directly comparing citations with cited items," they found a wide variety in the levels of correspondence or "registration" between the meanings found in cited items and the meanings ascribed to them by citers. Often they found that the meaning ascribed was in total opposition to the cited work. They also found that identical misinterpretations, which they called "directed misregistrations," were ascribed to by many different authors. Directed misregistration, they posit, "derives from the fact that most scientists become aware of literature largely through informal channels and by means of secondary literature rather than by independent assessment of the primary literature" [10, p. 156].

The present study combines the presence of multiple discrepancies (repetitions of errors in detail) with directed misregistration (repetitions of identical evolved meaning) and, in some cases, co-citation and other relationships to make a strong case for the presence of secondary and tertiary citing in the literature related to the Ortega Hypothesis, a literature that spans the past twenty-five years.

There are several ironies in the case presented here. First is that the evidence of secondary and tertiary citing in this study occurs in documents discussing the validity of citation analysis or presenting the results of analyses that make assessments of individual influence based on citations. Second is that, in the process of transforming the meaning of

José Ortega y Gasset and then disputing that transformed meaning, Cole and the many authors who, like him, reject the Ortega Hypothesis, may be said to agree with Ortega y Gasset. Finally, evidence of the practice of secondary and tertiary citing seems equally likely to be present among the citations of those who could be considered staunch defenders of the validity of citation analyses, among them [21] and [22] and, again ironically, W. E. Snizek [23], whose 1986 article [24] forms part of the error chain discussed later in this article. For example, in responding to the suggestions of MacRoberts and MacRoberts that greater attention be paid to the actual contexts and validity of individual citations in citation analysis, Snizek offers, "Given the extreme care taken by me and others who employ citation analysis as a 'roughly valid,' but by no means a 'perfect,' measure of influence, I find the criticisms of [bibliometric methods by] the MacRoberts to be inappropriate at best, and vacuous and sophomoric at worst. . . . In the final analysis, various cannons [*sic*] of science concerning the reliability and validity of measures, as well as the reproducibility of results must be upheld. In this regard, I find citation analysis to hold imminently [*sic*] more promise than the blatantly unscientific nihilistic agenda advocated by MacRoberts and MacRoberts" [23, pp. 312–13].

We believe Harriet Zuckerman argues the importance of such studies as suggested by MacRoberts and MacRoberts when she says, "Specifically we do not know the extent to which sources are cited and cognitive conduits, obliterated, or cognitive conduits cited while sources are obliterated, nor how this relates to their relative standing in science. In both instances, the extent of intellectual influence is underestimated and the structure of intellectual influence is misrepresented by citations" [25, p. 332].

The products of our analysis argue that, at least in the literature of the Ortega Hypothesis, the use of cognitive conduits is readily apparent. In the case presented here, the determination that secondary and tertiary citing has occurred suggests the identification of the cognitive conduits for an idea. The variety of citing patterns exhibited for a single concept, the Ortega Hypothesis, helps us at least guess the degree to which citing and obliteration of a cognitive conduit (Cole to Ortega y Gasset) is common.

In the remainder of this article we describe the Ortega Hypothesis and discuss the evidence of evolved meaning in its derivation and use (directed misregistration). The citation patterns evident in the set of documents related to this Ortega Hypothesis are examined as are varieties of citing patterns and the presence of errors in detail (multiple discrepancies) in the citations. The results of these examinations are used to argue that secondary and tertiary citing are not only present in this set but may be normative practices.

The Ortega Hypothesis of Cole and Cole

The central topic of the documents discussed in this article is the assessment of individual influence and eminence as determined from statistical analysis of citation data. The Ortega Hypothesis, although not yet so named, was first articulated in Jonathan R. Cole's 1969 dissertation [1]. The term "Ortega Hypothesis" first occurs in a 1970 article by Cole that closely follows the language of his dissertation [2]. This language and use of the term are repeated in a 1972 article [3] and form chapter 8 of a 1973 monograph [4], both of which indicate Stephen Cole as coauthor. Cole, and later Cole and Cole, introduce their excerpt of Ortega y Gasset as follows:

Until recently, historians and philosophers of science have attributed much of the growth of science to the work of the average scientist who, it is suggested, has paved the way with his "small" discoveries for the men of genius—the great discoverers. This hypothesis is boldly asserted in many sources, but perhaps no more clearly than in the words of José Ortega y Gasset. "For it is necessary to insist upon this extraordinary but undeniable fact: experimental science has progressed thanks in great part to the work of men astoundingly mediocre, and even less than mediocre. That is to say, modern science, the root and symbol of our actual civilization, finds a place for the intellectually commonplace man and allows him to work therein with success. In this way the majority of scientists help the general advance of science while shut up in the narrow cell of their laboratory, like the bee in the cell of its hive, or the turnspit of its wheel. [1–4]⁴

Eugene Garfield expresses the hypothesis in a few words: "I happen to subscribe to the Ortega y Gasset hypothesis, which holds that the work of the scientific elite owes much to that of the average scientist" [26, p. 133], and "Science is built on the contributions of thousands of creative individuals, as Ortega y Gasset suggested in *The Revolt of the Masses*—not merely an elite group of highly visible or highly cited individuals" [27, p. 46].

In testing and rejecting the Ortega Hypothesis, Cole used citation analysis techniques to assess patterns in citing behaviors to see if he could perceive a scientific elite among the citers, and, if that elite existed, to determine whether that elite cited all other works proportionately. Simply put, the questions Cole asked were (1) Do citation patterns reflect a scientific elite as distinct from other scientists? (2) Are citers equally likely to cite both elite and nonelite scientists? (3) If elite scientists are more heavily cited, are less cited and therefore nonelite scientists redundant to the march of scientific progress? and the resulting policy question, (4) Can support for nonelite scientists therefore be eliminated without impeding progress?

4. This passage is given in the exact form used by Cole [1, 2] and Cole and Cole [3, 4].

The Present Study

This study does not attempt to prove or disprove the Ortega Hypothesis but attempts to add to the understanding of referencing behavior through an examination of the complex network of documents and citations related to the hypothesis. The idea for this article came about as the result of having read Cole and Cole [3], MacRoberts and MacRoberts [28], and papers reacting to MacRoberts and MacRoberts's criticisms of Cole and Cole [23, 25, 29–39]. We examined the work that inspired the Ortega Hypothesis—Ortega y Gasset's *The Revolt of the Masses* [40]⁵—to discover what there was about the work that piqued the interest of Cole and Cole or, as MacRoberts and MacRoberts put it, “descend[ed] to the level of the document” [10]. After looking at the original work⁶ by Ortega y Gasset, we discovered not only that the pagination in the Cole and Cole reference was incorrect, but that the text of Ortega y Gasset excerpted by Cole and Cole was presented in an altered form [3, p. 368]. As we traced incorrect pagination and other excerpting and citing errors, we came to believe that the errors tell a story that more accurately depicts influence patterns than standard bibliometric analysis indicates. The errors were physical manifestations that reveal the identification of cognitive conduits and, in some cases, the underrepresented influences Zuckerman describes [25]. In the literature of the Ortega Hypothesis, any reference to Ortega y Gasset implies the influence of Cole whether or not reference to Cole is also present. In the bibliometric literature, Cole serves as the cognitive conduit to Ortega y Gasset.

Building the Document Set

In gathering data for this study, it was important to build a fairly comprehensive set of the documents referring to the Ortega Hypothesis to reveal variations in meanings, citing behaviors, and contexts. We used various and iterative methods to search bibliographic and citation indexes and databases in the social sciences. We also used the texts and bibliographies of documents within and outside the set to lead us to other documents, scanned every article in *Scientometrics* (a common source of material referring to the Ortega Hypothesis), and many other works by

5. The edition of *The Revolt of the Masses* used in this study is copyrighted 1932, copyright renewed 1960. It is 190 pages. There are multiple editions and printings of this work. These are discussed elsewhere in the article.
6. We use the term “original work” advisedly, acknowledging that the true original was in Spanish. Only the authorized English translation of the work is cited in the document set.

authors prominent in the set, and encouraged word-of-mouth reports of references to the Ortega Hypothesis from among our colleagues.

It was not possible to examine all the documents that cite documents or authors in the set because the numbers and reasons for citing these documents and authors are so vast. For example, each year Ortega y Gasset's *The Revolt of the Masses* is cited as many as a hundred times for a variety of different reasons. The relevant works of Cole and Cole, particularly their 1973 monograph [4], are also cited many times each year, in differing contexts, and for varying reasons.

We believe that the varieties of searching methods we used produced a reasonably representative subset of relevant documents. Searching full-text databases of retrospective runs of scholarly journals for the phrase "Ortega Hypothesis" or for co-occurrence of the terms "Ortega" and "Cole" would undoubtedly add to the set, but such databases are not yet available.

The Directed Misregistration and Evolved Meaning of the Ortega Hypothesis

Arguably, the Ortega Hypothesis, as defined by Cole and Cole and many others, attributes to Ortega y Gasset a statement which is at great divergence from his original work. The meaning ascribed to Ortega y Gasset by Cole and Cole and, with one exception [41],⁷ all others we found using the term "Ortega Hypothesis" or citing Ortega y Gasset in bibliometric research, rests on the proposition that Ortega y Gasset distinguished between elite and nonelite scientists and that Ortega y Gasset believed the work of the nonelite scientists forms a necessary foundation for the work of elite scientists. Ortega y Gasset makes no such distinction between elite and nonelite scientists—rather he relegates all modern scientists to the nonelite masses by virtue of their being, of necessity, specialists rather than universalists. In fact, Ortega y Gasset has very little good to say of scientists. "And now it turns out that the actual scientific man is the prototype of the mass-man. Not by chance, not through the individual failings of each particular man of science, but because science itself—the root of our civilisation—automatically converts him into mass-man, makes him a primitive, a modern barbarian" [40, p. 109], and

7. Martha A. Harsanyi and Stephen P. Harter [41] cite a different passage of Ortega y Gasset for reasons having nothing to do with the Ortega Hypothesis, but the Harsanyi and Harter passage is found in the same chapter as the Cole and Cole passage. Harsanyi and Harter are known to have read the Ortega y Gasset chapter as a result of having seen an early version of this article.

I have said that he was a human product unparalleled in history. The specialist serves as a striking concrete example of the species, making clear to us the radical nature of the novelty. For, previously, men could be divided simply into the learned and the ignorant, those more or less the one, and those more or less the other. But your specialist cannot be brought in under either of these two categories. He is not learned, for he is formally ignorant of all that does not enter into his specialty; but neither is he ignorant, because he is "a scientist," and "knows" very well his own tiny portion of the universe. We shall have to say that he is a learned ignoramus, which is a very serious matter, as it implies that he is a person who is ignorant, not in the fashion of the ignorant man, but with all the petulance of one who is learned in his own special line. [41, p. 112]

We do not claim to be Ortega y Gasset scholars, but there is ample evidence that our interpretation of *The Revolt of the Masses* is commonly shared. The writings of José Ortega y Gasset, a "Spanish philosopher and humanist who greatly influenced the cultural and literary renaissance" of twentieth-century Spain, have been discussed and studied in many fields [42, p. 1015]. A 1986 bibliography by Anton Donoso and Harold C. Raley lists some 4,000 pieces of Ortega y Gasset scholarship [43]. In many sources, *The Revolt of the Masses* is described as Ortega y Gasset's most famous work. It is much studied, much discussed, and to this day, much cited.

A look at encyclopedia entries for Ortega y Gasset shows that a common interpretation of the book emerges. Ortega y Gasset "characterized 20th-century society as dominated by masses of mediocre and indistinguishable individuals, who he proposed should surrender social leadership to minorities of cultivated and intellectually independent men" [42, p. 1015]. *The Revolt of the Masses* "holds that only an intellectual elite can lead the unthinking masses in building and maintaining society, which is man's only means of fully realizing himself" [44, p. 89]. In *The Revolt of the Masses*, "Ortega concludes by demanding that the masses surrender their leadership to the minorities of cultivated men" [45, p. 231]. *The Revolt of the Masses* "argues for the essential inequality of human beings and for the vital importance of intellectual elites in human history" [46, p. 231]. For us, reading the monograph confirms these interpretations.

Ortega y Gasset divides humanity into two groups, the "masses" and the "select minorities." The book opens by stating that the ascension of the mass man in the nineteenth and twentieth centuries to positions of power is the greatest crisis ever to face civilization. Ortega y Gasset's espousal of the triumph of the specially qualified seems to match what Cole and Cole suggest in their studies: the progress of science would be little impeded if only the work of the scientific elite were supported. Yet this is in direct opposition to what Cole and Cole ascribe to Ortega

y Gasset: that "the work of the great scientist is built upon a pyramid of small discoveries made by average scientists" [3, p. 369].

Ortega as Concept Symbol

Both the term "Ortega Hypothesis" and citations to Ortega y Gasset have become concept symbols in the bibliometric literature. In developing the idea of "concept symbol," Henry G. Small argued that the process of citing a source defines that source. "The language pointed to by the footnote number labels or characterizes the document cited—or, in other words, constitutes the author's interpretation of the cited work. In citing a document an author is creating its meaning, . . . In the extreme, this means that there need not be any similarity between the document and the concept it stands for—or, to put it more directly, the perceived content of a document is independent of the document itself" [47, pp. 328–29].

The contexts surrounding references to Ortega y Gasset in the bibliometric literature indicate that this transformation of meaning has occurred. Reference to Ortega y Gasset in the document set indicates a specific interpretation of the work: scientists are divided into two classes, with the work of average scientists forming the necessary foundation for the work of elite scientists. The following examples illustrate this:

The imagery implied by this conception of scientific development is clear. Average scientists, working on relatively unambitious projects, make minor contributions. But without these lesser discoveries by a mass of scientists, the breakthroughs of the truly inspired scientist would not be possible. [1, p. 198, immediately following the quote of Ortega y Gasset]

Ortega seems to be suggesting that average scientists, working on relatively unambitious projects, make minor contributions, but that, without these minor discoveries by a mass of scientists, the breakthroughs of the truly inspired scientist would not be possible. [3, p. 369]

Ortega's (1932) and Florey's (Cole and Cole, 1973) primary assumption is that utilization of work that is of relatively minor importance is a necessary precondition to the success of more important scientific endeavors. [48, p. 47]

Ortega seems to be suggesting that the work of the great scientist is built upon a pyramid of small discoveries made by average scientists. . . . We concluded that Ortega had been wrong and that rather than the giants standing on the shoulders of a mountain of dwarfs they had been standing on the shoulders of a few other giants. [49, p. 449]

Many "mediocre" scientists work in applied fields, instrumentation, etc. *They* are the "dozens" of non-cited scientists meant by S. A. Goudsmit, quoted in M&M's earlier paper, p. 155. Their work is of vital importance to science, they are the "water-carriers" of Ortega y Gasset. [37, pp. 327–28]

In arriving at this conclusion, they focus on their use in studies of the Ortega Hypothesis—the notion that science advances “thanks in great part” to the contributions of average, or as Ortega calls them, “mediocre” scientists. [25, p. 329]

The meaning of Ortega y Gasset has evolved; identical misinterpretations (directed misregistration) are clearly evident. The meaning ascribed to Ortega y Gasset in the literature of citation analysis, while a consistent concept symbol, does not match the meaning of the original work.

The Errors of Detail—Multiple Discrepancies

Looking at Ortega y Gasset as quoted by Cole and Cole [1–4] and comparing it to the original passage we find three seemingly minor discrepancies: (1) the spelling of “civilization” is converted from the British “civilisation” in the original; (2) between the second and the third sentences of the quote, text was omitted without inserting an ellipsis; and (3) the preposition “in” has changed to “of” in the last line of the passage.

For it is necessary to insist upon this extraordinary but undeniable fact: experimental science has progressed thanks in great part to the work of men astoundingly mediocre, and even less than mediocre. That is to say, modern science, the root and symbol of our actual civilization, [discrepancy 1] finds a place for the intellectually commonplace man and allows him to work therein with success. [discrepancy 2] In this way the majority of scientists help the general advance of science while small sections, to enclose oneself in one of these, and to leave out of consideration all the rest. The solidity and exactitude of the methods allows of this temporary but quite real disarticulation of knowledge. The work is done under one of these methods as with a machine, and in order to obtain quite abundant results it is not even necessary to have rigorous notions of their meaning and foundations. [40, p. 111]

In the missing sentences (discrepancy 2), Ortega y Gasset further damns the scientist as the epitome of the mass-man:

The reason of this lies in what is at the same time the great advantage and the gravest peril of the new science, and of the civilisation directed and represented by it, namely, mechanisation. A fair amount of the things that have to be done in physics or in biology is mechanical work of the mind which can be done by anyone, or almost anyone. For the purpose of innumerable investigations it is possible to divide science into small sections, to enclose oneself in one of these, and to leave out of consideration all the rest. The solidity and exactitude of the methods allows of this temporary but quite real disarticulation of knowledge. The work is done under one of these methods as with a machine, and in order to obtain quite abundant results it is not even necessary to have rigorous notions of their meaning and foundations. [40, p. 111]

In the set of over thirty articles that test or discuss the Ortega Hypothesis, fourteen contain references to Ortega y Gasset in their bibliographies. Of these, seven repeat the quote of Ortega y Gasset given by

Cole and Cole and all but one of these repeat the three textual errors introduced by Jonathan Cole in his dissertation (see table 1).

A fourth discrepancy is introduced by Cole and Cole [3] and is repeated in five other articles in the set. In making the first use of the Ortega y Gasset quote in his dissertation, Jonathan R. Cole cites pages 110–11 of a 1960 Norton printing of the work [1]. In his 1970 article, he cites a 1932 Norton printing of the work without indicating page numbers [2]. In their 1972 article [3] and 1973 book [4], Cole and Cole cite the 1932 Norton printing but cite pages 84–85 for the quotation. Yet the quote actually falls on pages 110–11 in the edition cited.

The Revolt of the Masses has been published in at least two different English translations by five different publishers. The editions by Allen & Unwin, W. W. Norton, and The New American Library are all the same authorized translation that is quoted in the bibliometric literature.⁸ A book of enduring interest such as this is often reprinted, most recently in 1994, resulting in a confusion of bibliographic records being found in the bibliographic utilities, OCLC and RLIN, and in the printed *National Union Catalog*. Changes over time in the rules for bibliographic description regarding copyright, copyright renewal, and printing dates add to the confusion. The clearest distinguishing factor among the multiple editions and printings is pagination.

The authorized translation printings of the book are variously 141, 144, 190, and 204 pages. It is in the 190-page printings that the relevant quote is found on pages 110–11. All Norton editions are either 190 or 204 pages; only Norton editions are cited in the bibliometric literature. The passage falls on pages 84–85 solely in the 144-page, 1961 Allen & Unwin edition. This edition is never cited in the bibliometric literature. We can infer from this information that, in trying to restore the pagination that was lost in [2], the Allen & Unwin edition was examined in preparation for [3] and [4], but whoever found the pagination, Cole and Cole or some assistant, did not notice the change in edition.

Snizek introduces discrepancy 5 to the document set. When he both quoted and cited Ortega y Gasset in a 1986 *Scientometrics* article, Snizek repeated all the discrepancies introduced by Cole and Cole and transformed the title of the work from *The Revolt of the Masses* to *The Revolution of the Masses* [24]. There is no evidence that this title variation was used in any English translation of the work nor are cognates of “revolution” used in other translations of the work. (The original Spanish title of the work is *La rebelión de las masas*.) The Snizek title transformation

8. An edition by the University of Notre Dame Press is a different translation. The edition by Chekhov Publishing may be another translation but could not be examined for this study.

TABLE 1
CITING BEHAVIORS IN ARTICLES THAT CITE ORTEGA Y GASSET

	Imprint of Ortega Cited (All Norton)	Includes Ortega Quotes	Includes Textual Errors ^a	Title Error ^b	Page Numbers Cited ^c	Cites Cole or Cole and Cole
Cole, J. R. (1969)	1960	✓	✓		Right	N/A
Cole, J. R. (1970)	1932	✓	✓		None	1969
Cole, J. R., and Cole, S. (1972)	1932	✓	✓		Wrong	1973 ^d
Cole, J. R., and Cole, S. (1973)	1932	✓	✓		Wrong	
Green (1981)	1932	✓	✓		Wrong	1972, 1973
Garfield (1983)	1957				Right	
Oromaner (1985)	1957	✓			Right	1973
Garfield (1986)	1932				Wrong	1972
Snizek (1986)	1932	✓	✓	✓	Wrong	1972
Nederhof and Van Raan (1987)	1932			✓	None	
Oromaner (1987)	1957			✓	Right	
Zuckerman (1987)	1932				Wrong	1972, 1973
Garfield (1988)	1957				Right	
Nederhof and Van Raan (1989)	1932			✓	None	

^a"Civilisation" is changed to "civilization," "in" is changed to "of," and the four intervening sentences are missing without ellipses.

^b"Revolt" is changed to "Revolution."

^cThe correct pagination for the quote is 110-11. In each case of incorrect pagination, 84-85 was used.

^dCited as a forthcoming publication.

TABLE 2
CITING BEHAVIORS IN ARTICLES THAT USE THE TERM "ORTEGA HYPOTHESIS"

	Articles Not Attributing Evolved Meaning to Ortega y Gasset	Articles Attributing Evolved Meaning to Ortega y Gasset	All Articles
All articles	13	13	26
Articles citing Ortega y Gasset	0 (0%)	11 (85%)	11 (42%)
Articles citing Cole or Cole and Cole	7 (54%)	7 (54%)	14 (53%)
Articles co-citing Ortega y Gasset and Cole or Cole and Cole	0 (0%)	6 (46%)	6 (23%)
Articles citing neither Ortega y Gasset nor Cole or Cole and Cole	6 (46%)	1 (8%)	7 (27%)

is repeated by A. J. Nederhof and A. F. J. Van Raan [50, 51]. Multiple discrepancies, exact repetitions of errors in detail, are clearly in evidence in the document set.

Co-citation and Other Relationships

Among the documents in the set were twenty-six that used the exact term "Ortega Hypothesis." None of these documents correct the directed misregistration or evolved meaning; only fourteen of these articles cite Cole [1, 2] or Cole and Cole [3, 4]. In further examining the texts of the twenty-six documents, we were able to divide the articles into two equal groups: (1) those that only used the word "Ortega" as part of the term "Ortega Hypothesis" and (2) those that refer to Ortega y Gasset as author of the Cole hypothesis so named (see table 2).

We judged the presence of such phrases as "Ortega seems to be suggesting" [3, p. 369], "Ortega referred to" [52, p. 3], and "Ortega calls them" [25, p. 329] to indicate attribution of the evolved meaning to the Spanish author. None of the articles in the first group cited Ortega y Gasset, while 85 percent of the second group did. Fifty-four percent of each group cites Cole or Cole and Cole; 46 percent of the second group cite neither Ortega y Gasset nor any of the relevant texts of Cole or Cole and Cole. This suggests that it is normative to cite an author to whom we directly attribute an idea whether or not we have confirmed that the author actually stated that idea. It also may indicate that the citing of the cognitive conduit for an idea happens about half the time.

Looking at other citation relationships, we see that the twelve documents among the twenty-six that use the term "Ortega Hypothesis" but do not cite Cole or Cole and Cole, were written by a total of nine different authors or author pairs. (Nederhof and Van Raan form an author pair; neither appears in the document set without the other.) A search of the *Social Science Citation Index* for the period starting in 1969 (date of the first use of the quote of Ortega y Gasset by Cole) and ending in 1989, the date of the most recent of the twenty-six articles, revealed that all but three of the authors had previously cited a Cole or Cole and Cole document that introduced and explained the term. These three articles [31, 33, 35] are all commentaries reacting to the MacRoberts and MacRoberts critique of the Ortega Hypothesis [28] and do not mention Cole or Cole and Cole. Examination of other reference lists of the authors of the three articles reveals very little overlap between the documents they cite and the documents commonly cited by other authors in the document set. In particular, they do not include Jonathan R. Cole or Stephen Cole among the authors they commonly cite.

Interpretation of the Evidence

Is secondary and tertiary citing occurring? Are authors citing documents without looking at those documents, trusting the work of their colleagues for both accuracy in detail and interpretation of original texts? Clearly, like Broadus [13] and Moed and Vriens [11] before us, we cannot prove that this is occurring, but we argue that there is little evidence that it is not occurring. With the possible exception of Garfield [26, 27], no one in the bibliometric literature has questioned the directed misregistration of the meaning of Ortega y Gasset.

We have four reasons to believe that Garfield consulted the original Ortega y Gasset. First is his introduction of the 1957 edition to the set cited; second is the correction of an error of detail; and third is a veiled implication that, just perhaps, the meaning of the hypothesis has more to do with Cole and Cole than with Ortega y Gasset. But the argument that Garfield examined the original work is clinched by his use of Ortega y Gasset's chapter title, "The Barbarism of Specialisation," in [26], the only appearance of the chapter title among the citations.

Garfield [26] is the first to cite the 1957 imprint of the work. He does not repeat the quote used by Cole and Cole but gives the correct page numbers for the Ortega y Gasset passage. In [53], Garfield confirms that he may have examined the original text by stating "it is important to note there is some ambiguity in this eponym. It ['Ortega Hypothesis'] became popular as a result of the primordial paper by Jonathan and

Stephen Cole" [53], but curiously, in this later article, his reference repeats the errors of detail of Cole and Cole [3] and [4] using the 1932 Norton imprint and the wrong pagination. Such a pattern tends to support the argument that the mere presence of multiple discrepancies does not prove failure to consult the original work by those who repeat the discrepancies, nor does the absence of such discrepancies prove the original work was examined by the researcher. As Broadus suggests in his study of multiple discrepancies, "It is possible that a later writer did use fraudulently the [error-bearing] bibliographic reference . . . and then by good fortune had the actual wording corrected later perhaps by a zealous research assistant making a final check of footnotes. On the other hand . . . it is not unusual for a person to jot down a bibliographic reference while reading a book or article, then to look up the cited article in a journal but fail to note the error in the original reference" [13, p. 133].

In M. Oromaner [52], we have another instance in which it is evident that the investigator citing Ortega y Gasset consulted the original document. Oromaner gives the full quote of Ortega y Gasset and, like Garfield, cites the 1957 Norton printing. His transcription of Ortega y Gasset carries none of the discrepancies of the Cole and Cole quote. Yet Oromaner, too, does not challenge the Cole and Cole interpretation of Ortega y Gasset.

In *On the Shoulders of Giants: A Shandean Postscript*, Robert K. Merton states, "In the transmission of ideas, each succeeding repetition *tends to erase* all but one antecedent version, thus producing what may be described as the anatopic or palimpsestic syndrome" [54, p. 218]. The new version is either inharmonious with the original (an anatopism has been created) or has wholly erased and written over the original (as in the case of a reused parchment or palimpsest). Perhaps this easy conversion to a later meaning can most readily be explained by the examination of surrogates in lieu of cited texts.

From Garfield and Oromaner we can infer another reason for the easy transformation of meaning. The succeeding repetition does not erase its predecessor, it simply ignores it. Ortega y Gasset was not a bibliometrician, did not practice citation analysis, and had been dead for over a decade when Cole wrote his dissertation. Although Garfield and Oromaner may have, by examining the original cited document, revealed the underlying manuscript on the palimpsest, they may have found its actual content irrelevant to the discussion and therefore not worth elaborating.

With the exception of Jonathan R. Cole, Garfield, Oromaner, and, perhaps, Stephen Cole, we have no evidence to contradict our assumption that authors "lifted" their quotes, their interpretations, and their

citations to Ortega y Gasset from other authors discussing the concept of the Ortega Hypothesis. Arguably, even many of those who cited Cole [1, 2] or Cole and Cole [3, 4] may have lifted those citations from other documents and other authors.

Nederhof and Van Raan [50, 51] repeat Snizek's title transformation in both their references to Ortega y Gasset. In neither case do they give credit to Cole and Cole for the Ortega Hypothesis. Although they cite numerous works of Cole and Cole in other contexts in the earlier paper [51], they cite none of the works explicating the Ortega Hypothesis. They do cite the Snizek article which introduced the title error in [51]. In the later paper [50], they self-cite their earlier paper and the original Ortega y Gasset. They cite neither Cole and Cole nor Snizek in [50], although they still carry the Snizek-induced title error. Thus, based on the references in [50] alone, we might assume that Nederhof and Van Raan are themselves the interpreters of Ortega y Gasset. But the presence of the Snizek title transformation suggests that Nederhof and Van Raan did not examine the original Ortega y Gasset text and may not even have used Cole and Cole for their interpretation of Ortega y Gasset, relying instead on the third-hand interpretation of Snizek. If we liken each intervening document to a screen or filter, then each document may further obscure the meaning of the original. The pattern of influence indicated by the references in Nederhof and Van Raan denies the existence of the filters, citing as they do only Ortega y Gasset.

A question that must arise in assessing the importance of this finding about errors indicating secondary and tertiary citing to Ortega y Gasset is whether this is a common or unusual circumstance. Without the obvious "footprints" of multiple discrepancies and directed misregistration, there is little to suggest that secondary and tertiary citing has occurred. Likewise, except in the case of a "first citing" there is little evidence to confirm that it has not occurred. Arguably, as many correct citations and meanings are lifted as incorrect ones.

Perhaps the failure to examine the original was more prevalent in this case because the articles in the set are not really about the writings of Ortega y Gasset; rather, they are about the assessment of individual influence through citation analysis. Stephen Cole and G. S. Meyer [49], which gives the full Cole [1] version of the Ortega y Gasset quote with the three textual errors, has no citation to Ortega y Gasset. This may represent a more realistic measure of intellectual influence, but it leaves those who wish to determine the original context for the quoted passage without an easy way to find its source. (Damned if you do and damned if you don't.)

We can think of only two ways to test the representativeness of the citing behaviors of the literature of the Ortega Hypothesis and the accu-

racy of our suspicion that secondary and tertiary citing is a common, if not normative, practice. Both are fraught with difficulties.

One method is to ask authors whether they have actually examined all the articles they cite. As it is widely held that failure to have done so is evidence of laziness or sloppiness, it may be difficult to obtain accurate self-reports. Timeliness is another factor that argues against this method; for a set of multiple discrepancies to develop, enough time must pass for reading and citing the documents that start error chains. In the present case, the documents span more than twenty years. We cannot reasonably expect authors to remember whether they actually examined a document they cited only once several years before.

The other method is to use the indicators already used by Broadus, Moed and Vriens, and this study to examine other cases. There exists an extensive literature on the presence of error in quotes and citations, including reports of collections of those errors into large databases. Nelda Rae Hernandez and Arden White examined some 1,189 quotes in single volumes of four scholarly journals and found errors in 519 of them [55]. How many of these quotes are used repeatedly and in how many cases are the errors repeated? Similarly, in a sample of 2,933 citations, White found 1,888 errors [56]. How prevalent are repetitions of these errors?

Studies of this nature might confirm our impression that secondary and tertiary citing is common. Such studies might also reveal factors that make the practice more or less likely to occur. Are secondary and tertiary citations more likely to be used for older items, for monographs, for items in foreign languages, for particular citer motivations, when a transformation of meaning has occurred, by researchers in particular fields, or to documents outside the field of the citer?

If one accepts the prevalence of secondary and tertiary citing, does this indicate that further analysis of citation patterns and behaviors is a necessary prerequisite to the use of citation index data for individual influence assessment? Is such analysis equally necessary for "macro-" cases (like the Cole and Cole suggestion that such data be used to make policy decisions about numbers of scientists) and "micro-" decisions (deciding the employment status of individual scholars)? Is secondary citing the mirror image of obliteration by incorporation, a sign that a particular author has become so much a part of the literature that he must be cited whether or not his work is examined? The answers to these questions do not lie in the study of a single case, as in this article. We argue the need for large-scale studies of this phenomenon. Until such studies occur, we are forced to agree that "the methodology of citation analysis is still burdened by unsolved questions. The elementary methods of stratification (or matching) and adjustment are adequate for

many studies, but there is still an urgent need for a statistical model that should accom[m]odate a fairly large number of independent variables in a manner that could be easy to implement and that would take into account the inherent skewness of citation counts" [57, p. 451].

Errors will, we fear, be found in the present study despite careful attention to detail. But, quoting Cole and Cole, "If a paper presents an error that is important enough to elicit frequent criticism, the paper, though erroneous, is probably a significant contribution" [58, p. 24].

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