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# Patterns of citations for the growth of knowledge: a Foucauldian perspective

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## Abstract

**Purpose** – The purpose of this paper is to sensitize researchers to qualitative citation patterns that characterize original research, contribute toward the growth of knowledge and, ultimately, promote scientific progress.

**Design/methodology/approach** – This study describes how ideas are intertextually inserted into citing works to create new concepts and theories, thereby contributing to the growth of knowledge. By combining existing perspectives and dimensions of citations with Foucauldian theory, this study develops a typology of qualitative citation patterns for the growth of knowledge and uses examples from two classic works to illustrate how these citation patterns can be identified and applied.

**Findings** – A clearer understanding of the motivations behind citations becomes possible by focusing on the qualitative patterns of citations rather than on their quantitative features. The proposed typology includes the following patterns: original, conceptual, organic, juxtapositional, peripheral, persuasive, acknowledgment, perfunctory, inconsistent and plagiaristic.

**Originality/value** – In contrast to quantitative evaluations of the role and value of citations, this study focuses on the qualitative characteristics of citations, in the form of specific patterns of citations that engender original and novel research and those that may not. By integrating Foucauldian analysis of discourse with existing theories of citations, this study offers a more nuanced and refined typology of citations that can be used by researchers to gain a deeper semantic understanding of citations.

**Keywords** Citation theory, Qualitative citation patterns, Dimensions of citations, Discourse analysis, Knowledge growth, Original research

**Paper type** Conceptual paper

## Introduction

As much as I appreciate the value of citations, I noticed that your manuscript contains 211 unique references. At least a half of them do little to substantiate your claims, and many are hardly relevant. E.g., is it really necessary to support the statement that system usefulness is a key determinant of use intentions with nine references? I suggest that you review your list of references and remove those that contribute little, if anything, to your argument or are simply redundant.

You cite Oswick *et al.* (2011) to argue for your use of the term "epistemic script" but I found no such term in that article or anything remotely related to it that might support your argument. I checked because I am familiar with how this term is used in another domain, and your use of the term differs markedly from my understanding of it.

~Extracts from reviews of manuscripts submitted to leading information systems (IS) journals.

Newton's (1675) aphorism, "If I have seen further it is by standing on the shoulders of Giants," highlights the critical link between the present and past generations of scientists that makes the cumulative growth of knowledge possible (Merton, 1968b). These links that take the form of citations to previous works are the focus of this study, specifically, how researchers choose and apply them to advance their own research. Because scientific investigations self-select evidence for the construction of knowledge (Knorr-Cetina, 1981), citations and references to

previous studies play a critical role in how the knowledge is constructed. The problem is that the citation selection process is extremely subjective, varies among researchers and is shaped by their social, political and personal circumstances (Gilbert and Mulkay, 1984). As a result, authors' citing behavior varies dramatically in terms of their goals, relevance, necessity and how well they reflect on the ideas they purport to carry. For example, in the information systems (IS) field, Hansen *et al.* (2006) found that the vast majority of citations (79 percent) made to the IS classic article "Power, politics and implementation" (Markus, 1983) did not play any important role in the citing articles' main argument. Also, despite the wide breadth of topics and the diversity of research areas in IS, Loebbecke and Leidner (2012) observed that citations in the IS field are highly skewed toward the top two journals, *Management Information Systems Quarterly* and *Information Systems Research*, with an extremely low average number of citations from the other four top journals in the field. This pattern of citations puts into question how IS researchers value the contribution of those other journals and suggests that the reputation of the top two journals, rather than their content, played a major role in them being cited. If such citing behavior reflects the predominant citation pattern in the IS field, they do not bode well for the growth of knowledge in the field.

Moreover, the IS field is not unique. For instance, in a study of 60 references in the field of organizational behavior, Harzing (2002) found that certain academic myths are perpetuated by rampant misquotations and careless copying of citations. In ecology papers, more than 18 percent of statements are not supported by the cited source (Todd *et al.*, 2007), while in marine biology publications, one in four citations is found to be inappropriate (Todd *et al.*, 2010). In the knowledge management field, 30 percent of all citations are considered problematic (Serenko and Dumay, 2015). As Golden-Biddle *et al.* (2006) explain in the case of the citing of focal articles in the management field, even if the citations were appropriate, authors apply citations in vastly different ways thereby raising important issues about how knowledge is created using those citations. Other studies find that because of lack of research experience, authors often omit seminal works and cite irrelevant ones (Raamkumar *et al.*, 2016).

Taking into consideration a continuously growing volume (Hyland and Jiang, 2018) and the complex nature of citations (Erikson and Erlandson, 2014), a better understanding of how authors select citations is possible by focusing more on the qualitative patterns of citations rather than on the more commonly studied quantitative, citation-count patterns (e.g. following the tradition of Price (1963) and others). As soon as the Citation Index was created (Garfield, 1964), scholars were already asking for qualitative information to help them understand the relationship between the citing and cited works (Lipetz, 1965). Instead of focusing on using citation counts for assessing, evaluating and ranking studies, Swales (1986) recommends undertaking a study of the discourse of citations, paying more attention to the context surrounding them in order to interpret the function of the citation. Both Merton (1968a) and Gilbert (1977) argue that researchers often choose citations because of their authors' favorable reputation. Distinguishing among these different categories of citations requires a reasonable understanding of the subject matter and a qualitative analysis of the discourse, not a quantitative count of citations. Consequently, by extending the pioneering efforts by Chubin and Moitra (1975) and Moravcsik and Murugesan (1975) to classify citations, scholars interviewed (Brooks, 1985) or surveyed the authors (Shadish *et al.*, 1995) and readers (Willett, 2013) in order to understand the motivations behind their citing choices.

The growth of knowledge (Lakatos and Musgrave, 1970) is studied in detail within the disciplines of the history, philosophy and sociology of science. Of the many schools of thought dominating the thinking surrounding how knowledge grows, three are mentioned here. The logical positivists (Neurath *et al.*, 1969) claim that science progresses through the process of empirical verification. The critical schools of thought which includes Popper disagree with verificationism, and state that knowledge grows incrementally through a continual process of conjecturing, refuting and a dialectical process of learning from mistakes (Popper, 1959;

Popper, 1962). Kuhn (1970) admits that knowledge grows incrementally but argues that extraordinary progress occurs when paradigm shifts take place. Foucault's (1970, 1972) critical discourse theory of knowledge growth is closest to the Kuhnian perspective (Weiss and Wodak, 2003). Both were historians of science and both see significant growth in knowledge from similar processes; dominant paradigms are overthrown in the case of Kuhn; *epistemes* undergo revolutions in the case of Foucault (Dreyfus and Rabinow, 1983). In addition to Kuhn's description of normal and extraordinary science, Foucault (1970, 1972) provides more details that are useful for a scientometric analysis.

By following this Foucauldian perspective, we extend the qualitative citation analysis tradition to better understand the motivations behind citations. In terms of relevance, we ask: is the citation directly related to the theory or concept drawn or to the research method deployed? With respect to necessity, is the citation really critical to the work of the citing author or merely an acknowledgment of the general area? Regarding goals, is the purpose of the citation to extend the previous work or to provide an alternative view? And in terms of agreement, does the author agree or disagree with the cited work? Many studies report that a large proportion of references are redundant, refer to the same concept without necessarily adding any new contribution to the paper's argument, or are completely inappropriate (e.g. see Todd *et al.*, 2007). It is, however, irksome and even impossible for article reviewers and editors to interview or survey authors to understand their citation choices. At the same time, a more nuanced and refined understanding of the motivations behind the citations relying on a qualitative discourse analysis of the text can help them make informed decisions about the manuscripts they are evaluating. As previous studies have shown, citation theory is not only complex (MacRoberts and MacRoberts, 1989) but also very difficult to code and analyze (White, 2004). A deeper semantic analysis of citations will be useful especially for identifying the patterns of citations that would enhance the growth of knowledge in the related field.

The present study addresses this problematic subject of citer motivation by focusing on three unique goals. The first, primary goal is to sensitize readers, reviewers and editors, and by extension, all researchers, to qualitative citation patterns that characterize original research, contribute toward the growth of knowledge in their respective fields and, ultimately, contribute to scientific progress. Although previous citation motivation studies assume such a goal for all fields, their proposed typologies are not specifically designed to analyze the growth of knowledge. The second objective is to provide a theoretical foundation to explain how specific citation patterns contribute toward the growth of knowledge, based on existing citation theory and Foucault's analysis of discourse. The third goal is to offer a more nuanced and refined typology of citations, along with examples, so that reviewers and editors, and by extension, the general reader can begin to recognize the motivations behind key citations in the articles they are reading.

## A typology of citation patterns for the growth of knowledge

We propose a typology of citation patterns (Figure 1) that contribute to or are harmful to the growth of knowledge. Expanding the typologies suggested by previous studies (Bornmann and Daniel, 2008; Chubin and Moitra, 1975; Moravcsik and Murugesan, 1975) and using the theoretical foundations of citation theory (Cozzens, 1981; Cronin, 1981, 1998; Leydesdorff, 1987, 1998; Leydesdorff and Amsterdamska, 1990; Nicolaisen, 2007) and discourse analysis based on the Foucauldian perspective (Fairclough, 2003; Foucault, 1970, 1972), this typology and its underlying justifications provide more insights into the spectrum of citing behaviors.

According to the proposed typology, citations vary in terms of their contribution to the growth of scientific knowledge – whereas some of them promote the growth of knowledge, others contribute little or may even be harmful. We explain in the following subsections how this typology is constructed based on citation theories proposed by scientometric scholars and Michel Foucault's theory of discourse.
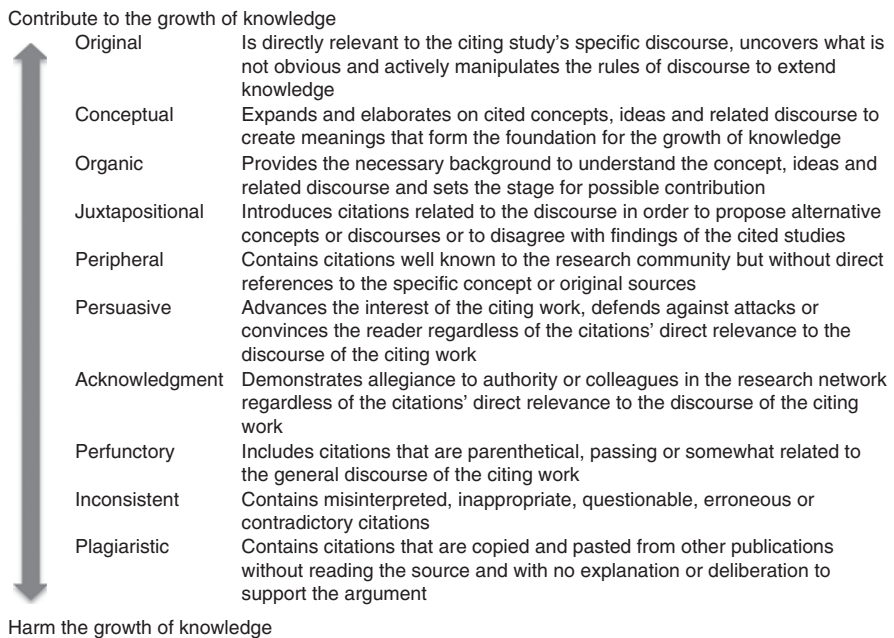
Contribute to the growth of knowledge

| Original | Is directly relevant to the citing study's specific discourse, uncovers what is not obvious and actively manipulates the rules of discourse to extend knowledge |
| Conceptual | Expands and elaborates on cited concepts, ideas and related discourse to create meanings that form the foundation for the growth of knowledge |
| Organic | Provides the necessary background to understand the concept, ideas and related discourse and sets the stage for possible contribution |
| Juxtapositional | Introduces citations related to the discourse in order to propose alternative concepts or discourses or to disagree with findings of the cited studies |
| Peripheral | Contains citations well known to the research community but without direct references to the specific concept or original sources |
| Persuasive | Advances the interest of the citing work, defends against attacks or convinces the reader regardless of the citations' direct relevance to the discourse of the citing work |
| Acknowledgment | Demonstrates allegiance to authority or colleagues in the research network regardless of the citations' direct relevance to the discourse of the citing work |
| Perfunctory | Includes citations that are parenthetical, passing or somewhat related to the general discourse of the citing work |
| Inconsistent | Contains misinterpreted, inappropriate, questionable, erroneous or contradictory citations |
| Plagiaristic | Contains citations that are copied and pasted from other publications without reading the source and with no explanation or deliberation to support the argument |

Harm the growth of knowledge

**Figure 1.**
Typology of
citation patterns

*Theoretical background: discourse analysis and the dimensions of citations from the Foucauldian perspective*
Discourses form the basis for the emergence of a new discipline and work to establish or undermine that discipline. As Foucault (1972) explains, discourses are:

> […] that on the basis of which coherent (or incoherent) propositions are built up, more or less exact descriptions developed, verifications carried out, [and] theories deployed. They form the precondition of what is later revealed and which later functions as an item of knowledge or an illusion, an accepted truth or an exposed error (p. 182).

These discourses are formed because the external sociological conditions of that specific time and place create a set of "rules" that governs the formation of statements concerning the objects and concepts of study. These rules of formation or discursive formations establish various relations and "enunciative functions" that operate within the statements belonging to that discourse. As a result of the operation of these enunciative functions within a particular domain, the statements formed become a part of a specific discourse (e.g. economic, biological or psychological discourse). In order to define this "discursive formation," Foucault stressed that statements operate beyond their linguistic functions and carry additional enunciative functions that relate these statements to a specific domain of knowledge. For example, the enunciative function within the sentence: "The streets of Rome are paved with gold!" enunciates more than the physical substance that makes up Roman streets; the sentence makes a statement extolling the wealth and opportunities Rome offers.

Thus, when an author cites someone else's works, what takes place is an insertion of a statement from those works into the author's current work. The citation essentially becomes a Foucauldian statement, which carries with it all the rules of discourse, the enunciations, and everything that the statement supposedly represents. For example, when a legal article cites studies published in psychiatry, the discursive formation of psychiatry and the enunciative functions associated with those psychiatric statements are being put into

operation by the author into his or her legal research. It is through these intertextual activities that cross-disciplinary efforts become possible. For instance, psychiatric discourse can be found in medical, legal, philosophical and political disciplines. The division of the penal code based on mental deviance (e.g. when someone is declared not guilty by reason of insanity) demonstrates the use of psychiatric discourse to change the rules of the legal discipline (Foucault, 1972). Each discourse takes a form that enables scholars from one discipline to say that they are "talking about the same thing," are "at the same level," or are "applying the same principles" as scholars from other disciplines.

Using this theory, Foucault explains how new objects of study, concepts and theories are formulated. Research may even use the same terminology, but as long as the works are enunciatively different and manipulate or modify the rules of the discourse they cite, the citations are considered original and contribute to the stock of knowledge in their field of study. For instance, Burns and Stalker (1994/1961) in the management discipline cite Herbert Spencer (1864), a scholar of biology and psychology who lived a century earlier, to explain the correspondence between the organization as an organism and its environment. Spencer (1864), in turn, cites Cuvier (1800–1805), who established the concept of organismic biology in which each component part is arranged in form and function in an integrated whole to work with its surrounding relations. Each scholar modifies the rules surrounding the concept of "organism" and "organic structure" as the concept is being applied in each different discipline. Researchers may use exactly the same words as were used in previous studies, but those words imply different concepts and become part of a different theory. Thus, the term "organic" in organizations resembles the term "organic" in biology but is enunciatively different. Each one belongs to different discourses and provides a different sense of what is discussed even though similar principles belonging to that term remain in both disciplines. Each discourse applies its unique rules to the objects being studied, making it possible for the discourse to create new concepts to explain something different.

What is in question is the extent of that creative contribution. To explain the mechanisms by which citations realize this contribution, recent studies in the theory of citations provide us with some answers. Cozzens (1981) suggests three major perspectives for describing the nature of citations: normative, interpretive and symbolic. Leydesdorff (1998) adds to these views of citations by describing the nature of citations as either *explanandum* (something that needs to be explained) or *explanans* (the explanation). Cronin (1998) supports Cozzens' (1981) normative view of the role of citations (i.e. the normative perspective), and adds that citations can also be interpreted from functionalist and phenomenological perspectives.

Combining all four perspectives – functionalist, normative, interpretive (which includes the phenomenological) and symbolic – and insights from other studies, Hassan and Loebbecke (2017) extract 13 dimensions of citations that explain the underlying theory for citing behavior (see Table I). These dimensions represent reasons for citing based on the growing body of citation theories. By combining these dimensions of citations with Foucault's discourse analysis, we can extend the reasons and dimensions for citing into the domain of the formation of discourses to better explain the mechanism by which citations support or impede the growth of knowledge. For instance, authors might cite research for two reasons: to acknowledge the intellectual debt of the cited research or to elaborate on or communicate ideas and concepts from that research. Both Cozzens (1981) and Cronin (1998) categorize the first reason for citing as part of the norms of citing behavior, which Leydesdorff (1987, 1998) calls the citation's cognitive dimension.

The second reason leverages the symbolic perspective of citations (Small, 1978) and goes further by exploiting the cited ideas and concepts. Hassan and Loebbecke (2017) call this second reason for citing as applying the ideational dimension of the citation. How the author deploys the cited idea or concept will determine the extent of the author's contribution to

| Dimension | Description |
|---|---|
| Cognitive | Recognize intellectual debt and contribution to common property |
| Evidentiary | Point to evidence as *explanans* of progress in research |
| Historiographical | Mark historical or significant events |
| Ideational | Communicate or elaborate on ideas and concepts imparted from and onto the cited text |
| Interactionist | Meanings of the citations evolve as a result of citing authors' social actions |
| Linguistic/hermeneutical | Use citations as rhetorical devices to persuade readers of the citing papers' claims |
| Phenomenological | Represent inter-subjective and socio-psychological factors derived from the citing authors' lived experience |
| Practice | Establish norms of citing behavior and referencing based on the domain, journal or period of time |
| Science management tool | Rank and map research activities as part of managing science |
| Search tool | Used as search tools to find relevant research |
| Social network | Represent collaborative groups ("invisible colleges") |
| Sociological | Used as *explanandum* to represent significance, impact, prestige, influence and quality |
| Verification tool | Verify claims, identify discrepancies and spot fraudulent referencing |

**Source:** Adapted from Hassan and Loebbecke (2017)

**Table I.**
Dimensions of
citations

existing research. Using the case of Markus' (1983) IS classic "Power, politics and MIS implementation" that is cited nearly 3,000 times as an example, Figure 2 shows how it is cited by three different articles, each applying a different citation pattern.

We define a qualitative "pattern" of citation to mean a combination of one or more dimensions of citations that fulfill the goal of the citing authors. In the first article, Lapointe and Rivard (2005) draw a connection between Markus' model of IT resistance and, using both the cognitive and ideational dimensions, propose a new multi-level model of resistance to IT. Locke and Golden-Biddle (1997) call this process creating a "synthesized coherence" that would not have been exposed otherwise. Because the rules of discourse are modified, the application of these two dimensions of citations constitute the original citation pattern.

The second article by Lee (1989) also applies the ideational dimension of citation by extensively citing Markus (1983) and her ideas and concepts but because it makes no attempt to extend or modify Markus' discourse, Lee's (1989) citing of Markus constitutes a conceptual citation pattern. The third article by Kankanhalli *et al.* (2005) only uses Markus
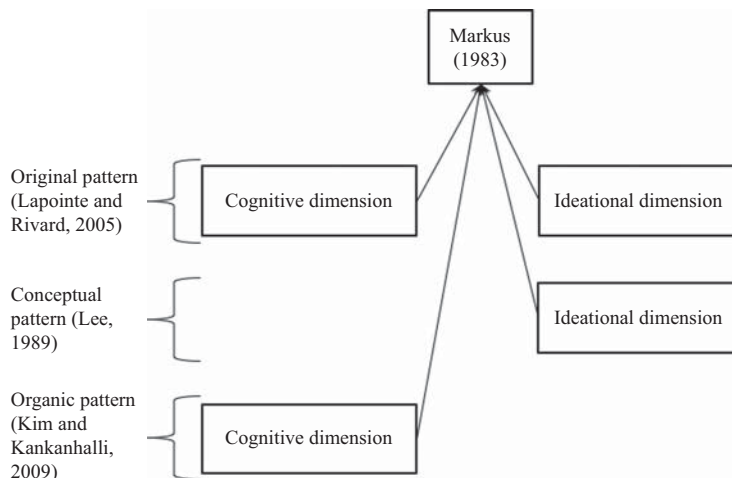
**Figure 2.**
Citing of a classic

(1983) to provide the necessary background for its own concepts, which therefore constitutes the organic citation pattern. Table II summarizes the relationship between the patterns of citation described in the typology in Figure 1 with selected dimensions of citations listed in Table I. Depending on the role of the citations within the formation of the discourse, each dimension may be applied in different patterns. A detailed discussion of each citation pattern is provided in the following subsections.

### Original citation pattern

The original citation pattern operates within the "context of discovery" (Reichenbach, 1938). As argued by Liu and Rousseau (2013, p. 587), citations "originate from the interestingness of the phenomenon that has been addressed in the old article and considered again in the new one," and original works build on that interestingness. Foucault (1972) proposes three criteria for identifying original works that add to the growth of knowledge. First, the claims or propositions made are subordinated to the discourse – the different statements all belong to a single discourse that often takes the shape of a discipline. In this way, it becomes possible to recognize a contribution to knowledge because the associated discipline provides the necessary background for assessing that contribution. Second, the statement makes evident what is not obvious – to contribute, the statement should uncover the shroud that prevents a clearer understanding of the object of study. For example, Porter (1980) uncovered a new approach toward analyzing corporate competitiveness, among others, by drawing from Andrews (1971) that focused the analysis at the industry level rather than at the firm level. Consequently, Porter made hidden relations between corporations and industry evident. Third, the statement "actively" manipulates and acts on the constellation of existing statements. What Foucault means by the active nature of the research is how the research puts into operation a new set of rules that changes the way the object of the discourse is manipulated, how the concepts are employed, and how theories are formed.

Even though every statement in a specific discourse bears certain regularities such that it is saying the same kind of thing another statement in the field is saying, original research provides some sense that is "different." For example, in evolutionary theory, Darwin's (1859) ideas were similar to Lamarck's (1809/1960) ideas proposed half a century earlier. Within this general discourse, Darwin's works could be charged with offering no new contributions. However, what made Darwin different from Lamarck was that Lamarck offered a discourse closer to cosmology rather than biology (Foucault, 1972); therefore, Darwin's work can be said to represent a major original contribution.

Thus, the original citation pattern, which exemplifies the use of citations that are: relevant to the citing study; make evident what is not obvious in the existing discourse; and change the rules of discourse by offering ideas different from the existing discourse, supports the creation and growth of knowledge. Using the dimensions of citation summarized in Table II, we see several mechanisms at work in the original pattern. The first criterion of originality is fulfilled by authors applying the search tool dimension, the verification tool dimension and evidentiary dimension to ensure that citations are relevant to the existing discourse. Locke and Golden-Biddle (1997) call the process of linking the existing study to previous studies as "constructing intertextual coherence." What they mean by the "intertextual field" is the constellation of literatures referenced by the existing study, which represent the reconstruction of appropriate literatures in which related works cite each other. By citing any one or more of those studies, the existing study places itself in the intertextual field and is ready to contribute to the discourse. For example, in the case of the discovery of DNA, Frederick Griffith's demonstration of bacterial transformation in 1928 came out of his search for a vaccine against bacterial pneumonia (Garfield, 1964), a different discourse than his own, but it contributes to the knowledge of genetics.

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| Typology of citation patterns | Dimension of citation | Description |
|---|---|---|
| Original citation pattern | Search tool | Uses citations as search tools to find relevant discourses and identify gaps, and to construct "intertextual coherence" |
| | Verification tool | Uses citations as tools for verifying and comparing contributions in "synthesized coherence" |
| | Evidentiary tool | Uses citations as indicators or evidence within an *explanans* for the progress of research |
| | Cognitive/ historiographical | Recognizes nodal events and significant discoveries related to existing discourse as a basis for "synthesized coherence" |
| | Ideational | Builds more coherent explanations or modifies ideas and concepts offered by the cited text. Constructs new rules of discourse that push aside existing statements and claims |
| | Symbolic interactionist | Facilitates the evolution and growth of ideas and concepts within the same discourse or builds new discourses inspired from meaningful relationships with other researchers |
| | Operational | Enhances or modifies a previous research method, statistical procedure or research operation |
| Conceptual citation pattern | Search tool | Uses citations as search tools to find relevant discourses |
| | Verification tool | Uses citations as tools for verifying citations |
| | Ideational | Creates meanings from cited ideas or concepts without extensive manipulation or major changes to the existing rules of discourse |
| | Methodological | Applies existing research methods, techniques and procedures from cited works |
| Organic citation pattern | Search tool | Uses citations as search tools to find relevant discourses |
| | Verification tool | Uses citations as tools for verifying citations |
| | Cognitive/ historiographic/ sociological | Applies citations that are essential to the understanding of the concept being researched. The cognitive dimension of citations attributes intellectual debt. The historiographic dimension describes the history of the work and its context. The sociological dimension describes the significance, impact, prestige, influence and quality of the citations |
| | Phenomenological | Reflects on the authors' lived experience and familiarity with the discourse |
| | Symbolic interactionist | Represents results of the authors' interaction with peers and editors |
| Juxtapositional citation pattern | Cognitive | Compares with cited work to provide an alternative discourse without any specifics |
| | Sociological | Compares with cited work that is influential in order to leverage that influence without developing the discourse from the cited work |
| Peripheral citation pattern | Cognitive | Recognizes the intellectual debt of the cited work without specifically referencing the discourse |
| | Sociological | Recognizes the influence of the cited work without any ideational dimension |
| Persuasive citation pattern | Rhetorical | Applies citations as linguistic devices to support findings of citing papers usually without any details of the discourse of the cited work |
| Acknowledgment citation pattern | Social network | Chooses citations to demonstrate allegiance toward senior authors, friends and colleagues in the network regardless of the discourse |
| Perfunctory citation pattern | Sociological | Uses parenthetical or passing references, especially influential works, that are related to the general discourse but have no direct relevance to the citing work |
| Inconsistent citation pattern | Sociological/ rhetorical | Uses questionable or erroneous citations, or demonstrates an abusive use of citations often to persuade the reader of the authority of the citing work |
| Plagiaristic | Sociological/ rhetorical | Copies and pastes citations and surrounding text to support arguments and enhance credibility |

**Table II.**
Combining the dimensions of citations with the proposed typology of qualitative citation patterns

The second criterion, uncovering what is not evident, is accomplished using various methods. Authors can draw connections between works and research streams that were not typically cited together. This form of "synthesized coherence" (Locke and Golden-Biddle, 1997, p. 1030) takes place when overarching ideas between different research areas are constituted or when an underlying consensus is brought to the fore that was not obvious before. This process is visible when two or more citations are brought to bear to accomplish such a synthesis. The cognitive and historiographical dimensions of citations help the author locate nodal events and significant discoveries related to the existing discourse from which the author could start synthesizing his or her own original rules or relationships between extant concepts. Uncovering what did not exist in the discourse could also take the shape of citing analogies and metaphors that exist within the symbolic perspective – either from concepts imparted onto the cited text or from the authors' meaningful relationships with other researchers – to bring up to the surface new ideas that were previously hidden (Schön, 1963). Thus, in the case of Griffith's discovery, although his goal was not to describe how bacteria transferred genetic information, the results of his experiments uncovered such a process (Garfield, 1964).

Finally, changing the rules in the existing discourse can take the shape of pushing aside other statements to apply new rules or create a new system of statements within the constellation of statements in the discourse. When Darwin (1859) introduced his statements surrounding "common ancestors," "successive variations" and "natural selection," these claims pushed aside the ideational dimensions from previous biologists (Cuvier, 1800–1805; Lamarck, 1809/1960) and created its own system of statements within the constellation of other biological statements. Another way that different rules are made to operate is by contradicting or problematizing previous works and replacing them with more coherent explanations (Alvesson and Sandberg, 2011; Locke and Golden-Biddle, 1997; Sandberg and Alvesson, 2011). For example, using new rules of how traits are inherited, Mendelian genetics was able to explain the mechanism of trait inheritance that Darwin's pangenesis could not. All of these characteristics of citations – relevance to the discourse, making evident what is not, actively manipulating existing statements – contribute to the growth of knowledge.

*Conceptual citation pattern*
Conceptual citation patterns are used for creating meanings within the source article based on the concepts sourced from the cited article (Small, 1978). The creation of meanings takes place when a concept is cited or borrowed and then expanded or elaborated in some form or fashion. Once the relevant concepts are found using search and verification citation tools, conceptual citations are distinguished by their specificity and focus on particular ideas rather than on the general discourse. The ideational dimension of citations plays a major role in this pattern by imparting those directly relevant ideas and concepts onto both the cited and citing text, supported by the phenomenological and interactionist dimensions of citations, where the citing authors' lived experiences as well as their social interactions expand such ideas and meaning. Original patterns are by definition conceptual, but not all conceptual patterns are original. The difference between the conceptual citation pattern and the original citation pattern lies in the extent to which the source article manipulates the cited concepts – its level of being "active." If the cited concept and associated discourse are elaborated on, contrasted, but are not manipulated, changed or modified in any extensive way, the conceptual pattern applies. The conceptual citation pattern represents the genesis – the creation of meanings – for the growth of knowledge to occur, taking the form of discourses (concepts and ideas as well as the rules that link them) that may later be used by the original citation pattern for that growth to materialize.

*Organic citation pattern*
Organic citation patterns contain references essential to the understanding of the concept in the citing study. Based on the cognitive, historiographical and sociological dimensions, organic citation patterns provide the necessary background or set the stage for the citing paper's deliberations (Moravcsik and Murugesan, 1975; Peritz, 1983). Organic citation patterns can be confirmatory or negational, but they all are consistent with Merton's (1968b) conventional approach to citing which is based on giving credit where it is due. The difference between organic and conceptual citation patterns pertains to the level of specificity of the context of the citation. Organic citation patterns do not necessarily refer to the main concept of the citing article but describe other concepts necessary for the citing article to be well received by peers. Terms that suggest the citations are following the organic pattern and include words such as "builds on," "extends," "based on," "expands," "refers to," "assume," "can be described as," "can be viewed as" and "examples include." The organic pattern also reflects the phenomenological and symbolic interactionist dimensions of citing, as authors choose specific citations because they are accustomed to those works from their lived experience, or because journal editors or referees recommend relevant references during the review process. Organic patterns include citations to other studies to which the current study is being actively compared, corroborated or contrasted (Peritz, 1983). Organic citation patterns build the background necessary for contributions to knowledge.

*Juxtapositional citation pattern*
Juxtapositional citation patterns are closely related to organic patterns but are cited in a contrasting or negational fashion in order to provide an alternative concept or to disagree with the cited study (Moravcsik and Murugesan, 1975). Similar to the previous patterns, the juxtapositional pattern is founded on elements of the critical tradition where the current study is compared to other studies but the other studies play no significant role in shaping the current paper. Juxtapositional citation patterns can contribute to the growth of knowledge if they are accompanied by original, conceptual or organic citation patterns. For example, a negational citation may underscore a weakness in existing studies and be followed by original citation patterns that describe how that limitation can be overcome.

*Peripheral citation pattern*
Peripheral patterns include citations that all informed members of the community are assumed to know (e.g. reported in textbooks or taught in post-graduate training) but without reference to the original sources (Gilbert, 1977). A classic example is the Likert-type scale, published in the *Archives of Psychology* in 1932, and routinely used in surveys, but rarely cited. Another example is the citing of review papers, which often are highly cited within its associated field, but with little discussion of the conceptual details. In this sense, the peripheral citation pattern reflects the recognition (cognitive dimension) it has received and its influence within the research community (i.e. its sociological dimension), but does not necessarily imply the use of its ideas. The peripheral pattern can be identified when authors choose more "visible" citations in order to increase the likelihood of acceptance by peers (Cole and Cole, 1973) without necessarily explaining why those citations are directly related to the existing study. Peripheral citation patterns have given rise to the Matthew effect (Merton, 1968a), where renowned authors continue to amass recognition while such recognition is withheld from other authors who have not yet made their mark. In the end, peripheral citation patterns recognize existing knowledge but do not significantly contribute toward the growth of that knowledge.

*Persuasive citation pattern*

Persuasive citation patterns are primarily based on the rhetorical dimension of citations to advance the interests of the authors. Through persuasive citations, authors justify that their work has not been invalidated in any way, defend claims against attack and convince others (Moed, 2005). Persuasive citation patterns often employ rhetorical devices that imply impartiality, the use of standard procedures and the conscription of renowned authors (Gilbert, 1976). Emphasis and persuasive references, such as "previous research does not," "yet little research," "no evidence of," "the dearth of studies" and "scarcity of empirical evidence," signal the intention of the authors in using a persuasive citation pattern to support their arguments. When valid evidence is provided, the persuasive pattern supports the original citation pattern; however, that may not always be the case. Transitional words and phrases that accompany citations such as "for example," "moreover" and "consequently" and verb forms such as "further suggest," "leads to" and "purport" also signal the use of persuasive citation patterns. Because persuasive citation patterns rely on rhetorical devices rather than original or conceptual content, they do not generally contribute to, and may even harm the growth of knowledge, unless they are accompanied by organic, conceptual or original citation patterns.

*Acknowledgment citation pattern*

Acknowledgment citation patterns demonstrate the sociological and social network dimensions that exist between the citing author and the cited authors. When citing authors show allegiance toward senior authors, friends and colleagues in the network or general discourse (Gilbert, 1977) over other more relevant sources, they demonstrate the acknowledgment citation patterns. This choice does not imply that there are no ideational or cognitive elements at play at all. It suggests that the social network dimension took precedence. Sometimes, such patterns take the form of redundant citations to "keep reviewers happy" or citing for the purposes of obtaining or providing reward in the form of promotion, tenure or grants (Moed, 2005). These citations are called "power seeking texts" (Cozzens, 1989, p. 441), and they act as pure reward systems without a strong conceptual component. Acknowledgment citation patterns do not generally add to the growth of knowledge but serve to coalesce and strengthen a research program.

*Perfunctory citation pattern*

Perfunctory citation patterns are considered the weakest demonstration of citing behavior that is still "valid" or is at least related to the general discourse, but they do not demonstrate any direct conceptual relation. Perfunctory patterns can also be described as "parenthetical," "passing" or "casual" citations. Moravcsik and Murugesan (1975) introduced the concept of perfunctory citations as ones that are unnecessary for working out the concepts in the citing paper or as merely mentioning authors in the general discourse. The haphazard or redundant use of citations for padding the citing article is included in this category. Authors that use perfunctory citations often merely review the cited article's abstract and do not demonstrate a direct link with the citing article. Chubin and Moitra (1975) refer to such concepts as "supplementary" when they provide additional information or "perfunctory" when the cited reference is related to the citing paper but provides no additional information. For example, authors may cite themselves (Gray, 2009) because the cited article is in the general discourse but contributes little if anything at all to the current study. Perfunctory citations only serve as padding to the citing article and to bolster the authors' citation ranking without adding anything to the growth of knowledge.

*Inconsistent citation pattern*
Inconsistent citation patterns characterize questionable, erroneous or abusive use of citations. Primarily related to the verification dimension of citations, this pattern essentially fails any test of attribution applied in that dimension. Hansen *et al.* (2006) found that 29 percent of the articles citing "Power and politics" fall within this category. Such a practice is probably not motivated by malicious intentions, but more of careless use of cited sources. Inconsistent patterns are also driven by a misinterpretation, misreading or mistaken application of the concept or method cited as part of the authors' strategic move to win the audience. During the process of transforming a claim, authors construct and deconstruct the original text until it "supports" their claims (Latour and Woolgar, 1979). By following this pattern, authors may use an authoritative source over a lesser known one, even if it leads to distortion (Nicolaisen, 2007) because the former helps the article get published. The rhetorical dimension exposes the blurry boundaries between the social and the technical in scientific practice and how scientists transform the meaning of their references to suit their needs in the creation of knowledge (Gilbert and Mulkay, 1984). Inconsistent citation patterns generally harm the growth of knowledge within the discipline and ultimately harm the discipline itself.

*Plagiaristic citation pattern*
Plagiaristic citation patterns look like regular citations, but what has happened is that authors copy and paste the surrounding text together with the citations into the citing study without consulting the original source, with no explanation or deliberation, giving the impression that work is done when it is not. In some disciplines, up to 90 percent of all citations are copied from the reference lists of other works without consulting the original publication (Simkin and Roychowdhury, 2005). Plagiaristic citation patterns harm the growth of knowledge and the discipline and should be avoided. The key problem with plagiaristic citations is that they often replicate the mistakes made by the authors whose citations were copied. Such mistakes may range from the misattribution of credit for scientific discoveries, which misrepresent knowledge growth, to mis-citations and wrong inferences. For example, Teixeira *et al.* (2013) report that 15 percent of citations incorrectly acknowledge the source of original ideas. As a result, the scientific ideas become distorted to such a degree that incorrect conclusions are drawn and harmful recommendations are proposed. Plagiarized citations have also led to the propagation of distorted evidence in biology leading to ineffective or even damaging intervention policies (Smith and Banks, 2017; Sanz-Martín *et al.*, 2016). This does not bode well with the cumulative growth of valid scientific knowledge.

## Case studies of citation patterns
To illustrate how these patterns of citations can be identified, we provide examples from two classic works.

*Granovetter's (1973) "The strength of weak ties" – example of original, conceptual and organic patterns*
In his classic article on the "Strength of Weak Ties," Granovetter (1973) sets the stage by using organic patterns from the field of sociology to emphasize the need for a clearer understanding of how micro-level interactions (e.g. interactions in small groups) impact macro-level phenomena (social mobility, community and political structure):

(A) Using a negational organic citation pattern to highlight a lack of work in this discourse, Granovetter argued (pp. 1360-1361)[1]:

(1) A fundamental weakness of current sociological theory is that it does not relate micro-level interactions to macro-level patterns [...] We have had neither the theory nor the measurement and sampling techniques to move sociometry from the usual small-group level to that of larger

structures. While a number of stimulating and suggestive studies have recently moved in this direction (Bott, 1957; Mayer, 1961; Milgram, 1967; Boissevain, 1968; Mitchell, 1969), they do not treat structural issues in much theoretical detail.

All of the references cited directly concern the relationship between micro-level interactions and macro-level implications:

(B) Using the conceptual citation pattern, a series of key concepts and ideas were gathered from previous studies, and elaborated to build the foundation for the growth of knowledge (pp. 1362-1363):

(1) Implicit here is Homan's idea that "the more frequently persons interact with one another, the stronger their sentiments of friendship for one another are apt to be" (1950, p. 133).

(2) The hypothesis is made plausible also by empirical evidence that the stronger the tie connecting two individuals, the more similar they are, in various ways (Berscheid and Walster, 1969, pp. 69-91; Bramel, 1969, pp. 9-16; […]). […] Applied in reverse, these two factors – time and similarity – indicate why weaker *A-B* and *A-C* ties make a *C-B* tie less likely than strong ones […] that the triad shown *never* occurs.

Here, the concept of the weak tie was elaborated and additional concepts, such as the concept of the "forbidden triad," were highlighted. This concept asserted that if strong ties exist between A and B and between A and C, an absent tie between C and B is unlikely (p. 1364):

(3) The significance of this triad's absence can be shown by using the concept of a "bridge"; this is a line in a network which provides the *only* path between two points (Harary *et al.*, 1965, p. 198).

The concept of the "bridge" was introduced and became another brick in the foundation for a new concept and idea in social network analysis:

(C) Using the original citation pattern, a new concept and idea that "weak ties are bridges" was introduced (pp. 1363-1364):

(1) [6]The models and experiments of Rapoport and his associates have been a major stimulus to this paper […] His and Horvath's 1961 hypothesis is even closer to mine […] their development of this hypothesis, however, is quite different, substantially and mathematically, from mine (Rapaport, 1953a, 1953b, 1954, 1963; Rapaport and Horvath, 1961) […] Now, if the stipulated triad is absent, it follows that, except under unlikely conditions, *no strong tie is a bridge* […] all bridges are weak ties.

After establishing the relevance of the argument with previous studies and with the support of the organic and conceptual citation patterns, Granovetter uncovered what was not obvious: that "all bridges are weak ties." This claim carries many social implications including those related to social and economic mobility, community organization and urban renewal, diffusion of ideas and technology, political organization and social cohesion. To introduce this new concept and idea, Granovetter modified and manipulated existing discourses that Rapaport and his colleagues had developed surrounding the characteristics of a large sociogram. Rapaport and Horvath (1961) found that the sample of members that could be reached by asking from the first or second choice friends was smaller than by asking more distant friends. Instead of limiting the discussion to the formula of tracing such relationships as Rapaport and colleagues had done, Granovetter claimed that the first or second choice friends, or strong ties, tended to select one another or picked redundant relations. To reach out to more people, selecting the more distant friends (or weak ties) would be more effective.

*Sokal's (1996b) "Transgressing the boundaries: toward a transformative hermeneutics of quantum gravity" – example of persuasive and inconsistent citation patterns*
In 1994, Alan Sokal, a New York University Physicist who was concerned about how certain academics in the humanities were becoming increasingly negligent of the

standards of rigor, logic, truth and intellectual honesty in research, decided to highlight such a state of affairs by writing an article that would infringe on those standards and show that it would still get published in those circles. Known later as the "Sokal Affair" or "Sokal Hoax" (Sokal, 2000), the article needed to be believable but would be filled with all the worst violations in scholarly writing – appeals to authority, unreadable prose, outright erroneous scientific claims and failure to follow the scientific method – yet, still appear to be scholarly. From the perspective of citations, the article would contain valid citations (none were fabricated). The result was supposedly "original" writing that contained a mix of plausible claims that would be stretched, implausible claims that are set forth as being widely accepted but lead nowhere and a sprinkling of truth. The article was submitted to *Social Text,* a leading journal of cultural studies, which coincidentally decided to include the article as a part of its special double issue on "Science Wars," a skeptical commentary on how the practice of science may be contaminated by social values more than scientists care to admit. Scientists argue that the social scientists and researchers in humanities working in the growing field of "science studies" are unlikely to know enough to analyze any scientific field, and it so happened that among the many authors of that issue, Alan Sokal was the only bona fide scientist. After the article was published in the journal's summer issue in 1996, Sokal (1996a) revealed what he did to *Lingua Franca*, an American magazine that reports on the academic world. He wrote: "To test the prevailing intellectual standards, I decided to try a modest (though admittedly uncontrolled) experiment: Would a leading North American journal of cultural studies […] publish an article liberally salted with nonsense if (a) it sounded good and (b) it flattered the editors' ideological preconceptions?" (p. 1):

(A) Using persuasive citation patterns to flatter the editors and reviewers of the journal and appease their ideological preconceptions:

Rather, they cling to the dogma imposed by the long post-Enlightenment hegemony over the Western intellectual outlook, which can be summarized briefly as follows: that there exists an external world, […] These themes can be traced, despite some differences of emphasis, in Aronowitz's analysis of the cultural fabric that produced quantum mechanics[4]; in Ross' discussion of oppositional discourses in post-quantum science[5].

Both Aronowitz and Ross were Editors of *Social Text*, and although the cited works were part of the general "science studies" genre, they were conscripted to support the author's claims of a "dogma […] that there exists an external world":

(B) Inconsistent and persuasive citation patterns that raise a dubious concept to cutting-edge theory:

Finally, an exciting proposal has been taking shape over the past few years in the hands of an interdisciplinary collaboration of mathematicians, astrophysicists and biologists: this is the theory of the morphogenetic field.[46] Since the mid-1980s evidence has been accumulating that this field, first conceptualized by developmental biologists[47], is in fact closely linked to the quantum *gravitational* field[48].

[endnotes]

[46][…] field. Sheldrake (1981, 1991), Briggs and Peat (1984, chap. 4), Granero-Porati and Porati (1984), Kazarinoff (1985), Schiffmann (1989), Psarev (1990), Brooks and Castor (1990), Heinonen *et al.* (1992), Rensing (1993). For an in-depth treatment of the mathematical background to this theory, see Thom (1975, 1990); and for a brief but insightful analysis of the philosophical underpinnings of this and related approaches, see Ross (1991, 40-42, 253n).

[48][…] field. Some early workers thought that the morphogenetic field might be related to the electromagnetic field, but it is now understood that this is merely a suggestive analogy: see Sheldrake (1981, 1977, 1990) for a clear exposition. Note also point (b) below.

Using elaborate endnotes, the article conscripts Sheldrake's (1981) pseudoscientific theories of "morphic resonance" (see the long list of commentaries in Wikipedia's entry to Sheldrake) which *Nature* (Maddox, 1981) dubbed as "a book for burning," to persuade the reader of the validity of its claims. In addition to the rhetorical dimension, inconsistent citation patterns are applied since Sheldrake did not claim that his "morphogenetic field" was a part of cutting-edge quantum theory (Sokal, 1996a).

(C) Use of persuasive and inconsistent citation patterns (citations of authority, play on words and strained analogies) without valid evidence:

Along the same lines, Niels Bohr (1928; cited in Pais, 1991, 314) wrote: "An independent reality in the ordinary physical sense can […] neither be ascribed to the phenomena nor to the agencies of observation." […] More generally, note Heisenberg, […] And once again Bohr (1934; cited in Jammer, 1974, p. 102): "A complete elucidation of one and the same object may require diverse points of view which defy a unique description. Indeed, strictly speaking, the conscious analysis of any concept stands in a relation of exclusion to its immediate application. [5]" This foreshadowing of postmodernist epistemology is by no means coincidental […] elucidated by Froula (1985) and Honner (1994), and, in great depth, by Plotnitsky (1994).[6,7]

The play of words and the use of citations of authority sought to justify the conclusion, without any warrants, that the still speculative theory of space and time has political implications and directly consonant with the postmodern epistemology, abolishing the concept of objective reality. By stretching the analogies using persuasive and inconsistent citation patterns, Sokal (1996b) created a link where there was none.

What the Sokal Affair demonstrated is that citing behavior can vary from stretching the original intent of the cited works, to worse, perpetuating nonsense (Sokal and Bricmont, 1998). Because the spectrum of citing behavior is so wide, it behooves readers and especially the gatekeepers of knowledge, the editors and reviewers of reputable journals, to be cognizant of the range of possible citing behaviors, as shown in the patterns of citations described above.

### Conclusion
Searching for and choosing the right citations for any field, and especially for a diverse field, can be very challenging. The researcher needs to select from different disciplinary databases and is faced with an unprecedented volume of information that is often evolving at a rapid rate. Even the use of the dimension of citations as a search tool requires deploying numerous strategies in order to find the relevant works (Brocke *et al.*, 2015; Webster and Watson, 2002), only to be confronted with the choice of which citations best fit the current research (Boell and Cecez-Kecmanovic, 2014; Wolfswinkel *et al.*, 2013). The question is, after perhaps finding the right set of citations to be used in our research, will we stand on the shoulders of giants, dwarfs or ghosts? This paper addresses such a question by following the Foucauldian perspective. Do we copy and paste citations and surrounding texts without regard for the contents of those works? Do we choose citations conveniently available, or pick authoritative citations to bolster the credibility of the current study, even if they do not support our key assumptions, as the persuasive citation pattern dictates? By perpetuating questionable or erroneous conclusions from inconsistent citation patterns, are we not risking the future of our disciplines? Do we not care that perfunctory citation patterns that merely pad the current study only serve to muddy the waters and contribute little or nothing to the study itself? Do we distinguish between citations that acknowledge our social circle or appease our editors and reviewers, from those that really contribute to the conceptual development of our current study?

Organic citation patterns build the foundation of our current study, clearly demarcate the conceptual space in which our current study is located, and provide the necessary background for its deliberations and potential contribution. The genesis of that potential contribution to the growth of knowledge is centered around the conceptual citation pattern,

which imparts ideas and meanings onto the cited and citing text and elaborates on what the author is trying to introduce in the original citation pattern. The jewel in the crown of research is this original citation pattern, which while standing on the shoulders of giants, makes evident what is not, actively manipulates and organizes existing statements, applies new rules of discourse, and creates novel and interesting findings that grow the knowledge of our disciplines.

## Note

1. Citations embedded in the examples are intentionally not listed in the bibliography for the sake of brevity.

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