

Writing, Arguing, Contributing - A Cogent Argumentation Framework for Identifying, Specifying, and Evaluating Research Contribution

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Abstract

The predominant means by which research becomes visible and accessible to the research community is through publication. Generally, publication requires careful framing of the research in relation to existing knowledge. As a contribution to knowledge cannot be self-evident, authors must persuade, through argumentation, the editors, reviewers, and the research community that their work offers a contribution. In Information Systems, the discussion of argumentation is often limited to the logic dimensions of argumentation, namely deductive, inductive, and abductive reasoning. In this paper, we demonstrate that argumentation requires the consideration of three additional dimensions of argumentation: rhetoric, dialectic, and social-institutional. Kuhn's concept of the disciplinary matrix is introduced as the background toward which a cogent argument is directed and against which contribution is evaluated. We then illustrate the role of argumentation through the example of the seminal paper by Orlikowski and Iacono on the role of IT in Information Systems research. Understanding the importance of argumentation in framing one's research contribution is critical to authors, editors, and reviewers alike within and beyond Information Systems and its reference disciplines.

Keywords: argument; argumentation; cogency; research contribution; contribution; Information Systems; Toulmin; Kuhn; publication

1 Introduction

The last step in the research process is often the most time-consuming and problematic: persuading reviewers, editors, and readers that an instance of research contributes to knowledge. Research outcomes do not speak for themselves but instead require researchers to present the research findings within the ongoing discourse of the research community. Careful argumentation is indispensable if researchers want to make a compelling case for the importance, relevance, benefit, and value of their research for the community, for the broader field, or to practitioners. It is incumbent on authors "to convince their colleagues that their work has value. ... [thus] *the arguments researchers use to expound their [research findings] must be crafted carefully; otherwise, their theories' contribution to knowledge might be overlooked*" (Corley and Gioia 2011 p. 14; emphasis added). In this research, we deconstruct two critical aspects of Corley and Gioia's claim to provide guidance for editors, reviewers, and authors in the crafting and evaluation of research for publication: first, the importance of argumentation and second, the context within which contributions can occur.

First, authors must construct a cogent or persuasive argument to convince editors, reviewers, and colleagues that a paper participates in the ongoing discourse of the research community. To this end, Locke and Golden-Biddle (1997) identify two rhetorical strategies that legitimize research through constructing intertextual coherence (disagreement, cumulative progress, and latent consensus) and problematizing the existing literature (identify gaps, oversights, or alternative accounts) to expose opportunities for contribution to knowledge. In identifying that rhetoric is important in constructing a perception of novelty, Locke and Golden-Biddle (1997) explicate one element of argumentation; however, argumentation also involves logic, dialectic, and social-institutional dimensions (Rehg 2009; Toulmin 1958; Wenzel 1990). The insight that argumentation is essential to participation in a research discourse requires us to engage more thoroughly with argumentation theory (Habermas 1984; Rehg 2009; Toulmin 1958).

Second is the question of how a contribution is recognized. While many submissions identify excellent questions, provide analysis of reasonable data, and deliver a literature review which articulates the research background, “the most common comment that one sees on reviews is that the authors need to enhance their ‘contribution’” (Straub 2009 p. iii). To this end, novelty and utility are often noted as key criteria for assessing a contribution (Hovorka and Boell 2015, 2017). But neither novelty nor utility is self-evident, nor can they be properties of a paper itself. Scientific contributions, therefore, do not exist as isolated papers but rather are evaluated against a background of accepted knowledge, such that research activity increases what is known, what is valued as knowledge, how we come to know, or what researchers aspire to know. While intertextual coherence has been identified as a rhetorical strategy (Locke and Golden-Biddle 1997) and problematization as a tactical approach (Barrett and Walsham 2004), it is necessary to articulate the shared knowledge and commitments which a contribution seeks to change. Thomas Kuhn’s concept of the *disciplinary matrix* (DM) (Kuhn 1977) offers guidance for participating in the material and discursive activity in which researchers participate and in which progress is made.

In the following section, we take a closer look at theories of argumentation in academic discourse, distinguishing four different dimensions of argumentation. As this review will highlight the importance of understanding argumentation as involving the shared values and commitments of a community of researchers, we then turn to Kuhn’s (1962, 1977) work on paradigms and more specifically the DM. Using the concept of the DM, we outline different ways in which research can advance and challenge the shared symbolic generalizations, exemplars, and models of a community to which research seeks to contribute. Thus, we claim that argumentation of the importance, relevance, benefit, and value of the contribution made by research is the result of a persuasive argument in relation to a DM. We then demonstrate the importance of argumentation using Toulmin’s argumentation scheme in relation to the seminal paper by Orlikowski and Iacono (2001) on the IT artefact.

2 Argumentation

In this article, we describe argumentation as the action or process of systematic reasoning in support of an idea, action, theory, or method using logic, rhetoric, dialectic, and social-institutional dimensions of argumentation. While the importance of argumentation is recognized within the IS community (Levy and Ellis 2006; Ochara 2013), to date, argumentation is often understood in terms of the logic used in argumentation, namely the difference between deductive reasoning, inductive reasoning, and abductive reasoning

(Ochara 2013). While these are important differences in the logical structure of arguments, focussing on the logic dimension of arguments alone offers only a limited picture of what is involved in argumentation. Understanding the types of logic applied to research thus cannot offer a sufficient picture as to why research fails or succeeds in persuading other researchers of its contribution.

To this end, we can look at the work by Rehg (2009) on the cogency of argumentation in scholarly discourse. Cogency conceptualizes how scholars persuade their peers of the value of their work. Rehg’s conception of cogency brings together different perspectives on argumentation, including Toulmin’s (1958) work on how arguments are constructed, Habermas’ (1984) work on discourse and ideal speech situations, as well as Kuhn’s (1977) work on scientific revolutions. Rehg (2009) suggests that argumentation can be understood as involving four dimensions which together produce cogency in academic work. These four dimensions include logic, rhetoric, dialectic, and social-institutional aspects of argumentation (Table 1). We now turn to each of these four dimensions, outlining how each offers important insights into the role that argumentation plays when authors try to persuade their readers, editors, and reviewers of their contribution.

Dimension	Exemplary Aspects of Cogent Argumentation
Logic	<ul style="list-style-type: none"> • Relevance (Is relevant information overlooked?) • Plausibility (Are premises sufficiently precise?) • Non-contradiction and consistency • Support for premises
Dialectic	<ul style="list-style-type: none"> • Providing proofs for claims • Acknowledging other views and contributions • Creating, considering, and responding to challenges • Engaging in critical assessment
Rhetoric	<ul style="list-style-type: none"> • Clearly reference how research assents to or dissents from earlier work • Sufficiently demonstrate expertise in used methods and theories • Appeal that the research benefits the research community • Appeal that the research benefits practice and society
Social-institutional	<ul style="list-style-type: none"> • Unbiased – peer review • Acknowledge limitations due to socioeconomic and material resources • Appeal to prestige / expertise / reputation • Acknowledge reputation and achievements of others

Table 1. Dimensions of Cogent Argumentation

2.1 The Logic Dimension of Argumentation

The logic dimension of argumentation is interested in how arguments are built in terms of how syntactically and semantically the conclusion and premises are linked to each other. This requires analysing the reasoning brought forward for linking the conclusion of an argument to specific premises that support such a conclusion (Rehg 2009). Within the academic context, traditionally the interest has been in two logical types of reasoning: deductive reasoning as well as inductive reasoning, with a clear favour for the former. These two forms of reasoning have been added to by abductive reasoning as a third form of the logic of argumentation (Gregory and Muntermann 2011; Ochara 2013).

Deductive reasoning employs the idea that the acceptance of specific premises forms the foundation from which specific claims can be made that logically must follow from those premises. For instance, if one premise is that clouds are the source of rain and a second premise is that there are currently no clouds, then deductive logic would conclude that it is currently not raining. Deductive reasoning is used when testing specific hypotheses or premises postulated by a model, such as that the intention to use technology increases when technology is both useful and easy to use. Following deductive reasoning, any instance where the intention to use technology is high despite the technology being useful and easy to use would reject the deductive logic of the model as incorrect.

Inductive reasoning, in contrast, justifies its conclusion based on high likelihood given past experience. That is, a particular conclusion is not certain but highly likely given specific premises. In contrast to deductive reasoning, an exception to the expected behaviour does not falsify the premises but may be explained by using additional premises stating exceptions. Inductive reasoning is required in abstracting generalized rules from specific observations. One example of inductive reasoning could be that the sun is rising in the morning, as the sun has so far risen every morning. Inductive reasoning is used when researchers generalize their research findings beyond the observations made by them as they make predictions about likely future observations.

Abductive reasoning, sometimes also called retrodution, was introduced by Peirce as additional form of logical reasoning (Douven 2017). Given the history of science, where explanations offered by long-standing theories eventually turned out to be incorrect, the possibility of using purely deductive reasoning is rejected. Instead, abductive reasoning uses the idea of best possible explanation for an observation given what is known. Abductive inference thus provides the most probable conclusion given specific premises. In research, abductive reasoning is used when existing theory guides the interpretation of observations as to what is the most likely explanation for a specific observation.

Looking at argumentation from the logical dimension, it is important that arguments are plausible, non-contradicting, and based on consistent use of premises. Judging the logic of arguments will thus evoke the dialectic dimension of argumentation as providing the foundation on which the syntactic and semantic link between premise and conclusion is assessed as appropriate.

2.2 The Dialectic Dimension of Argumentation

The dialectic dimension of argumentation involves the rules, standards, attitudes, and behaviours applied by participants engaged in argumentation (Rehg 2009; Wenzel 1990). To be considered cogent, arguments must be open to critical assessment by the community according to dialectic standards used for challenging, testing, and rebutting the content of arguments (Rehg 2009). From the dialectic dimension, arguments have to adhere to dialectic standards applied by a community as part of their practices used when competing for better arguments (Habermas 1984). Dialectic aspects of argumentation include, for instance, that arguments need to stay on topic or that authors need to provide proof for their claims.

Within academic discourse, the dialectic dimension of argumentation requires that arguments need to be tested in relation to challenges brought forward regarding an argument's content (Rehg 2009). The need to respond to such challenges is frequently involved in the review process where authors, as the creators of an argument, have to respond to challenges brought

forward by the review team. But likewise, the dialectic dimension of argumentation also requires authors to respond to questions when they present their work to the academic community at conferences, at seminars, and in talks.

The dialectic dimension involves all conditions according to which arguments can be openly and critically tested. The dialectic dimension provides the foundation for how argumentation is to be undertaken in accordance with the agreed-upon standards within a community of competent participants. Following Habermas' (1984) concept of an 'ideal speech situation', academic discourse is generally agreed to be undertaken in a way where different viewpoints are allowed to participate, where deviating views are not suppressed or excluded, where any argument can be expressed without restraint, and where authors are not deceptive.

2.3 The Rhetoric Dimension of Argumentation

The rhetoric dimension of argumentation is concerned with the effective rhetorical presentation of an argument in a social-psychological sense (Rehg 2009). Cogent argumentation is not simply a matter of using logical devices such as causal reasoning or inductive analogy, but also depends on effective assertion towards the audience that one is in a position to make a competent judgment in a particular area. As researchers will bring various assumptions, training, backgrounds, and expertise to their research, they will differ in how they judge existing knowledge and in how a proposed hypothesis or research question may be considered appropriate for advancing knowledge (Rehg 2009). Thus, authors must use rhetoric to effectively communicate their expertise and credibility, as well as the relevance of their research for the audience. For instance, authors can demonstrate that they have relevant knowledge of a field by discussing seminal papers and introducing alternative viewpoints in their literature review. Cogent argumentation usually also involves discussing how the findings or standpoint presented in a paper benefit other researchers and practitioners.

When discussing existing knowledge to construct one's contribution, one of two standpoints can be taken: assent or dissent (Rehg 2009). A position of assent accepts existing knowledge claims, to build upon them in one's own research (Locke and Golden-Biddle 1997). Authors summarize existing knowledge to demonstrate a cumulative research tradition, upon which they can then build their own research efforts. This can be achieved by showing explicit or latent consensus in earlier research given the relevance of particular constructs or the relationships among them. Based on such constructed consensus, the authors can then argue for their own research as extending existing knowledge.

In contrast, a position of dissent challenges existing knowledge claims as insufficient or incorrect. Using this strategy, authors demonstrate their familiarity with existing standpoints and explanations in order to show how these are insufficient (Locke and Golden-Biddle 1997). This rhetorical move can be achieved by demonstrating inconsistency, contradiction, or oversights in earlier research studies. By problematizing existing knowledge claims, authors create a foundation on which they can then propose an alternative standpoint.

Irrespective of the rhetoric standpoint chosen (assent or dissent), authors have to persuade their audience that their judgment of existing knowledge is warranted. Thus, readers, editors, and reviewers need to be persuaded that the authors are trustworthy and in a position to cast a fair-minded and balanced judgment on existing knowledge.

2.4 The Social-institutional Dimension of Argumentation

From the social-institutional dimension, cogent argumentation requires considering social and institutional procedures and rules and their influence on argumentation. Cogent argumentation relies on sustaining particular social practices and is evaluated according to these social practices and procedures. Thus social, institutional, and cultural aspects form the background and social order within which academics operate (Rehg 2009). These interlocutors guide and constrain how normative and factual constraints can be used for scrutinizing the conception, execution, and presentation of research in terms of its dialogical adequacy. For example, the social-institutional dimension determines what can reasonably be expected within the context of available material resources and time constraints researchers face in a particular disciplinary context.

Often, social-institutional aspects involved in scholarly argumentation are “taken for granted in the process of argumentation” (Rehg 2009 p. 152). An example of one such aspect would be that cogent argumentation will involve a process of peer review, where research findings are scrutinized by experts before they are made available to the wider community of scholars. Another social-institutional assumption is that journal-level ranking by impact-factor or University ranking lists are suitable measures of research quality. Other social-institutional aspects are: the way in which disciplinary groups are organized; how academic achievements are recognized through awards and prizes; the reputation and social relationships of researchers; and facilities, financing, or other socio-economic forces (e.g. big-science vs. small-science research).

Researchers can therefore rely on tacit agreement that a particular instance of research is undertaken within certain constraints. What constitutes, for instance, a suitable subject population to sample (e.g. students, IS professionals, or executives) will depend on what is considered reasonable when taking into account financial constraints or access within a particular research environment.

Through ongoing discourse within the academic community, such as panels at conferences or opinion pieces, the merits of social-institutional practices can be challenged. If social-institutional practices are perceived as hindering the exchange of reasonable arguments, they can be questioned from the dialectic or rhetoric dimension of argumentation. Social-institutional practices will thus only persist as long as they are perceived as adequate in supporting the exchange of cogent arguments.

Overall, all four dimensions of argumentation come to bear when authors seek to persuade the academic community of the contribution of their work. When properly utilized, these dimensions can produce cogent arguments that not only adhere to the tenets of logical form, but also provide sufficient force to persuade. But returning to our own critique that novelty and usefulness do not stand on their own, we can question how the norms for argumentation are established, evaluated and maintained within a community of scholars. As Kuhn notes, principles of theory choice (for problem-solving) and the evaluation of contributions are sociological. We must understand the “nature of the scientific group, discovering what it values, what it tolerates and what it distains” (Kuhn 1970 p. 237).

While the four dimensions discussed above highlight the relevance of argumentation when presenting and assessing research, argumentation always takes place within the context of a

community of scholars. We now turn to the commitments shared by the group of scholars within which our research is problematized and toward which our argument is oriented.

3 Argumentation within the Disciplinary Matrix

While argumentation is critical in persuading editors, reviewers, and the research community of the value of a research instance, it is important to understand the context within which the argument is oriented. Contribution requires that some 'body of knowledge' or set of beliefs exists, into which a contribution can be placed. Here, we turn to Kuhn's (1962) concept of *paradigm* to underscore the dependence of scientific research upon concrete examples that "bridge what would otherwise be gaps in the specifications of the content and application of scientific theories" (Kuhn 1965 p. 16). The term *paradigm* has been criticized as ill-defined (Masterman 1970), as enabling a reification of the subject/object dualism (Burrell and Morgan 1979), and as providing multiple and conflicting interpretations (Hassan and Mingers 2018). Kuhn acknowledged that he "lost control of the word [paradigm]" and introduced the *disciplinary matrix* (DM) to describe the commitments of a community, which "enabled them to solve puzzles and that accounted for their relative unanimity in problem-choice and in the *evaluation of problem-solutions*" (1970 p. 271; emphasis added). The intellectual function of these shared commitments is to determine "the patterns of theory, the meaningful questions, the legitimate interpretations, etc. within which theoretical speculation is bounded" (Toulmin 1970 p. 40).

Kuhn suggests the term 'disciplinary matrix' as:

"'disciplinary' because it refers to the common possession of the practitioners of a particular discipline; 'matrix' because it is composed of ordered elements of various sorts, each requiring further specification" (Kuhn 1977 p. 182).

In Kuhn's view, a central locus of interest is the *community* (e.g. discipline) which can ideate, perform, and evaluate research in a coherent manner without a set of declarative rules. For Kuhn, the *discipline* is recognized as the community of researchers who share commitments, not as the more recent meaning of a political/institutional group named by a university as "a discipline" (e.g. Information Systems, Business Analytics, Management). He argues that communities become scientific when a group shares research commitments rather than by adopting or imposing a pre-existing "scientific" set of criteria.

The DM, while historically grounded in the natural sciences, offers a starting point from which to investigate the shared commitments which coordinate research and through which contributions are evaluated in the social sciences. In Table 2, we describe and provide illustrations of Kuhn's concept of shared commitments, including exemplars, symbolic generalizations, and models (Kuhn 1977). These shared commitments are not considered discrete paradigms by researchers themselves, but rather are the background upon which research activities are guided in their performance and evaluation (Masterman 1970). We use them as analytic categories to illustrate how argumentation can be directed toward the elements of a community's DM. The aspects of the DM encapsulate the practice into which new researchers are enrolled and become the accepted ways for framing problems, the vocabulary used to articulate research, and the methods and instruments through which research is performed. Thus, problematization (Barrett and Walsham 2004; Sandberg and Alvesson 2011) occurs within and between DMs and it is from within a DM that contributions are argued.

Particular	Description
Symbolic Generalizations	<ul style="list-style-type: none"> Standardized forms for expressing problems and solutions Readily accepted without question e.g. using a hypothesis to express a research problem e.g. a regression in the form: $Y = \beta_0 + \beta_{jx_1} + \beta_{2x_2} + \dots + \beta_{nx_n}$
Exemplar	<ul style="list-style-type: none"> Finished and published research Are used in enrolling researchers into a community Demonstrate what problems are and how they can be solved Provide templates for engaging in new problems and their solution e.g. Walsham's interpretive research on IS (Walsham 1995) e.g. Technology Acceptance Model (Davis 1989; Davis et al. 1989)
Models (Theories)	<ul style="list-style-type: none"> Preferred analogies for describing phenomena Abstract representations of phenomena When held deeply, become objects of metaphysical commitments (ontology) e.g. a gas behaves like a collection of microscopic billiard balls e.g. Rogers' model of diffusion of innovations

Table 2. Particulars (shared commitments) of a Disciplinary Matrix

Symbolic generalizations are the expressions of a community that permit representation of explicit, formalized components of the DM (Kuhn 1977). Symbolic generalizations connote the unquestioned means by which a community represents its own activity. In IS, few would disagree that conceptual frameworks (e.g. a boxes-arrows diagram), regression models, hypotheses or propositions, and statistical correlation tables are suitable means for representing research problems and their solutions. For example, there may be disagreement about a particular conceptual framework; however, by and large, the use of a conceptual framework as a means to express and conduct research is readily accepted within the IS community.

Exemplars are a key particular in Kuhn's conception of how involvement in a disciplinary practice is learned, maintained, and stabilized. Exemplars illustrate and reveal: a specific problem-solution; manifestations of analogies and metaphors; research heuristics; or methods of problem-solving. IS examples include Walsham's (1995) "Interpretivism in IS" and "Design Science Research" (Hevner et al. 2004), which each contain the key theoretical approaches and techniques, and which explicate applications of those approaches in solving important problems. Another well-known example in IS is the Technology Acceptance Model (Davis 1989; Davis et al. 1989), which is frequently used in classes for training research students.

Models (Theories) are generalized beliefs or patterns about the world (e.g. the analogy that electricity can be viewed as a 'fluid' flowing through conductors). Theories are then more specific and precise attachments of symbolic generalizations to specific phenomena of the world. For Kuhn, theories are a foundation upon which problems are solved. An example of a deeply held model in IS is presented by Weber (2012) as: "All concrete things in the world possess properties ... a human (a concrete thing) may possess a property that he uses an information system, ... we perceive a property ... [as] an attribute ... a particular user of an information system has two attributes that relate to the information system: 'perceived ease of use' and 'perceived usefulness'" (pp. 3-4). This model represents relationships between

humans and information systems and also specifies the ontological commitments of a community of researchers.

Kuhn's concept of the DM provides a means for describing the commitments of a community of scholars within which research argumentation is oriented. While Kuhn uses the three elements of symbolic generalizations, exemplars, and models (theories) to describe the shared commitments held by a community of scholars, he explicitly acknowledges that they do not provide an exhaustive list of all of the shared commitments. Indeed, further commitments may include particular values held by a community (e.g. emphasizing the importance of relevance to practice) or the instruments used by a community of scholars for advancing the production and verification of knowledge.

The critical insight is that the DM held by a community of scholars orients the cogency of argumentation. We can thus analyse the argumentation of a research paper to demonstrate this orientation beyond the level of an individual paper, outward to a community of researchers.

4 Argumentation in Research: An Example

Toulmin (1958) provides a scheme for analysing the logical structure of arguments beyond the formal logics of deduction, induction, and abduction. He proposes a scheme describing how arguments need to be structured if they are to persuade recipients of a particular claim. Stripped back to its bare bones, Toulmin's scheme states that any argument involves at least three basic elements: a claim, which is the position or belief that one is arguing for; a ground that is brought forward to support the claim; and a warrant, which is the often-implied rationale by which a ground actually supports a claim (Figure 1). Toulmin further extends this basic scheme by stating that both ground and warrant can be further substantiated or backed if needed, and that a claim can be further qualified, for instance, by stating specific conditions under which exceptions are possible.



Figure 1: The bare bones of Toulmin's (1958) scheme of argumentation.

In order to demonstrate that a contribution needs careful argumentation, we can now use Toulmin's (1958) scheme to unpack the overall structure of the argument made by Orlikowski and Iacono (2001) (Figure 2).

The claim stated by Orlikowski and Iacono (2001) addresses the community of Information Systems researchers, as the authors argue for a shift in the way the community engages in research. The authors argue that a shift in the communities' research agenda is needed to develop "conceptualizations and theories of IT artefacts; and incorporating such conceptualizations and theories of IT artefacts expressly into our studies" (ibid p. 130). This claim is grounded in the authors' observation that in the year 2001, most IS research had a "tendency to take IT artefacts for granted in IS studies" (ibid p. 133). This black-boxing has limited the ability of the IS research community to understand the implications of IT. To support their claim, the authors provide explicit evidence to link the ground of their argument to their claim. To do this, the authors analyse all 177 papers published during the first ten years

of the journal *Information Systems Research* (ISR) and demonstrate that the vast majority of papers published in ISR did not seriously engage in theorizing IT artefacts.

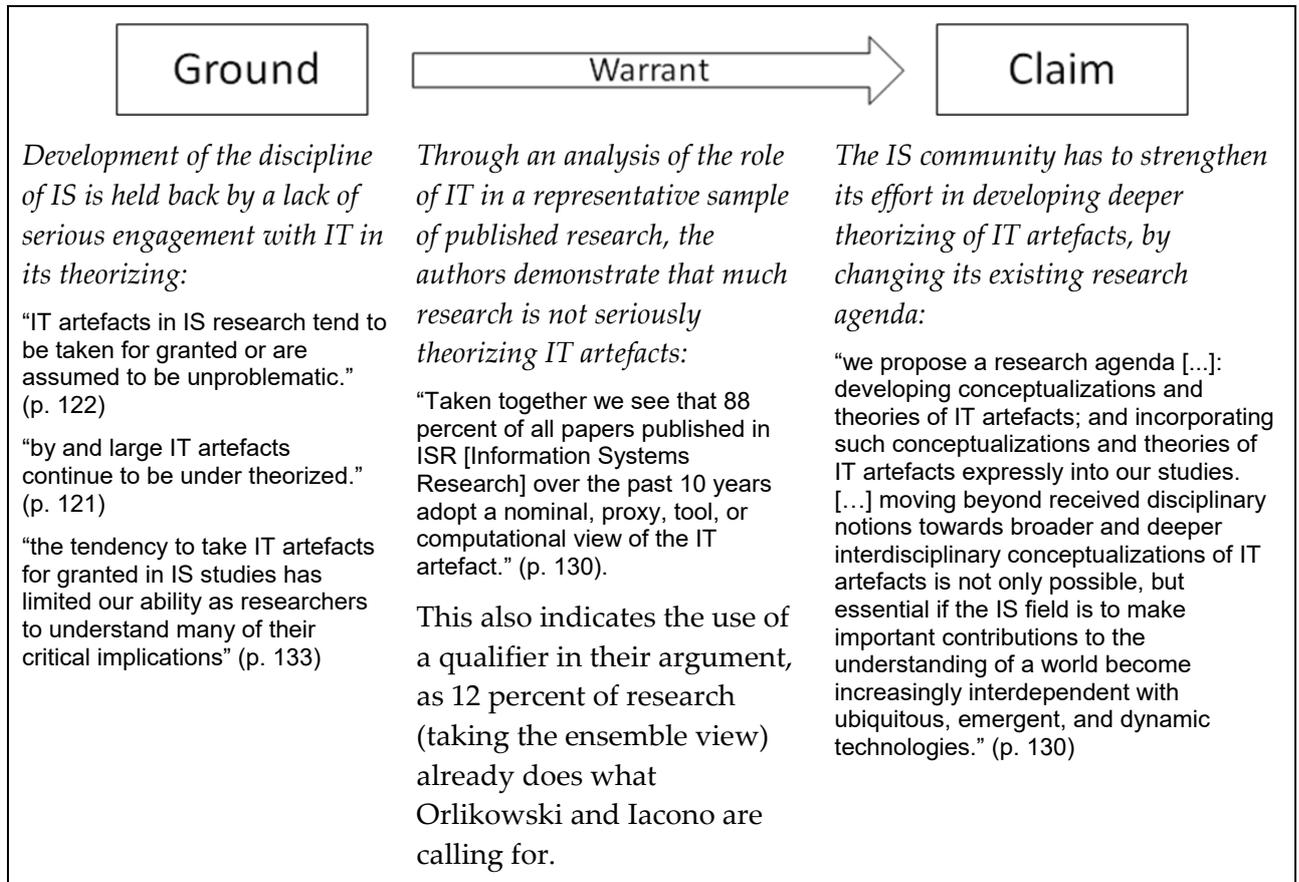


Figure 2: Using Toulmin's argumentation scheme to describe the overall argument of Orlikowski and Iacono (2001)

As our analysis of the argument of Orlikowski and Iacono (2001) demonstrates, the contribution made by them involves several dimensions of argumentation. First, their contribution evokes the social-institutional dimension of argumentation as they argue toward the shared commitments of the IS research community, pointing out that while the community generally agrees on the importance of IT, most research takes IT for granted. Rhetorically, they dissent from earlier research, as they show that the vast majority of research published in one of the leading journals in the field does not seriously engage in theorizing IT artefacts. Dialectically, the paper engages in the collection and analysis of evidence for the authors' claim. The validity of this evidence is difficult to be disputed by those associating themselves with the IS research community and hence forming the intended audience of the publication. Finally, the authors employ deductive and abductive logical reasoning, as they link the outcome of their analysis with their claim that a shift in the communities' research agenda is needed.

Furthermore, we can see that the argument made by Orlikowski and Iacono (2001) is oriented outward toward the disciplinary matrix of the Information Systems research community. They use *symbolic generalizations* widely accepted within the IS community to present the results of their analysis: their findings are summarized in a table listing the number of publications

allocated to different conceptualizations of IT. Their paper also introduces a *model* describing how IT is used in Information Systems research. This model is a detailed description of five clusters of conceptualizations of IT, that together contain 14 different subcategories. This model offers a theoretical account for how the discipline engages with and uses IT as part of its research. Since its publication, the paper has become an *exemplar* for how IT is conceptualized in IS research and it has instigated an ongoing debate about the discipline and its research orientation (e.g. Alter 2003; Benbasat and Zmud 2003; Hirschheim 2006; Hirschheim and Klein 2003; Ives et al 2004; King and Lyytinen 2006; Lyytinen and King 2004; Myers, 2003; Robey 2003). The overview of different conceptualizations of IT has become important in orienting a new generation of IS researchers into the richness and diversity of approaches to IT within the wider IS community.

5 Discussion

The argument presented to this point discloses scientific contributions as discursive and material argumentation. Contribution is not self-evident, and a paper cannot make a contribution in isolation. Authors need to place arguments in relation to a disciplinary matrix, which requires careful and appropriate structuring and understanding of the shared commitments of a community. This positioning increases the importance of engaging with literature as a means to learn the DM of a community. Engagement requires in-depth reading of existing research to understand relevant research problems: the accepted means to express research outcomes and findings (e.g. accepted use of symbolic generalizations); appropriate formulations for presenting research insights; appropriate research instruments; and other aspects of the community's DM. This nuanced understanding reveals three important insights for the social sciences, including IS.

First, argumentation and philosophical inquiry play a crucial role as communities borrow from or infiltrate other communities of scientific practices, both within the broader IS field and from other disciplines. When models, symbolic generalization, or exemplars from one DM are imported into another DM, problematization (Sandberg and Alvesson 2011) must occur. This is not simply aggregation from one DM to another, but indicates fundamental changes and the emergence of altered models, generalizations, values, or problem domains. Ontological and epistemological assumptions may be questioned, evaluative criteria may be critiqued, and the phenomenon itself may come under scrutiny. This suggests that challenges to the components of the disciplinary matrix are only achieved through argumentation. For example, Lee and Hubona (2009) illustrate how authors can emphasize the dialectic dimension of argumentation by calling upon positivist researchers to adhere to their own rigorous commitments. Their critique does not seek to refute or subvert positivist approaches; rather, they are identifying the logical implications inherent in the values (e.g. prediction and validity) and methods (e.g. sampling and regression) of positivist research, that would enable the community to strengthen its own claims.

Secondly, new communities may coalesce as epistemological approaches, models, and exemplars are compounded and institutionally legitimized. An example of a nascent DM is the Design Science Research community. Design activities, products, and design models that existed in other guises were widely dispersed across communities (Indulska and Recker 2010; Kuechler and Vaishnavi 2008) and were difficult to place into the literature. A paper commissioned by a top journal (Hevner et al. 2004) consolidated prior knowledge into what has become a seminal exemplar, around which symbolic generalizations, academic practice,

illustrations, and the institutional force of journal special issues, conferences, and expertise have evolved. Notably, DSR has not subsumed other communities, nor does it represent a revolution in research thought; rather, it coexists with other communities and is becoming a legitimate approach to creating knowledge within the broader domain of socio-technical development.

Thirdly, our perspective invites a re-examination of social sciences like IS as scientific practices. IS is not subject to disruptive revolutions or the refutation of extant theories and exemplars, which characterize Kuhn's account of the natural sciences. It is reasonable to question why a diverse field like IS, composed of multiple communities (Indulska et al. 2011) with different disciplinary matrices, would progress in the same manner as a natural science. As a field largely defined by institutional organizations, IS is composed of intellectual communities and competing schools of thought, which are supported by identifiable sets of journals (Larsen et al. 2008), conferences, special issues, and special interest groups (SIGs). But argumentation within and between these communities does not have the force of crisis behind them that would overthrow or subsume other communities in the natural sciences; rather, argumentation expands the set of metaphysical orientations, models, and exemplars that coexist, compete (for journal and conference space, funding, and citations), and obtain 'partial communication' among members of differing communities. As a science, IS largely pursues a coherence (internally consistent) approach rather than a correspondence (to nature) approach.

Argumentation enables a disciplinary matrix to evolve through challenges, support, alteration, or addition to existing shared commitments. Argumentation may also counter and constrain such evolution. Here, the taken-for-granted role performed by journals can be seen as enacting magisterial authority (Toulmin 1970), a social-institutional aspect of argumentation that stabilizes and constrains change in a disciplinary matrix. When a DM is strongly held, editorial processes seek to shape papers into contributions which appeal to a broad research audience and are thus likely to be cited; however, integrating new exemplars, models (theories), and values, or building communities who share new sets of commitments (e.g. DSR, Data Science) are slow processes. The tendency to exclude novel or challenging ideas during the review process is therefore an area where study of the editorial magisterial authority practices may reveal opportunities for progress by changing the goals of specific outlets.

As argumentation is foundational to change and progress in scientific communities, we see additional opportunity to challenge the format of conferences and publications in IS. For example, the dialectic element invokes the claim that cogent arguments should stand up in open debate. Yet, as a field, few papers are debated or become the focus of a discussant; rather, they are commented upon and shaped by editors and reviewers in a process that is inaccessible by the wider IS community.

6 Conclusion

Persuading reviewers, editors, and the community at large that a piece of research makes a useful contribution to the research community and is worthy of publication requires forceful argumentation using logic, rhetoric, dialectic, and social-institutional dimensions to position the work; however, to date, much of the discourse around argumentation in Information Systems overly emphasizes the logic dimension of argumentation at the expense of the rhetoric, dialectic, and social-institutional. Expanding the role of argumentation in persuading others of the contribution of one's work is important, as in Information Systems and the social

sciences, more generally, manuscripts do not speak for themselves. To be evaluated as contributing to the shared disciplinary matrix of a community, authors must use all aspects of argumentation to construct the contribution against the background of existing knowledge.

Argumentation must be placed in the context of the shared commitments of the community to which the contribution is to be made. The often-referred to criteria of novelty and utility for assessing contribution (Hovorka and Boell, 2015, 2017) per se provide limited guidance to researchers in formulating argumentation to editors and reviewers for evaluating claims of contribution. Viewing contribution as involvement in an ongoing discourse will enable authors to problematize their research such that future researchers can more clearly adapt and translate the work in ways which inform new research. For a paper to be assessed as a contribution, the reviewers, editors, and readers must be persuaded that the paper improves the research discourse of the community. Thus, specific attention to the relation between elements of argumentation in a paper and elements of the disciplinary matrix of the community can persuade reviewers and editors of the contribution.

In our paper, we highlight that contributions can only be made in relation to the commitments held by specific communities. We put forward Kuhn's more developed concept of a DM to avoid the ambiguity and misappropriation of the word 'paradigm'. DMs are the "prerequisite of research, their grip on the mind is not merely 'Pickwickian' nor can it be right to say 'if we try, we can break out of our [disciplinary matrix] at any time'" (Kuhn 1970 p. 242). A DM is thus not a set of tools researchers use but rather the background understanding of a practice in which the researcher enrolls and is involved through reading exemplars, writing a dissertation, reviewing research by others, writing and referencing, and attending conferences. The worldview through which phenomena are disclosed and investigated, the kinds of problems that are relevant, applicable references, and appropriate methods and instruments of observation and measurement constitute the matrix of commitments upon which a community agrees. Recognition that the cogency of science results from all aspects of the matrix of commitments shared within and between communities sensitizes authors to the need for rhetorical and dialectic connections to the appropriate aspects of the scientific discourse. The focus on discursive and material argumentation and on the DM shifts the involvement in the discourse toward challenging, extending, contrasting, measuring, reproducing, or refuting shared commitments of the community.

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