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Abstract

This article showcases current best practices in quantitative organizational communication research. We emphasize their value in exploring issues of the day and their relation to other research approaches. Materials are presented around four themes: systematic development and validation of measures, including the use of mixed methods; multiple levels of analysis; the study of change and development over time; and relationships among people, units, organizations, and meanings.

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The purpose of this article is to provide a broad overview of potentials and possibilities for quantitative research in organizational communication. It will not delve in depth in any single method. That will be left for a series of articles to appear in this journal in the future. Instead, this article documents a nascent resurgence of quantitative methodologies in organizational communication research by considering the novel and powerful affordances a number of recent developments provide for scholars. It is based on our firm belief that the vitality of organizational communication scholarship depends both upon insightful and heuristic theory and upon rigorous and diverse methods. We argue, in short, that it is imperative to develop a vibrant quantitative research community for organizational communication research to continue to advance.

In so doing we do not mean to reignite the “paradigm wars” between quantitative and qualitative approaches that played out in the 1970s and 1980s among organizational communication scholars. We simply believe that there should be a greater recognition of the value of quantitative methods as a complement to the interpretive, critical, and discursive approaches.

Our view is that all carefully developed and rigorously applied methods afford scholars insights and understanding. We are in accord with Taylor and Trujillo (2001, p. 166), who in their review of qualitative research methods in organizational communication state that

it is relatively pointless to debate the merits of each approach in a qualitative-versus-quantitative type of debate. We agree with Miles and Huberman (1994) that “the quantitative-qualitative argument is essentially unproductive” and that there is “no reason to tie the distinction to epistemological preferences.” (p. 41)

This does not mean, however, that qualitative and quantitative methodologies generate equivalent types of knowledge and understanding. As Taylor and Trujillo (2001) emphasize “the different methods tap into different dimensions of organizational communication and . . . no one method has more privileged access to organizational ‘reality’ than any other” (p. 167).

This article addresses four opportunities afforded to organizational communication scholars by recent developments in quantitative methods. For

each we describe the opportunity and then offer some details on methods for taking advantage of it.

First, qualitative and critical studies have generated insightful theories, concepts, and findings that can be explored further and advanced using quantitative approaches. By this we do not mean a return to the old “prescientific function of rhetoric” (Bowers, 1968) viewpoint, which implies that qualitative studies discover phenomena that are then more definitively studied and “completed” using quantitative approaches (see Edmondson & McManus, 2007, for one argument along this line). Rather, the traditional strengths of quantitative research, including its conscious distancing of the investigator from the object of study through systematic development and validation of measures, study design, and statistical hypothesis testing, are useful in further exploring the validity and reach of qualitative findings, contextualizing qualitative studies, and generating further questions for qualitative research through reinterpretation and critique of the quantitative results. In addition, mixed methods, here briefly introduced by Karen Myers, offer a formal approach to combining qualitative and quantitative methodologies, thus capitalizing on the strengths of both.

Second, quantitative methods can enable systematic study of organizational communication phenomena across multiple levels of analysis. Miller (2001) describes the need for multilevel theory and analytics in organizational communication research across individual, work unit, organizational, and interorganizational levels. A key challenge is to determine the nature of influence across levels and which levels are the most important influences. Multilevel modeling (MLM), introduced by Hee Sun Park, offers a systematic method for sorting out the influences of levels and for testing for cross-level influences.

Third, quantitative methods can facilitate the study of change and development over time in organizational communication. Monge, Farace, Eisenberg, Miller, and White (1984) emphasize that organizational communication was first and foremost a process and should be studied over time through systems approaches. Studies of change and development have been hindered in the past by the need to use general linear model-based approaches which were not well suited for the study of change or process. In recent years, new approaches specifically designed for the study of processes of change and development have been developed (Poole, Van de Ven, Dooley, & Holmes, 2000). After a general introduction to some of these approaches, Monge, Lee, Fulk, Frank, Margolin, Schultz, Shen, and Weber discuss evolutionary and ecological models.

Fourth, quantitative methods enable organizational communication researchers to study relationships among people, units, organizations, and meanings. Organizations are inherently interconnected, and communication is what maintains these connections. Hence, a fruitful approach to the study of organizational communication is to map the networks linking members, units, and organizations. Long-available methods tend to yield descriptions of the network, hence the common description of network analysis as “a method in search of a theory.” In recent years new methods of network analysis have evolved that enable researchers to test for the presence of various generative mechanisms that shape networks and to model network evolution over time. These methods facilitate not only the mapping of linkages among various entities but also charting of semantic domains in organizations, enabling aspects of interpretive research to be studied in relation to network linkage models. Michelle Shumate discusses recent developments in network analytic methods.

These four developments, which have come to fruition in the past 15 years, set the stage for a reinvigorated quantitative wing of organizational communication research. They will enable organizational communication scholars to address issues that cannot be addressed by the interpretive, critical, and cultural approaches that have dominated recent organizational communication research and add a quantitative voice to conversations on key topics in current inquiry. We turn now to the four affordances of quantitative research in organizational communication.

I. Quantitative Approaches Afford a Systemic and Rigorous Complement to Interpretive, Critical, and Discursive Approaches

The hallmark of quantitative approaches is their grounding in systematic procedures that focus on assessing the strength, consistency, and generality of relationships posited by organizational communication theories. This seems obvious at first glance. It is, after all, at the foundation of every argument in favor of quantitative methods. But it is also the basis for rejection of quantitative inquiry by interpretive, critical, and discursive scholars, who contest the possibility of generalization.

The argument for rejecting quantitative approaches is grounded in a dichotomous view of research methods that divides them into positivistic and interpretive-critical, with a clear dividing line (not to be crossed) between them. There is, however, another way to look at methods, as the advocates of

mixed methods have shown: Methods of different types can be blended so long as we remain judicious concerning their assumptions and aware of the limitations of what various methods can establish.

At the heart of the purported divide between quantitative and interpretive-critical approaches is the claim that the positivist approach commonly associated with quantitative analysis cannot adequately illuminate social construction, which is variable across time and space, multilayered, and processual. Miller (2000), however, notes that most quantitative scholars today can best be characterized as post-positivists (Phillips, 1987, 1990). Post-positivism recognizes the flaws in classic positivism and acknowledges social construction but also assumes that knowledge can best be gained through search for regularities and causal relationships among components of the social world. As Miller (2000, p. 59) notes, post-positivism is consistent with social constructionism in two ways. "First, many post-positivists would argue that the *process* of social construction occurs in relatively patterned ways" that are amenable to scientific investigation. Second, "social constructions are regularly 'reified' and treated as objective by actors in the social world," and these reifications give rise to regularities that can be studied scientifically.

Quantitative approaches can advance organizational communication research precisely because of the unique stance they require the researcher to take and the system of restrictions they place on the process of inquiry. Unlike interpretive, critical, and discursive approaches, which allow the investigator freer play and are not particularly amenable to systemization, quantitative researchers willingly abide by rules (see Kerlinger, 1986) that are designed to prevent them from reading themselves or their idiosyncratic preconceptions into the object of study. These rules are explicitly articulated and shared by the community of quantitative scholars, who are constantly interrogating and critiquing their and others' methods and conclusions. This body of rules is constantly growing as a function of the advance of methodology and critique of past and current research practice. The result is a purposeful community of scholars that self-consciously attempts to achieve a univocal way of *generating and validating* knowledge claims. Note that we are referring here to a univocal view of the process of inquiry, not to some universal system of knowledge. There is wide recognition among quantitative scholars that agreement about substantive conclusions on the same order as those achieved in natural or biological sciences is impossible due to differing theoretical frameworks.

Two critical elements that contribute to the rigor of quantitative approaches are careful attention to the explication and measurement of constructs and representative sampling. We discuss them briefly below, with special attention to challenges for organizational communication research. Following

this, Karen Myers addresses mixed methods, which coordinate quantitative and qualitative approaches. The mixed methods approach has become increasingly articulated in the past decade, and we believe it offers a useful way to work through how quantitative and qualitative approaches can complement one another.

Measurement

A hallmark of quantitative inquiry is careful attention to the explication and measurement of constructs. The steps of construct development are widely known (Nunnally, 1978; Schwab, 1980) and can be articulated through definitions of associated terms. Concepts, the starting point, are expressions of phenomena formed by observing behaviors. Constructs are invented terms to describe and assign meaning to phenomena. Researchers define the principal elements embedded in constructs and theorize how one construct relates to another in conceptualizations. In operationalization, researchers seek precise indicators for each principal element, and multiple indicators are usually required to capture the diversity of each element. Some constructs are conceived as unidimensional and others as multidimensional (Hunter, 1980), but each dimension will have its unique set of indicators. Finally, a “measure is an observed score gathered through self-report, interview, observation, or some other means” (Edwards, 2003, p. 313).

To move through these steps there are systematic methods for assessing the reliability and validity of the measure. Construct validity refers to the “correspondence between a construct and a measure taken as evidence of the construct” (Edwards, 2003, p. 329) or the extent to which “a measure assesses the concept it is designed to assess” (Miller, 2001, p. 145). An important tool to assess convergent and discriminant validation is factor analysis. Both exploratory and confirmatory factor analysis provide insights into scale items’ associations with a construct or factor (Miller, 2001). Many researchers prefer confirmatory factor analysis (e.g., Hunter, 1980; Hunter & Gerbing, 1982; Miller, 2001) due to its ability to identify items not loading on the anticipated factor and to provide statistical data on the overlap to other variables. However, each sample has unique characteristics and responds to measurement instruments in potentially novel ways, and researchers should perform factor analyses on all scales, even established ones, with each sample (Edwards, 2003; Levine, 2005; Levine, Hullett, Mitchell Turner, & Lapinski, 2006; Seibold, 2009).

Second, reliability rests with research participants’ interpretation of measurement instruments. A survey instrument is not reliable on its own merits,

so reliability must be established and reported with each sample (Thompson & Vacha-Haase, 2000). Third, researchers should specify (and test) the construct's basis at individual-, group- or unit-, and organization-levels as the referent or phrasing of an indicator can shift a participant's response (Schwarz, 1999). Referent or level distinctions have important implications for the aggregation of data and interpretation of findings (Klein, Dansereau, & Hall, 1994; Klein & Kozlowski, 2000). Scale items developed at the individual level may be aggregated, analyzed, and interpreted at the group level *if* researchers determine systematic response differences to be between groups rather than individuals (van Mierlo, Vermunt, & Rutte, 2009). In short, researchers must test their data before they are aggregated and interpreted at a "higher" level.

In addition to evaluating reliability and validity, it is important to rule out validity threats related to measurement. As an example, consider common method variance, which is a concern when a study uses a single method (e.g., a survey questionnaire) in a single setting. When all data are collected with survey instruments at one point in time, the correlations between measures reflect shared method and trait variance (Spector, 1992, 2006), and an inflation of observed relationships between measures can occur (Campbell & Fiske, 1959; Cook & Campbell, 1979; Doty & Glick, 1998; Fiske, 1982). Recommended steps to limit as well as to assess whether common method variance is biasing findings include conducting a confirmatory factor analysis on all variables, using multiple methods (e.g., survey and actual performance data), multiple sources (e.g., sampling supervisors and employees), and longitudinal designs (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003; Richardson, Simmering, & Sturman, 2009; Scandura & Williams, 2000; Wagner & Gooding, 1987).

Finally, continual construct specification, testing, and refinement are essential to the growth of a burgeoning field. Recent reviews of published self-report measures in group and organizational communication (Downs, DeWine, & Greenbaum, 1994; Seibold, 2009) offer a starting point for "thinking through" (Edwards, 2003; Pedhauzer & Schmelkin, 1991) each study and assessing the quality of measures. Furthermore, debates regarding the measurement of organizational communication constructs have raised awareness of measurement issues and problems. For example, confirmatory factor analytic techniques helped identify problems with the Organizational Identification Questionnaire, including the "moratorium" on its use called for by Miller, Allen, Casey, and Johnson (2000). In turn, the conceptual and measurement advances in the assessment of this prominent but challenging construct (Fontenot & Scott, 2007) have aided scholars in that area. Such

advances underscore what Miller and colleagues (2000) emphasize is the foundational character of social science: evaluating previous findings and developing refined or new measures to extend them.

Sampling

What kind of sample would best provide a representation of the phenomena being investigated? A “sample consists of a subset of elements from the population selected according to a sample design, which specifies the rules and operations by which the sample is to be chosen from the population” (Pedhauzer & Schmelkin, 1991, p. 319). There are many reasons for researchers to select their sample carefully, including the need to gather data from or observe individuals who experience the phenomena, who are representative of the ideal population, and who can be observed or convey the sought information. Seminal works on sampling (e.g., Kish, 1965; Sudman, 1976) provide directives on identifying appropriate samples. The overarching aim is to obtain a sample whose responses can be generalized to other similar organizational members and settings and whose responses satisfy the randomness required of subjects assigned to experimental conditions or that fulfill the requirements of probability statistics (Kerlinger, 1986; Nunnally, 1978; Pedhauzer & Schmelkin, 1991).

A key concern in organizational communication research is that sampling a single intact organization or units from a single organization actually represents a “case study,” which lacks generalizability to other organizational contexts (Schwab, 1999). Any set of responses from members of a homogenous culture or specific industry, where the distribution on behaviors and attitudes are skewed, both restricts the range of potential responses and the value for application to other settings. A general rule of thumb recommends that researchers provide information on response rates and follow-up procedures, the sample representativeness to other organizations (or even the representativeness of scale responses to known normative data on that scale), demographic characteristics of the sample, and comparisons between respondents and the target population (Mitchell, 1985).

Two recent practices, snowball convenience and non-random Internet sampling, exhibit possible problems. In snowball convenience sampling, subjects are rewarded for recruiting additional subjects through friendship or work networks. Snowball samples may be helpful in pilot testing instruments (Sudman, 1976) or in gaining access to participants who are reluctant to discuss sensitive organizational issues (e.g., theft, harassment). However, a convenience sample is *not* advisable because (a) the sample is difficult to duplicate; (b) it is

susceptible to selection bias; (c) participants' responses are disconnected to the organizational context; (d) variance in responses can not be linked to variance or confidence intervals in the target population; and (f) the procedure may favor particular local industries or socio-economic strata (Mitchell, 1985; Schmitt & Klimoski, 1991). Similar problems are inherent in non-random Internet sampling, where individuals respond (often in return for pay or coupons) to surveys. In this case, researchers contract with a provider with a database. Researchers can specify their desired relevant strata (e.g., industry, country). While this technique typically offers (for a price) a wider array of respondents, the resulting samples also lack randomness, authentication, and duplication. In such cases, the burden of proof rests on researchers using non-random Internet sampling to show how their sample approximates the target population.

Given these shortfalls, it is a good idea to avoid snowball convenience samples and non-random Internet samples. In cases where these techniques represent viable ways to obtain sensitive or "difficult" data, researchers must show how their sample relates to the target population and how variable scores differ between these samples and normative data.

Up to this point, we have considered the issues of measurement and sampling in terms of the advantages quantitative approaches offer. However, research need not be wholly quantitative; a growing trend is to blend quantitative and qualitative methods. While this blending has often been done in an ad hoc and improvisational manner, a body of scholarship on the systematic combination of quantitative and qualitative approaches has been developed over the past 15 years. In the next section, Karen Myers describes recent advances in mixed methods.

Mixed Methods

Contributed by Karen Myers

The terms multi-method and mixed methods research often are used interchangeably. However, *The Journal of Mixed Methods Research* editorial page defines mixed methods research as "research in which the investigator collects and analyzes data, integrates the findings, and draws inferences using both qualitative and quantitative approaches or methods in a single study or program of inquiry." In contrast, multi-method research is a broader term referring to research conducted with two or more types of data collection, which can involve two or more types of quantitative or qualitative data, but often within one theoretical perspective (Brewer & Hunter, 2006). Mixed methods research also has been called a hybrid or the third methodology (Creswell &

Plano Clark, 2007) because the two types of data enable researchers to enhance understanding when the study is guided by sequential data collection or when different types of data allow for a more complete understanding of the phenomenon (Erzberger & Kelle, 2003). As a result, mixed method studies typically include multiple hypotheses or research questions, and often both.

Interest in mixed method research dates to the 1950s, when Campbell and Fiske (1959) advocated for collection of multiple forms of data on the grounds that two types of (quantitative) data would enable researchers to triangulate findings. Interest in mixed methods grew in the 1970s and 1980s as qualitative research gained popularity (Denzin & Lincoln, 2005). Qualitative researchers saw advantages to combining both quantitative and qualitative methods. Extending or supplementing studies, often to test hypotheses derived from qualitative findings, gave their research more credibility with traditional quantitative researchers (Denzin & Lincoln, 2005).

This third method continues to gain acceptance, as evidenced by a handbook dedicated to various issues related to mixed methods research (*Handbook of Mixed Methods Research*), a journal dedicated to mixed methods studies (*The Journal of Mixed Methods Research*), and journals in several disciplines (e.g., *Annals of Family Medicine*, *Journal of Counseling Psychology*, *Journal of the American Medical Association*) that have devoted all or parts of issues to mixed method research. In addition, mixed methods have gained acceptance by major funding agencies, including the National Science Foundation, the National Institute of Health, and private foundations such as the Robert Wood Johnson Foundation and the W. T. Grant Foundation.

Mixed methods enable researchers to overcome shortcomings of individual methods and to break down the confines of traditional perspectives. First, mixing methods avoid the limitations of solely quantitative or qualitative methods. While quantitative studies (surveys, experiments) have been criticized for not considering context and for not giving participants a voice, qualitative studies (interviews, focus groups, observation) often are discounted for potential researcher biases, smaller sample sizes, and lack of generalizability (Altheide & Johnson, 1994).

Mixed methods research also enables researchers to draw on multiple philosophical and ontological assumptions (Tashakkori & Teddlie, 2003). Mixed methods are conducive to integrating a positivist view of an objective reality but also the multiple, socially-constructed interpretations posited in interpretivism (Greene & Caracelli, 2003; Morgan, 2007). However, Onwuegbuzie and Teddlie (2003) caution that mixed methods, or any methods, should not be dictated by a researcher's epistemology or by a desire to use particular methods. Rather, methods should be guided by the purpose of the research.

Morgan (2007) argues that due to *a priori* assumptions, positivistic and interpretive perspectives restrict research and the understandings that can be gained. He proposes a pragmatic approach to research instead, allowing the methods “to connect issues in epistemology with issues in research designs” (p. 68). Meanings are constituted through thought and social interaction (Maxcy, 2003); rather than designing the study with guiding theories, pragmatists first consider the purpose of the study and the complexities of social phenomenon as the guiding force. Methods are chosen that best enable the investigation of the given phenomenon (Morgan, 2007).

Researchers may be reluctant to use mixed methods, and those who do often do not report them as mixed methods studies. A primary reason for not employing mixed methods is that often researchers operate from firmly entrenched paradigms and studies in those paradigms privilege certain methods (Greene & Caracelli, 2003). Researchers, who might be attracted by the advantages offered by mixed methods, choose not to attempt them because they lack training in the necessary methods (Morgan, 2007). On the other hand, some researchers conduct mixed methods studies, but they make no attempt to integrate their data, instead choosing to publish only one part, either the quantitative or qualitative findings, or, they publish both, but in different reports (Greene & Caracelli, 1997). Bryman (2007) argues that many researchers retain their preference for one method or the other so the secondary method becomes back-grounded and non-essential. In these situations, the researcher may find the primary data more interesting and more *marketable* to journals. Bryman adds that researchers are reluctant to report their mixed method study as such because they consider it a daunting task. The assumptions associated with each method are very different, and ways of presenting data may not easily mesh. Furthermore, researchers may not publish mixed methods studies because they believe that audiences for quantitative and qualitative research are quite different, and/or that journals prefer one methodology or the other. Finally, not publishing mixed methods studies may simply be related to time: One phase of the research is often completed before the other or is quicker to analyze (Bryman, 2007).

Despite these issues, integrating data derived from mixed methods studies offers considerable advantages. Erzberger and Kelle (2003) suggest that mixed methods can do more than converge or triangulate findings but can offer complementary findings that supplement or counter the other. For example, Brewer and Hunter (2006) provide a description of crime statistics using various data gathering methods that offer vastly different results. Their example demonstrates the advantages of research that employs additional methods and multiple data sets to better understand the phenomenon.

Mixed methods have been utilized in investigations of organizational communication. In studying emotions and burnout among financial planners, Miller and Koesten (2008) examined emotional labor and emotion work (i.e., emotions that result from interaction in the course of doing one's job), which has been associated with stress and burnout. Five thousand randomly selected planners were invited to participate in the Web-based survey, resulting in 299 respondents. The survey included quantitative measures that enabled the researchers to test hypotheses related to emotional labor, emotion work, job satisfaction, and burnout (Miller, Birkholt, Scott, & Stage 1995; Miller, Stiff, & Ellis, 1988). Next, the researchers re-contacted 14 participants and conducted semi-structured telephone interviews to gain deeper understanding of the emotions and communication that are a part of financial planners' work. For example, qualitative interview data illuminated two quantitative findings from the first phase of the study: Emotion contagion was not a predictor of several outcome variables, but communicative responsiveness was a strong predictor of reduced personal accomplishment (a burnout factor). Respondents explained that it was the communicative relationships with clients that attracted them to the profession. They described the satisfaction they experience working with clients, helping to make a difference in their clients' lives and in the lives of their children, but they also talked about the burnout they experience when they share in their clients' disappointments. Although the quantitative portion of the study was the central focus, the qualitative data contextualized and provided deeper meaning to the relationships found in the survey results. Other examples of mixed methods research in the organizational communication area include Marshall and Stohl's (1993) investigation of worker participation, Myers and Oetzel's (2003) creation and validation of an organizational assimilation scale, and Papa, Mohammad, and Singhal's (1997) study of Bangladesh's Grameen Bank and its loan recipients.

Researchers interested in conducting mixed methods studies should consider several issues before and during their investigations and in writing resulting reports. First, Bryman (2007) suggests researchers critically evaluate how their study would benefit from mixed methods. Will the multiple methods be used in unison or sequentially to come to a greater understanding of the phenomenon under investigation? Will the multiple types of data create a synergy that could not be achieved without the use of mixed methods? If not, the research design should be reconsidered, including whether mixed methods will benefit the study.

Second, many researchers who attempt mixed method studies find integrating analysis and interpretation of both types of data to be their biggest challenge. One solution is to find model articles that are similar to one's

own study. Another option is to consider how the quantitative data inform the qualitative study and findings, and vice versa. If the findings from one type of data can potentially modify and shape the collection of the other, findings are often best reported in that sequence, but with an additional section that integrates the findings, often organized by topic. Conversely, when quantitative and qualitative data are collected simultaneously, or when the data sets are collected to converge or triangulate findings, results might more logically be blended (with topics or constructs related from both quantitative and qualitative data). Greene (2007) provides an extended discussion of various study designs and means of data reporting.

Finally, consider journal space limitations. Multiple sets of data usually require longer methods descriptions as well as more space to report findings, particularly if they are presented sequentially. Economy of expression will be vital in these instances.

2. Quantitative Methodologies Afford Scholars Ways and Means for Systematic Study of Organizational Communication Phenomena Across Multiple Levels of Analysis

The macro–micro relationship has long been a focus for quantitative and qualitative researchers alike (Knorr-Cetina & Cicourel, 1981). Scholars who favor a macro approach tend to either look to larger scale social phenomena like institutions to set parameters for individual action (e.g., Lammers & Barbour, 2006) or assume that macrolevel properties can be assembled by aggregating individual-level properties. Scholars who favor a microlevel approach tend to explain macrolevel properties as emergent from individual actions and interactions (e.g., Tracy & Standerfer, 2002). In other words, each set of scholars tends to favor one level over another. Another approach is to acknowledge that there are multiple levels, that the different levels might be more important depending on the context, and that more than one level might operate at any time. A number of interpretive and critical organizational communication scholars have developed theories and conducted qualitative studies based on this premise (e.g., Cooren, 2000; McPhee & Zaug, 2009; Poole & DeSanctis, 1990; Taylor, 1993).

A key limitation of the qualitative study of multilevel organizational communication phenomena is the difficulty of sorting out the relative influence of the levels on each other. While qualitative study can establish interlevel relationships, it is difficult to address questions such as: Does a higher level

phenomenon relate to the individuals in a lower one uniformly? Are there differences in how individuals at the lower level affect those at a higher level? To what degree do individuals share or agree on a higher level phenomenon? What is the impact of changing contexts on interlevel relationships?

Developments in multilevel analysis during the past 20 years make it possible to address these questions rigorously and with some precision. They make it possible to assess the degree of consensus about “shared” interpretations or meanings and to test hypotheses about interlevel relationships. They also help us address a key problem that has dogged organizational communication research, the problem of interdependence among subjects. Most classical statistical methods assume that each datapoint (subject or observation) is independent of every other one. However, because they have a history of prior relationships and interaction and experience a common culture, this is not a particularly tenable assumption about participants drawn from the same organization. Multilevel analysis makes it possible to assess the degree of interdependence among participants within the same organization and incorporates interdependence into the statistical analysis. It also enables us to determine if there are differences across organizations, if we collect data from more than one organization.

Multilevel analysis thus enables organizational communication researchers to specify and test theories of interlevel relationships. Hence, it offers the possibility of extending interpretive and critical theories. In the following section, Park describes multilevel analysis for organizational communication research.

Multilevel Analysis

Contributed by Hee Sun Park

Conventional wisdom suggests that theory should guide methods. However, when improper methods are used and/or currently available methods have limits, organizational communication can be “bound theoretically by methodology” (James, Joyce, & Slocum, 1988, p. 131). On the other hand, newly developed and available methods can make more sophisticated theorizing possible. Development in data analytic techniques and statistical software for MLM analysis makes it possible for scholars to examine the complexities of the hierarchical nature of organizational communication. Individuals are nested in organizations in such a way that individual members of an organization interact with one another and can show some amount of non-independence in some variables of interest. This multilevel characteristic of individual members and organizations can pose a problem for measurement and data analysis in terms of units of analysis. A single-level analysis focusing

only on the individual-level data would be insufficient because it neglects the influence of the organization-level variables. Popularly used inferential statistics such as analysis of variance and multiple regression analysis are inappropriate for analyzing data collected from individuals nested in organizations because the statistical assumption of independent observations is violated. When a single-level analysis focuses only on the organization-level data, statistical power is reduced and individual differences are smoothed over.

MLM models both individual-level and organization-level variables simultaneously. Regressing individual-level criterion variables on organization-level variables, enables researchers to explain non-independence in a criterion variable. A simple form of MLM involves organization-level (level-2) independent variables, individual-level (level-1) independent variables, and a dependent variable measured at the individual level. There are a number of statistical packages available for conducting MLM, including specific software like HLM (Raudenbush, Bryk, Cheong, Congdon, & DuToit, 2004) and routines within general purpose statistical software such as SAS and SPSS.

Not all organizational communication phenomena need to be examined at multiple levels. In some cases, theory specifies that only the organizational or individual level is relevant. This assumption can be tested empirically by examining the intraclass correlation (ICC) to see what proportion of the variance in the criterion variable can be attributed to the organization level versus the individual level. If the ICC on a dependent variable shows little variance at the organization level, it may indicate that individuals' scores are independent of one another. If, on the other hand, the ICC points to a meaningful amount of variance in the dependent variable attributable to the organization level, both organization-level and individual-level predictors can be included in the multilevel model to explain the organization-level and the individual-level variance, respectively, in the criterion variable. Table 1 illustrates the steps for the simplest form of a MLM that includes an individual-level independent variable, a group-level (i.e., an organization-level) independent variable, and an individual-level dependent variable.

In some cases, the individual's value on a variable is of interest, but in other cases it is the individual's degree of deviation from the organizational mean on a variable. For example, when we are investigating the impact of communication (broadly construed for purposes of illustration) on individual satisfaction, if we expect that more communication will increase satisfaction, we would be interested in each individual's level of communication in its own right. However, if we expected that individuals who have much lower than average communication are likely to be dissatisfied, while those with average or much higher levels of communication will be satisfied,

Table 1. Basic Steps for Conducting a Multilevel Modeling Analysis

- 1 Check the extent to which the within-group level variance and the between-group level variance comprise the total variance in the dependent variable.
- 2 Calculate the ICC on the individual-level dependent variable.
- 3 Check the size of ICC and the significance level to see if an MLM is appropriate.
- 4 For testing individual-level interactions and group-level interactions, check your choice of MLM software and see if it is necessary to create the individual-level interaction variable (e.g., two individual-level independent variables multiplied with one another) and the group-level interaction variable (e.g., two group-level independent variables multiplied with one another) before using MLM software. MLM software such as HLM can test cross-level interactions by specifying a group-level variable as the predictor for the effect of an individual-level independent variable on the dependent variable.
- 5 When including the individual-level independent variable, choose one of three options: (a) using the group-mean centering; (b) using the grand-mean centering; or (c) not using any centering method.
- 6 When including the group-level independent variable, choose one of two options: (a) using the grand-mean centering or (b) not using any centering method.
- 7 After checking the coefficient and significance level of the individual-level independent variables, calculate the extent to which the individual-level independent variable accounts for the within-group level variance in the dependent variable.
- 8 After checking the coefficient and significance level of the group-level independent variables, calculate extent to which the group-level independent variable accounts for the between-group level variance in the dependent variable.
- 9 Present the final model of a MLM analysis by explaining the roles of each independent variable in predicting the dependent variable.

Note: MLM = multilevel modeling; ICC = intraclass correlation. This model applies for the simplest form of a MLM that includes an individual-level dependent variable, an individual-level independent variable, and a group-level (i.e., an organization-level) independent variable. A group-level and an organization-level designation are used interchangeably here.

then we are interested in the deviation of the individual from the average amount of communication. In this latter instance, best practice in MLM suggests that the independent variable should be centered by subtracting its value from the mean value for the organization. For any given predictor, an organizational mean is calculated by averaging scores of individual members of an organization. If a study includes individual members of 30 organizations in the sample, the study has 30 organizational means. For example,

if Amy's score on a predictor is 3 and the mean of everyone's scores in her organization ABC is 4, Amy's score becomes 1. If Ben's score on the same predictor is 3 and the mean of everyone's scores in his organization XYZ is 1, Ben's score becomes -2 . It is also possible to center around the grand mean in a sample, the average of individuals' scores in the entire sample regardless of their organizational membership. Creating a grand-centered predictor means that individuals' scores on the predictor become deviation scores from the entire sample mean. For example, if an individual's score on a predictor is 3 and the mean of the entire sample is 5, that individual's score becomes 2.

Because centering a predictor around its organizational mean involves transforming individual scores into deviation scores from their corresponding organizational mean, whether individual deviation scores have practical or theoretical meaning needs to be clarified. Because no one centering method is inherently superior to the others, it would be beneficial for researchers to be well aware of the theoretical and statistical implications of the different centering methods (Hofmann & Gavin, 1998; Hofmann, Griffin, & Gavin, 2000; Kreft, 1995; Kreft & de Leeuw, 1998; Kreft, de Leeuw, & Aiken, 1995; Longford, 1989; Paccagnella, 2006; Park, 2008; Park, Eveland, & Cudeck, 2008; Plewis, 1989; Raudenbush, 1989a, 1989b; Raudenbush & Bryk, 2002).

It will be useful to consider a specific example. A multilevel analysis of data collected from 618 employees of 47 companies will be used to demonstrate how to analyze and interpret MLM results with HLM. The analysis of this data set is exploratory in nature and presented here for the purpose of illustrating how MLM works. The organization-level independent variable is institutional support provided to employees, a dichotomous variable for which each organization is characterized as either high or low in institutional support. In terms of individual-level independent variables, 618 employees indicated the extent to which they endorsed employer directive and smoking behavioral regulation. Employer directive was measured with two items ($\alpha = .92$; e.g., "An employer has the power to tell employees what to do."). Smoking behavior regulation was measured with two items ($\alpha = .96$; e.g., "An employer has the right to tell employees not to smoke."). All the measures used a 7-point format (1 = *strongly disagree*, 7 = *strongly agree*). The dependent variable was individual employees' attraction toward their organizations, which was measured by five items ($\alpha = .91$) adapted from Highhouse, Levens, and Sinar's (2003) organizational attraction scale (e.g., "For me, my current workplace is a great place to work"). It was hypothesized that organizational support (level-2 predictor), employer directive (level-1 predictor),

and smoking behavior regulation (level-1 predictor) were related to the employee's attraction to the organization (a level-1 dependent variable).

The first step in MLM is to partition the total variance in organizational attraction into individual-level and organization-level components. In this case, the organization-level variance in organizational attraction is significant (variance = 0.59, $\chi^2(46) = 424.28, p < .001$). The ICC for organizational attraction is .39, indicating that 39% of the explainable variance in organizational attraction is between organizations and 61% is between individuals. Since this indicates that a good portion of the total variance in organizational attraction is at the organization level, organization-level predictors can be introduced to explain the organization-level variance of organizational attraction. Individual-level predictors are also added to the multilevel model to explain the individual-level variance in organizational attraction.

When adding individual-level predictors to the model, it is necessary to decide which centering method to use for each individual-level predictor. HLM provides the following three options for individual-level predictors: add a variable uncentered; add a variable group-centered; or add a variable grand-centered. Adding an uncentered independent variable means that researchers are keeping the original measurement metric. Adding a group-centered independent variable means that individuals' scores on the predictor are transformed to be deviation scores from their organizational mean. Centering individual-level predictors around their corresponding organizational means enables the analysis to separate within-organization and between-organization effects and to test for cross-level interactions (see Park, 2008, for a detailed discussion and illustration of different centering methods).

When a multilevel model includes two individual-level independent variables, the model creates three level-2 variables: one level-1 intercept and two level-1 slopes. For the data set analyzed here, the level-1 intercept is the organization-level organizational attraction (conditioned on employer directive and smoking behavior regulation being zero) that can vary across the 47 organizations. In this case, the level-1 intercept for organizational attraction ranged from 3.30 to 6.54 across 47 organizations. When the variance of the 47 level-1 intercepts is calculated, it differs significantly from zero ($\chi^2(46) = 466.23, p < .001$). This indicates that organization-level predictors should be introduced to the model to explain the variance in the organization-level organizational attraction.

One level-1 slope pertains to the effect of employer directive on the individual-level variance in organizational attraction; another level-1 slope pertains to the effect of smoking behavior regulation on the individual-level

variance in organizational attraction. With 47 organizations in the data set, there are 47 level-1 slopes for each individual-level predictor. In some organizations, the effect of employer directive is negative or slightly positive, whereas in many other organizations, it is positive. When the 47 level-1 slopes are averaged, employer directive (added to the model as a group centered individual-level predictor) has an effect of 0.18 ($t(46) = 5.44$, $p < .001$). That is, the effect of employer directive on organizational attraction significantly differs from zero across 47 organizations. When the variance of the 47 level-1 slopes is calculated, however, it is not significantly different from zero. That is, the effect of employer directive on organizational attraction does not differ substantially across 47 organizations. This indicates that there is no need to include an organization-level predictor in the model to explain the variance in the effect of employer directive on organizational attraction.

On the other hand, smoking behavior regulation (added to the model as a group-centered individual-level predictor) has an effect of only 0.008 ($t(46) = 0.28$, $p = .78$). But this seems to be due to differences across organizations. When the variance of the 47 level-1 slopes is calculated, it is significantly different from zero ($\chi^2(46) = 65.25$, $p = .03$). For the effect of smoking behavior regulation on organizational attraction, the slopes range from -0.56 to 0.49 across 47 organizations. When the 47 slopes are averaged, the negative and positive slopes cancel one another out and the effect of smoking behavior regulation becomes nearly zero, as noted earlier. The significant variance in the effect of smoking behavior regulation indicates that an organization-level predictor should be included in the model to explain why the effect of smoking behavior regulation on organizational attraction varies across the 47 organizations.

The organization-level predictor, institutional support, is included in the model as a predictor of the organization-level organizational attraction (as the level-1 intercept). The organizational average of employee directive and the organizational average of smoking behavior regulation are included as organization-level predictors of the level-1 intercept to examine between-organization effects of employee directive and smoking behavior regulation on organizational attraction (see Park, 2008, for a discussion of separating within-group/organization and between-group/organization effects when using group-mean centered predictors). Institutional support was a positive and significant predictor (coefficient = 0.66, $t[43] = 3.13$, $p = .004$). Employees who belong to organizations high in support report greater attraction toward their organizations than those who belong to organizations low in support. The organizational average of employee directive is a positive and significant predictor (coefficient = 0.30, $t[43] = 3.11$, $p = .004$), but the

organizational average of smoking behavior regulation is not a significant predictor (coefficient = -0.02 , $t [43] = -0.21$, $p = .44$).

These findings, paired with the aforementioned results about the significant effect of employee directive and nonsignificant effect of smoking behavior regulation on individual-level organizational attraction, indicate that the effects of employee directive and smoking behavior regulation on organizational attraction seem consistent within organizations (individual level) and between organizations (organization level).

Institutional support is included as a predictor of the effect (level-1 slope) of smoking behavior regulation on the individual-level organizational attraction. To assess this, a cross-level interaction is tested in such a way that an organization-level predictor is expected to moderate the individual-level relationship between a predictor and the dependent variable. One hypothesis is that when organizations provide high institutional support, smoking behavior regulation is positively related to organizational attraction, possibly because employees may perceive employers telling employees not to smoke as employers demonstrating care (e.g., to protect employees from second-hand smoke). On the other hand, when organizations provide low institutional support, smoking behavior regulation is negatively related to organizational attraction, possibly because employees may perceive the employer telling employees not to smoke as an infringement on private behaviors. Inconsistent with this expectation, however, the results show that institutional support is not a significant predictor (coefficient = 0.01 , $t [45] = 0.27$, $p = .79$). Although there may be other organization-level variables that can explain variation in how smoking behavior regulation is related to the individual-level organizational attraction, this data set does not contain them, unfortunately. So, at this point, it remains for future research to uncover the explanatory organization-level variables that can explain why the relationship between individuals' endorsement of smoking behavior regulation and their organizational attraction is positive in some organizations, but negative in others.

As the example illustrates, MLM enables rigorous and sophisticated inquiry that takes multiple levels of organizational communication into account. It provides the tools to address systematically questions related to uniformity of influence of higher level constructs on individuals and groups on a lower level, to the degree of "sharedness" of attitudes, orientations and meanings among individuals and across organizations, and to whether higher level constructs have sufficient effects to warrant inclusion in our theories. MLM is increasingly being employed in organizational communication research (e.g., Myers & McPhee, 2006) and has the potential to complement qualitative inquiry in significant ways.

3. Quantitative Methodologies Afford Scholars Approaches for the Systematic Study of Change and Development Processes in Organizational Communication

That communication is a process is one of the central assumptions of the organizational communication research (e.g., Krone, Jablin, & Putnam, 1987). Nicholas Rescher (1996; also see Teichmann, 1995) offers a succinct and inclusive definition of process:

A process is a coordinated group of changes in the complex of reality, an organized family of occurrences that are systematically linked to one another either causally or functionally. . . . A process consists in an integrated series of developments unfolding in joint coordination in line with a definite program. Processes are correlated with occurrences or events: Processes always involve various events, and events exist only in and through processes. (p. 38)

In an article that has been influential in organizational communication research, Monge et al. (1984) offer an observer-oriented definition of process: "A pattern that is seen in reference to time is called a process" (p. 22). This second definition suggests that process is a concept that captures aspects of change, such as the transmission of a message from one person to another or the diffusion of an innovation through communication networks.

Given the recognized role of process in organizational communication, there has been much less research on the communication process per se than one would expect. Monge et al. (1984) concluded that, as of the early 1980s, actual research on processes was remarkably sparse. During the succeeding 20 years, this has continued to be the case.

Monge et al. (1984) traced the lack of process research to three factors: "methodological determinism, the inaccessibility of process techniques, and the perceived scope of effort required from the researcher" (p. 28). They argue that the experimental and survey methods that dominated empirical communication research at the time were ill-suited to process research, that techniques like time series analysis and Markov analysis were seen as esoteric and difficult, and that gathering longitudinal data was sufficiently time-consuming and difficult as to discourage process studies. The ensuing 25 years has seen additional quantitative analytical techniques for process research.

A lack of methodological tools is certainly among the reasons for the dearth of research on communication processes. Just as important, however, has been

a lack of theoretical models and guidelines for the development of theories of communication processes. A number of process theories of organizational communication have been advanced (Bryant & Monge, 2008; Corman & Scott, 1994; Monge, Heiss, & Margolin, 2008; Poole & DeSanctis, 1990; Poole & Roth, 1989) and methods have been articulated to facilitate characterization of processes and testing of process theories (Poole et al., 2000).

Mohr (1982) originally differentiated variance and process approaches in social scientific research, and Poole et al. (2000) extended his distinction to incorporate multiple developmental models. In general terms, a *variance theory* explains change in terms of relationships among independent variables and dependent variables, while a *process theory* explains how a sequence of events leads to some outcome. Variance theories are centered on the variables that explain a dependent variable, whereas process theories are centered on events that unfold over time.

Process explanations may include (a) an account of how one event leads to and influences subsequent events (e.g., events of type A have a .7 probability of being succeeded by events of type B and a .3 probability of being succeeded by events of type C); (b) an explication of an overall pattern that generates the series (e.g., the process develops in three stages, A, B, and C); (c) an explication of the generative mechanism that drives the process (e.g., emergence of norms in interaction is a function of evolutionary processes whereby random variations in current norms are tested and selected in group interaction and preserved through repetition); or (d) preferably, two or more of the above (in which case the connections among them should be articulated).

Process theories may incorporate several different types of explanatory factors, including critical events and turning points, contextual influence at various points in the process, formative patterns that give overall direction to the change, and causal factors that influence the sequencing of events. Processes are typically explained by developing a theoretical narrative that accounts for the unfolding of the process.

Van de Ven and Poole (1995) distinguished four basic types of process theories: (a) life cycle, whose theoretical narrative posits that the entity under study (a decision or an organization, for example) develops by passing through a set sequence of stages; (b) teleological, which posits that change develops through the formation of intentions and plans in response to a perceived problem; (c) dialectical, which posits a narrative in which change is the product of conflict between thesis and antithesis or reactions to contradictory tensions; and (d) evolutionary, whose narrative of change is based on variation, selection, and retention in a population of entities that changes over time. Each of these theories has a distinctive generative mechanism,

which is described in detail in Van de Ven and Poole (1995), Poole et al. (2000), and Poole (2007).

Empirical research on processes requires different methods than the variance-based general linear model that is standard fare in most quantitative methods classes. Methods for testing process theories must be able to identify temporal sequences and test the fit of empirical data to process models. There have long been methods for testing process theories in communication research, such as Markov analysis (Hewes, 1980) and phasic analysis (Holmes & Poole, 1991; Poole & Roth, 1989), but they have tended to be marginalized. In recent years more robust formulations of these methods have been offered (Poole et al., 2000; Poole & Van de Ven, 2010).

One type of process theory that has enjoyed increasing attention in recent years has been evolutionary and ecological theory, which is described in the next section by Monge et al.

Evolutionary and Ecological Models

Contributed by Peter Monge, Seungyoon Lee, Janet Fulk, Lauren Frank, Drew Margolin, Courtney Schultz, Cuihua Shen, and Matthew Weber

Recently, a growing interest in evolutionary and ecological analysis has emerged in the field of organizational communication (e.g., Monge et al., 2008; Monge & Poole, 2008). Here we explore the evolutionary and ecological perspective and overview new research tools to help us broaden our understanding of organizational communication processes, including organizational identity, culture, discourse, networks, information processing, technology, learning, power, and many others. A subsequent article describes relevant research methods in greater depth than is possible in this short piece (Monge, Lee, Fulk, Weber, Shen, Schultz, Margolin, Gould, & Frank, in press). In addition, the methods outlined in this article provide direction in response to recent calls urging the application and development of new analytical techniques and frameworks for research in a variety of areas including journalism (Zelizer, 2007) and interorganizational communication in the global context (Mumby & Stohl, 2007). For example, Monge and Poole (2008) argue that evolutionary theory could significantly improve our understanding of organizational discourse processes.

Evolutionary and ecological models have several features that, in combination, offer new perspectives on organizational communication. First, they rely heavily on variation, selection, and retention mechanisms as the drivers of change (Campbell, 1965; McKelvey, 1994). Second, they focus on the

relationship between environmental resources and individual or organizational performance (Baum & Singh, 1994). Third, they concentrate on competitive and cooperative processes that drive performance (Aldrich & Ruef, 2006; Hawley, 1986; Hunt & Aldrich, 1998). Fourth, they focus on communities that include entire populations of entities such as messages or organizations and the interactions among them (Astley, 1985).

Processes of variation, selection, and retention. Evolutionary models begin with fundamental mechanisms of variation, selection, and retention (Campbell, 1965). Variations are typically small changes to existing phenomena, though occasionally large-scale changes also occur. Variations often occur at random but can also be the result of human endeavor, planning, initiative, and trial and error (Romanelli, 1999). “Blind” variation means that it is not readily apparent whether a variation is beneficial or not (Romanelli, 1999). Many variations go unnoticed or are ignored. Others, however, are assessed by a selection mechanism. Of these, one or more are chosen while the others are rejected. Although variation leads to many different options, selective retention winnows the focus to one, or at most a few, of those variations. Selection mechanisms can be purposive, as when a top management team chooses a crisis communication plan out of the available alternatives, or imitative, as when one organization chooses to copy the choices of another (Miner & Raghavan, 1999; Rao & Singh, 1999). Once selected, variations are routinized by incorporating them into the repertoire of communication processes and other accepted practices (Nelson & Winter, 1982).

Cohen and Bacdayan (1994) examined the development and retention of organizational communication routines using an experimental laboratory procedure. Participant pairs played a card game without being able to communicate verbally with each other, but they nonetheless were able to generate adaptive strategies. The strategies that partners found successful in early rounds of the game were selected for and retained such that when the rules of the game were altered to permit communication, they continued to use the retained strategies longer than partners that had not formed such routines. Variation, selection, and retention processes also occur in the narratives that organizations use during crises. For example, initial reports by government and public health organizations on the nature and extent of the risk during the SARS epidemic varied widely (Bowen & Heath, 2007). Over time, “one clear and coherent narrative emerged triumphant out of conflicting narratives” (Bowen & Heath, 2007, p. 81). A longitudinal content analysis of changing narratives can provide insight into how particular narratives are selected and retained while others are rejected, thus enabling one frame to dominate the others.

These mechanisms of variation, selection, and retention operate at multiple levels. Aldrich and Ruef (2006) propose three possible units of analysis,

which are “(1) routines and competencies within organizations; (2) organizations as a whole; and (3) entire organizational populations or communities” (p. 28). The examples described earlier are illustrative of these various levels of analysis. When focusing on within-organization processes, evolutionary theories can provide a useful framework for studying various decision-making and organizational learning processes. Meyer (1994) asserts that the “internal evolution perspective” (p. 109) recognizes the capacity of managers to drive evolutionary processes. For example, organizational competencies such as strategic initiatives, information systems, administrative rules, and management structure are subject to variation, selection, and retention mechanisms that managers can influence.

Emergence and legitimacy of organization and communication forms. Organizational forms are a core unit of analysis for ecological studies, and are analyzed at both the population and community levels. Organizational forms are a particular set of characteristics and identities that distinguish one type of organization from another (Carroll & Hannan, 2000; Hannan & Freeman, 1977; McKelvey, 1982; Romanelli, 1991). For example, universities have a set of characteristics that distinguish them from automobile manufacturers. Organizational populations are composed of organizations that share common forms. Many communications also can be classified into forms, called communication genres, which are legitimated over time through repeated use and transmission (Orlikowski & Yates, 1994; Yates & Orlikowski, 1992; Yates, Orlikowski, & Okamura, 1999). For example, a business memorandum, marked by “To” “From” and “Subject” headings, became a common and recognizable form for intraorganizational communication in the late 19th century (Yates & Orlikowski, 1992). Forms can also be considered as communication codes that represent and convey unique attributes, characteristics, and aspects of culture that constitute organizational identity (Polos, Hannan, & Carroll, 2002).

Over time, forms are influenced by processes of variation resulting from changes in resource availability. Resource variability will have differential effects depending on the stability of the community and the nature of the change in resources; these shifts ultimately lead to the generation of new organizational forms (Astley, 1985; Romanelli, 1991). Carroll and Delacroix (1982; Delacroix and Carroll, 1983) examined the Argentinian and Irish newspaper industries and show that organizational foundings and deaths were directly linked to community factors including industry age, political unrest and economic conditions. Variation and the emergence of new organizational forms is only one part of the process; over time processes of legitimation drive the selection and retention of forms. Legitimation results from the increase in the number of organizations in the niche (e.g., Hannan, Carroll,

Dundon, & Torres, 1995; McKendrick, Jaffee, Carroll, & Khessina, 2003). It also occurs because the communication processes such as media coverage, public relations, and message strategies serve to establish organizational identities. For instance, social networking sites gained legitimacy in the United States largely through increased media coverage and recognition from professional associations (Weber, 2010).

The study of the emergence and legitimation of organizational forms have been examined via a number of methods. One approach employs taxonomic and classification techniques such as hierarchical clustering analysis, which groups organizations according to their common features (McKelvey, 1982). Another approach is through the analysis of archival records (Romanelli, 1991; Tushman & Romanelli, 1985). In addition, case studies have been used to look at the manner in which new forms emerge and strive for individual legitimacy (McKendrick & Carroll, 2001). For example, researchers have used communication processes such as the intensity of press coverage and the content of news articles as a means for examining recognition of new forms (Kennedy, 2008).

Evolutionary sequences. The evolution of forms often exhibits “path dependency” where small differences in early states or conditions reinforce one another, leading to substantial long term differences in development (Baum & Singh, 1994). Using sequence analysis (Abbott, 1995), Stark and Vedres (2006) identified common paths of organizational change in the ego-networks of Hungarian businesses from 1987 to 2001. Sequence analysis uses a matching algorithm to measure the distance between any two sequences. Hierarchical clustering analysis (Ward, 1963) is then applied to group proximate sequences under common headings, thus identifying organizations whose networks evolved along similar paths. This technique might be applied to sequences of argument moves within groups (Poole & DeSanctis, 1992), revealing structuring patterns that otherwise would be difficult to discern. Sequence analysis might also illuminate patterns of development in interpretational frames for new ideas or practices as these ideas or practices gain recognition and acceptance (Hirsch, 1986).

Evolutionary and ecological competition and cooperation. Each organizational population exists in a finite resource niche (Hannan, Carroll, & Polos, 2003; Hannan & Freeman, 1986) that establishes the resources available to the population. Each niche has a carrying capacity that determines the number of population members it can support (Hannan & Freeman, 1986). Populations within the same resource niche have commensalist relations, which range from fully competitive (the success of one population impairs the chances of success of another) to fully mutual (the success of one population helps the

chances of success for the other, Aldrich & Ruef, 2006). Selection operates under conditions of environmental scarcity (Astley, 1985, p. 229). During times of resource munificence, competition is less likely, and cooperation predominates. When resources are scarce, competitive processes become more common (Rao, 2002). The theory of density dependence predicts that levels of competition will vary as a direct result of the density of organizations (Carroll, 1984a; Carroll & Hannan, 1989; Hannan & Freeman, 1984).

Population growth generally follows an S-shaped logistic curve (Carroll, 1984b) representing slow initial growth, followed by a period of exponential growth, followed by declining rates of growth. This pattern occurs because populations begin to exhaust their environmental resources as they approach their niche carrying capacities. Communication and other diffusion processes have been frequently studied as logistic processes (e.g., Rogers, 1995).

A number of methods have been used to examine the role of density dependence in organizational communication research. Carroll and Hannan (1989) used event history analysis to show that the density of organizations has a direct correlation to the organization's survival over time. Bryant and Monge (2008) used the density of network linkages between organizations as a means for examining community development through four phases: emergence, maintenance, self-sufficiency and transformation. Applying this method, Weber (2010) demonstrates that newspaper organizations in the United States attempted a rapid transformation to remain competitive in an online news environment: A significant increase in the density of network linkages between Web sites over a 5-year period marked a clear shift to online news production.

The theory of resource partitioning builds on niche theory and seeks to explain why specialist firms do not fail and why, to the contrary, they can coexist with generalists in the same populations and industries (Carroll, 1985; Dimmick, 2003). Recent trends in both interactive media and online communities illustrate the phenomenon of resource partitioning. First, because of their scale advantage, large generalist online communities (e.g., Facebook) dominate the resources in the niche. As they move toward the resource-rich center, these online communities vacate the periphery of the niche space, leaving it open for new, specialist firms to thrive (e.g., Catster.com). In a similar example, today's newspapers tend to be generalists as they cover a wide range of topics and cater to a diverse set of readers. Blogs can coexist with these generalists, emerging in the loosely populated fringe spaces with more narrowly focused topics.

Recent work has employed a variety of methodological approaches to study the phenomenon of resource partitioning. Carroll (1985), for example,

used event history analysis to model the hazard rate of organizational death and explored the proliferation of specialist newspapers in an industry that is characterized by strong economies of scale. Carroll and Swaminathan (2002) used mixed methods, including interviews and stochastic modeling, to track the role of organizational identity in the market segmentation of the beer industry. Future research could build on this work by using interviews, ethnography, and event history analysis to explore the effect of specialists' communication strategies on performance and survival rates.

Intense competition can lead to what is called a Red Queen effect (Barnett & Hansen, 1996). In these situations organizations must continually evolve just to compete evenly. The tightly coupled evolution among the organizations makes the whole population vulnerable should any one competitor make a successful major evolutionary change. For example, Barnett and Hansen (1996) used a hazard model to show that Illinois banks experienced increased failure rates when banks that had evolved in dense, competitive markets entered their niche. The Red Queen model could similarly be applied to competitions between discourses. Discourses that survive in highly competitive environments may emerge with features that are noxious to other discourses. For example, certain pathological communication patterns may undermine even conscious attempts by all parties to avoid them (Watzlawick, Beavin, & Jackson, 1967).

Predator-prey models (also host-parasite) models describe how the densities and characteristics of interacting populations influence each other (Hannan & Freeman, 1989). This phenomenon is typically studied with the Lotka-Volterra equations, which can be approximated with simultaneous logistic regressions (Carroll & Harrison, 1994). Hannan and Freeman (1989) examined the competition between trade unions and industrial unions, the latter building on and subsequently absorbing the former's resources, weakening its chances for survival. But the demise of trade unions also hurt industrial unions. Stories or narratives may relate to one another in this manner, with critical narratives building off of and undermining dominant narratives (Monge & Poole, 2008).

Communication network evolution. In evolutionary models, communities are composed of organizational populations and their interactions (Astley, 1985). Organizational communication networks tie people and organizations to each other, thus providing the flow of information, news, knowledge, and other symbolic resources that enable the entire community to operate and evolve (Monge & Contractor, 2003). Monge et al. (2008) argue that evolutionary theory can help us understand the formation, growth, decline, and demise of communication network linkages over time. Communication linkages undergo

variation–selection–retention processes and have their own carrying capacities and fitness values. For example, collaboration among nongovernmental organizations (NGOs) changes over time based on variation, selection, and retention of strategic choices about their communication linkages (Shumate, Fulk, & Monge, 2005). These types of changes have substantial impact on the functioning of the entire community as well as the organizations themselves (e.g., Powell, White, Koput, & Owen-Smith, 2005).

Network analysis provides a useful tool for conceptualizing and examining these interdependencies. In particular, evolutionary thinking brings attention to the local processes of tie formation based on resource relations. The application of exponential random graph modeling (ERGM), sometimes called p^* models, can detect local-level substructures of dyadic and triadic relations, as well as higher level configurations (see Shumate, this article). The presence of these configurations can be tested as hypotheses on the basis of the probabilistic likelihood of occurrence against randomly generated models (Crouch, Wasserman, & Contractor, 1998; Robins, Pattison, Kalish, & Lusher, 2007; Wasserman & Pattison, 1996; see Shumate, this issue). In addition, exogenous influences can be modeled in order to incorporate the attributes of nodes into the network structuring processes. The ERGM has been further extended to enable the analysis of multiplex relations, as exemplified in the studies by Lazega and Pattison (1999) and Lomi and Pattison (2006). Lee and Monge (in press) show that collaboration ties and knowledge-sharing ties among organizations are intertwined and determine the evolution of each other. This emphasis on multiplex ties exemplifies the importance of considering the content of communication in network evolution.

Recently, several methodologies have been developed to incorporate time into network analysis. Examples include LPNet, which is an extension of PNet for estimating longitudinal ERGM (Wang, Robins, & Pattison, 2006, 2008) and computer simulation techniques like Simulation Investigation for Empirical Networks (SIENA; Snijders, 2001), which focuses on examining over-time social selection and social influence processes by considering the co-evolution of nodal behavior and network ties.

Evolutionary decay and demise. Communication networks link people to others within the same organization, to people in organizations in the same population, and to people in organizations in the various populations that comprise the community. However, links can disappear over time. Tie deletions are critical to understanding how the community evolves, as deletions indicate the most clear-cut example of selection processes at work. Several processes affect the probability of tie deletion. Recent research on link decay suggests that younger or newer nodes and links will have higher rates of tie

deletion than older nodes and links (Burt, 2000, 2002). Burt (2002) found that intergroup ties are more susceptible to decay than those formed within groups of similar nodes. Both studies used event history analysis to model the event of tie deletion along with the age of ties, the age of nodes, and the characteristics of ties as covariates. Event history analysis is a collection of methods that social scientists have used to study social events over a period of time (Carroll & Hannan, 2000; Tuma, Hannan, & Groeneveld, 1979). By definition, events, including many organizational variables, are categorical (Allison, 1984). For example, the adoption of a new communication technology, the evolution of workplace discourse, and changes in organizational policy could all be conceived as events that could be usefully modeled by event history analysis.

Organizational and communication genealogies. Van de Ven and Grazman (1999) used a Mendelian genetics approach to study organizational evolution. They used time series analysis to analyze the effect of managerial and industry events on the adaptation and branching of the Minneapolis Health Care industry over the past 150 years. Their work shows that an industry that began as a single organizational form predictably branched into several related subforms, demonstrating that organizations in the same environment followed equally viable paths. Texts also display genealogical properties, as shown in the March, Schulz, and Zhou (2000) study of the written organizational codes embodied in the 100-year history of the evolution of academic rules at Stanford University.

Punctuated equilibria. Organizational change and evolution are often viewed as slow and gradual processes that unfold over lengthy periods of time. Occasionally, however, major events occur that spur rapid and sizeable change, an evolutionary process called punctuated equilibrium (Tushman & Anderson, 1986). Interruptive events often include major communication events such as negotiated agreements that set standards or open markets, formation of strategic alliances that alter market dynamics, and major public relations campaigns that impact product attractiveness. For example, Barley (1986) showed that the introduction of new scanner technology significantly changed the communication networks of medical personnel in hospitals that installed the new technology. Bryant and Monge (2008) demonstrate that several major events changed the evolution of the 50-year history of the children's television community. Punctuated equilibria are found in many organizational processes, including work group development (Gersick, 1991), organizational learning (Lant & Mezias, 1992), and top management team composition in response to radical technological change (Tushman & Romanelli, 1985). Although several

techniques can be used to demonstrate the impact of significant communication events on organizational evolution, one of the most promising is interrupted time series analysis (Cook & Campbell, 1979; Williams & Monge, 2001). This technique computes two time series, one before and one after the event. These two series can be compared to see whether there is a significant change in the level of the series and whether the series differ in trend or cyclicity before and after the event. For example, Gould (2009) demonstrates that the network density of the Child's Rights Community was significantly greater after the 1989 UN Convention than before it, as NGOs formed new strategic alliances among newly legitimized community members and sought to bring new NGOs into the community.

Conclusion. In this section, we have shown that evolutionary and ecological theories and methods provide a framework from which a number of contemporary and emerging issues in organizational communication can be addressed. Processes of birth, growth, transformation, decline, and demise of communication processes are core issues for organizational communication. Research can beneficially examine, for example, interaction between populations of newspapers and populations of web bloggers by examining the effects of form emergence, density dependence, and resource partitioning on news diffusion. Similarly, Cheney (2007) calls for a renewed focus on organizational environments and on the effects of networks of communication systems. Studies examining systems of communicative interaction can benefit from utilizing the evolutionary framework as a means to understand how different populations interact in the space of larger resource environments. Globalization scholars have also called for the need to understand interorganizational complexities in a global environment (e.g., Fulk, 2001; Mumby & Stohl, 2007). There has also been a growing effort to "expand the organizational horizon across cultures, sectors, and organizational types" (Mumby & Stohl, 2007, p. 271). Evolutionary theory addresses these issues by focusing on multiple organizational populations and the interactions among them within communities and larger environments.

Organizational communication researchers have long advocated studying dynamic and longitudinal processes (Monge, 1990; Monge & Contractor, 2003). In this vein, Cheney (2007) identifies core questions for the organizational communication discipline as those involving "the flow of information, channels of communication, and the available media" (p. 81). While there has been an extensive emphasis on studying *organizing* as well as organizations, the evolutionary perspective adds competitive and adaptive dynamics to this process.

4. Quantitative Methodologies Afford Scholars the Ability to Study Complex Relationships Among Individuals, Groups, Organizations, Messages, Meanings, and Other Organizational Communication Phenomena

A major contribution to understanding the successes and foibles of organizational actions has been research on information exchange and relational patterns in formal and emergent organizational structures (Jablin, 1987; Monge & Contractor, 2003). The consideration of interaction patterns across the organization and between organizations can provide keen insights into how individuals and units achieve (or fail to achieve) coordination, unified purposes, and shared understandings. Theories explaining the role of communication in structure::action paradoxes (Poole & Van de Ven, 1989) reveal connections across individual, unit, and organizational behaviors and link individual acts to collective behavior.

Perhaps, the most consistently active line of research in quantitative organizational communication has been the study of networks. Formalized and sparked by Monge and Contractor's (2003) influential book, which provided theory to go with the methods, network analysis is fundamentally about mapping relationships among various units, including individuals, groups, organizations, and meanings. Michelle Shumate summarizes the many developments in this area in the following section.

Advances in Social Network Analysis

Contributed by Michelle Shumate

A social network is composed of a set of nodes and relations among those nodes. Nodes are specific entities. In organizational communication research nodes studied have included, but are not limited to, individuals (e.g., Corman, 1990; MacDonald, 1976; Yuan & Gay, 2006), groups (e.g., Barnett & Danowski, 1992; Doerfel & Barnett, 1999), and organizations (e.g., Doerfel & Taylor, 2004; Lim, Barnett, & Kim, 2008; Shumate et al., 2005). Relations describe any type of link that ties two nodes together. Relations examined in communication research include perceived communication (Danowski, 1980), observed communication (Sykes, 1983), agreement (Stohl, 1993), membership (Barnett & Danowski, 1992), friendship (Beinstein, 1977), trust (Prell, 2003), cooperation (Doerfel & Taylor, 2004), public affiliation (Shumate & O'Connor, 2010),

telecommunications traffic (Monge & Matei, 2004), citations (Rice, Borgman, & Reeves, 1988), funding (Lim, Barnett, & Kim, 2008), and hyperlinks (Shumate & Dewitt, 2008; Shumate & Lipp, 2008; Tateo, 2005).

Social network analysis describes a quantitative analysis method based in graph theory and matrix algebra (Wasserman & Faust, 1994). The techniques in this method are designed to understand the various ways that relationships between different nodes are related to attributes, cognitions, and behavior and the various ways that attributes, cognitions, behaviors, and other relations influence the pattern of relationships between nodes. In organizational communication research, social network researchers began by examining the similarities and differences between informal social networks and formal organizational structure (MacDonald, 1976; Roberts, 1978). Soon, however, researchers turned to the various ways that social networks shape organizational behavior, turnover for example (Feeley, 2000; Feeley & Barnett, 1997). Most recently, researchers have sought to predict the position of nodes within the networks, including foundational members (Taylor & Doerfel, 2003), experts (Palazzolo, 2005), and types of NGOs (Shumate et al., 2005).

As in all research, the methods available shaped the types of questions that researchers asked. Social network analysis in the 1970s and 1980s focused largely on the impact of social network position on cognitions, attributes, and behaviors or the relationships between different types of relations (i.e., multiplex relationships). When focusing on the impact of social structure, three explanations dominated these decades, structural equivalence, direct relations, and brokerage. Structural equivalence (Lorrain & White, 1971) describes the grouping of nodes into categories based upon their similar patterns of relations within the network. Direct relations describe the influence of those nodes immediately adjacent to any node; such explanations were often posited about a node's level of connectedness or the attributes of adjacent nodes (e.g., Eisenberg, Monge, & Miller, 1983). Finally, brokerage explanations arose largely from Burt's (1992) study of structural holes. When comparing two relations, quadratic assignment procedure (Hubert, 1976) or multiple quadratic assignment procedure (Krackhardt, 1988) was used to correlate the matrices. Each of these techniques is reviewed in Wasserman and Faust's (1994) volume and interested readers are referred there for more details.

In the 1990s and 2000s, several new social network analysis techniques emerged that enable researchers to ask different questions. Of particular interest to organizational communication researchers are three social network techniques: (a) ERGM; (b) SIENA; and (c) advances in both ERGM and SIENA for bipartite networks. While a technical introduction to these empirical methods

is beyond the scope of this section, organizational communication researchers may find the following overview of these methods helpful.

Exponential random graph modeling. ERGMs can be used to assess the statistical likelihood of specific network configurations, referred to as structures (see Robins et al., 2007; Shumate & Palazzolo, in press, for a nontechnical review; also see Snijders, Pattison, Robins, & Handcock, 2006, for a more technical one). While it may seem obvious that every network would contain some network structures, ERGM analysis examines the prevalence of the network structures above what would occur by chance alone. Wasserman and Pattison (1996; Frank & Strauss, 1986) more precisely express the mathematical form of ERGMs as

$$P(\mathbf{X} = \mathbf{x}) = \frac{\exp(\theta'z(x))}{\kappa(\theta)} \quad (1)$$

where $P(x)$ indicates the probability of a given network, and θ indicates a vector of model parameters, $z(x)$ is a vector of network statistics and κ is a normalizing function to ensure proper probability distribution across random networks (i.e., provides the comparison to a distribution of networks generated by random chance). The vector of model parameters, θ , contains the parameters of interest for estimation. ERGMs appropriately account for the interdependencies present in network data, which is of particular advantage over standard statistical methods such as logistic regression (Pattison & Wasserman, 1999; Robins et al., 2007; Wasserman & Pattison, 1996). Although initially developed in the 1990s (Pattison & Wasserman, 1999; Wasserman & Pattison, 1996), ERGMs have only recently gained popularity among social network analysis researchers as software has been created to make their estimation easily accessible to scholars who lack experience in advanced statistical programming.

For organizational communication researchers, what is particularly satisfying about ERGM is the ability to estimate the prevalence of network structure in conjunction with actor attributes. For example, researchers can choose any number of attributes of interest and determine if they are associated with particular network configurations. For example, socialization researchers might examine if newcomers to an organization are less likely to be chosen as friends in a workgroup network or if people are less likely to reciprocate reported friendship relations with newcomers. At the interorganizational level, attributes such as location, organizational age, number of employees/volunteers, and organizational type, all can be associated with particular network

parameters, and their conditional probability, given the other parameters included in the model, can be ascertained.

Simulation investigation for empirical networks. SIENA combines empirical estimation with simulation to understand network evolution. By network evolution, researchers refer to changes in the pattern of relations across a minimum of two time periods. Over time, four possibilities are present for each relation: (a) a non-relation can stay a non-relation; (b) a relation can be maintained; (c) a new relation can be formed; and (d) a relationship may be dissolved. Estimates ($\beta\kappa$) are based upon the network structure and changes across time. Simulations are used to infer the process of change that occurred between time periods.

To simulate network changes, the model makes several assumptions (see Snijders, Steglich, & van de Bunt, 2010, for a nontechnical review and Snijders, 2001, for a technical one). First, the model assumes that relations can be treated as states rather than events. These states are modeled via a Markov process which posits that the probability distribution of future relations is a function of only the present state (i.e., present attributes and network relations). Researchers can make this assumption more plausible by choosing relevant attributes from the past (e.g., founding date). Second, the model assumes that time between observations is continuous and the changing network is an outcome of a Markov process. Third, the model assumes that at any given moment in time only one actor may change a relation and, therefore, the changing relations are independent except for the influence of the whole network. This means that two actors are not permitted in the simulation to coordinate mutually their actions. Fourth, the model assumes that actors have control over their outgoing relations. These changes are assumed to be purposeful and subjected to structural constraints.

Actor-oriented modeling creates a utility function for each actor based upon the parameters entered into the model. The utility function suggests which of the above choices is more or less probable for each actor (i.e., create a relation, delete a relation, maintain a relation, keep a non-relation). The parameters are chosen by the researcher and based upon prior research. Further, all nodes do not need to be present for each wave, and the changing composition can be controlled (Huisman & Snijders, 2003).

In the utility function, three types of functions are incorporated: the rate function; the evaluation function; and the endowment function. The rate function specifies the rate of change that occurs between two time periods. The evaluation function specifies the types of relations formed between time periods. Network structures (e.g., reciprocity, transitivity), node attributes, and other networks of relations can be included as influential on the formation

of new ties. The endowment function specifies that once formed, a particular relation is less like to be broken in future transitions. The same parameters can be used to specify relations that may be endowed.

For organizational communication researchers, SIENA presents an opportunity to infer organizing processes from panel data. For the past 30 years, the study of organizing, versus organizations, has been part of the organizational communication metaphors (Putnam, Phillips & Chapman, 1996; Weick, 1979). Examining the evolution of social networks and the co-evolution of social networks and node attributes through simulation presents an intriguing possibility for future organizational communication researchers. Indeed, organizational studies researchers have already used SIENA to study managers' influence in creating and maintaining inter-firm relations among venture capitalist firms (Checkley & Steglich, 2007), which local governments decide to enter contracts (Andrew, 2009), and collaborative agreements in the genomics industry (van de Bunt & Groenewegen, 2007). Many of the models of process, including structuration (Banks & Riley, 1993), organizational evolution (Monge et al., 2008), the communicative constitution of organizations (Cooren, 2000), and the model of organizing flows (McPhee & Zaug, 2000), might be fruitfully explored using SIENA.

Bipartite networks. The final innovations that may be of particular interest to organizational communication scholars are new methods to address bipartite networks. Bipartite networks describe a network in which there are two different types of actors that are related to each other (Wasserman & Faust, 1994). For example, the membership of individuals in organizations would be a bipartite network including two types of nodes (i.e., individuals and organizations). In these networks, relations would only occur between actors of different types (i.e., individuals could be members of organizations, but not members of each other). Until recently, such networks would need to be converted into networks with one type of actor for further analysis. In such a conversion, a network of individuals would be created where the relations indicate that the individuals share a common membership in an organization, or a network of organizations would be created where the nodes would represent overlapping memberships. Research on interlocking boards of directors used this type of transformation, where common board members represented ties among firms (see Mizuchi, 1996, for a review).

Recently, both ERGM and SIENA have been extended to these unique networks. Such extensions have substantial promise for organizational communication scholars interested in multiple sites of identification (Scott, 1997), experts overlapping knowledge areas (Palazzolo, 2005), and multimodal networks of technology and individuals. In ERGMs, both attributes and network structure can

be utilized to estimate the bipartite network. In SIENA, covariates can be associated with rate, evaluation, and endowment functions for bipartite networks.

Trends and possibilities for social network analysis and organizational communication. In general, there are two trends in social network analysis that should be of interest to organizational communication researchers. The first is a move to keep all of the variance present in the network when utilizing network measures. This means a move away from reducing network observations to descriptive measures for later analysis (i.e., centrality), into groups based upon structural position (i.e., structural equivalence), or into one-mode matrices. Social network analysis methods now seek to capture as much variance present in the network as possible. While ERGM and SIENA analysis require the dependent network to be binary, methods are being developed to address valued networks and covariate networks. Even so, these new methods represent an advance in examining the multiple attributes, network structures, and relations that may influence a variety of networks.

Second, there is a move in social network analysis to better capture longitudinal changes in social networks. In doing so, social network analysis recognizes that organizing is a process, not a static structure to be understood. New innovations for streams of event data are on the horizon, and they will present even greater opportunities for the investigation of organizing as a process.

These innovations for organizational communication researchers open up not yet examined areas of investigation. For example, how are various multiplex relations among organizations or organizational members related? And how does organizing take shape over time from entrepreneurial ambition to reified organization? Such investigations could yield productive insights into the ways in which organizing of various types leads to various social structures. Additionally, large online social networks are publicly available for investigation through these methods.

Finally, while new methods of social network analysis have opened up many new empirical possibilities, theoretical work has not kept pace. There is substantial room for organizational communication scholars to theorize about how organizing processes create unique combinations of nodes and relations. Both social network analysis and organizational communication research would benefit from such work.

Discussion and assessment

We have sought to make the case in this article that organizational communication scholarship will benefit from greater incorporation of quantitative inquiry. Quantitative approaches to organizational communication research share the traditional merits of rigor, system, and a skeptical approach to

empirical claims. However, recent developments position them to enable scholars to approach with much greater precision previously intractable questions. Multilevel analysis enables the influences of individual, group, organizational, and interorganizational levels to be teased out and compared. Process methodologies enable change and development to be tracked more precisely and the multiple evolutionary influences on these processes to be identified and tested in a rigorous fashion. Network analysis enables characterization of complex networks that goes beyond description to explanation. Certainly, mixed methods enable researchers to build on the strengths of qualitative and quantitative methodologies. And the quantitative methods discussed in this article do not cover the entire range of possibilities, which also includes mathematical modeling and simulation, scaling methods, logistic regression, and advances in analysis of variance.

Echoing Taylor and Trujillo's (2001) call for openness and inclusiveness in organizational communication research methods and Monge and Poole's (2008) argument that evolutionary and discursive approaches to organizational communication are complementary, we argue for a rapprochement of quantitative and interpretive-critical approaches. A necessary condition for this to occur is that both quantitative and interpretive-critical scholars must change their current practice of largely ignoring each others' work. Only through understanding each other's contributions and limitations can quantitative and interpretive-critical scholars identify potential complementarities.

For too long, quantitative methods have been in eclipse in organizational communication research. While there have been calls for finding common ground among the various research perspectives in organizational communication (Corman & Poole, 2000), commencing in the 1980s, interpretive and critical approaches have increased their hold on the field. Some redoubts of quantitative inquiry have persisted, but the proportion of qualitative versus quantitative articles on organizational communication and the proportion of graduate PhDs who emphasize qualitative over quantitative methods clearly show that there has been a marked tilt in organizational communication studies toward interpretive, critical, and discursive approaches.

Just as antithesis arises within thesis, we would argue that quantitative methods are now poised for a comeback. Significant advances in quantitative and modeling methodologies—some developed outside the field and subsequently imported and some developed by organizational communication scholars—offer opportunities to address questions and test theories that were previously subject only to “hand waving” verifications. Methods previously accessible only to those with specialized statistical and programming skills are now available in robust and (relatively) user-friendly packages that can be

utilized by a wider group of scholars. These methods enable quantitative attention to theories and knowledge claims developed by interpretive, critical, and discursive scholars. They also enable quantitative scholars to address completely novel problems and questions.

Walter Lippman wrote, "When all men [sic] think alike, no one thinks very much." We believe that quantitative approaches to organizational communication represent an important alternative to currently prevalent lines of thought and as such should receive more attention from all organizational communication scholars.

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