Over the last couple of centuries, quantitative methods have dominated both the natural and social sciences. Such methods became part of the methodological canon because they enable investigators to measure variables and test for relationships between and among variables that are consistent with theoretical predictions. More specifically, quantitative methods allow researchers to assign meaningful numerical values to variables and then to analyze those values using descriptive and inferential statistics to describe the data, infer population characteristics from sample attributes, and discover significant differences between groups/conditions and relationships between variables.

Applied communication research as part of the social sciences has a brief, yet rich history of tackling pressing social issues through the use of quantitative methods. Indeed, ever since the challenge issued to communication scholars at the New Orleans Conference on Research and Instructional Development to conduct rigorous investigations about vexing social conditions (see Cisna, Eadie, & Hickson, this volume; Kibler & Barker, 1969), as even a cursory review of the literature reveals, applied communication scholars have employed a variety of quantitative methods to address important issues.
This chapter explores the nature and use of quantitative methods in applied communication scholarship. First, we contextualize the current use of quantitative methods in applied communication scholarship by distinguishing a traditional positivistic perspective from a postpositivistic perspective. We then examine five common quantitative methods—survey research, experimental research, content analysis, interaction analysis, and meta-analysis—employed in applied communication research, illustrating their use in early studies published in the *Journal of Applied Communication Research (JACR)* between 1973 and 1989 (before the National Communication Association [NCA] assumed ownership of the journal; see Cissna et al., this volume). We then report the results of a content analysis of quantitative studies published between 1990 and 2006 in five communication journals that regularly feature applied communication scholarship to understand the current use of such methods. We conclude the chapter with suggestions for using quantitative methods in future applied communication research.

**Positivistic Versus Postpositivistic Perspectives on Quantitative Methods**

Traditionally, quantitative methods have been associated with *positivism*, a philosophy proposed by Compte (1865/1986) that offered an alternative to metaphysics (which focuses on principles of reality transcending those of any particular science) by privileging the use of the scientific method to gather, through experimentation, observable empirical evidence of the natural world to test hypotheses derived from theory. From a traditional positivistic perspective, there is a single, objective reality that can be discovered by an unbiased researcher (who is independent from the phenomenon being investigated) using deductive logic and the scientific method. The result of this process is the discovery of universal Truths (with a capital “T”).

Over time, and especially after World War II, positivism (and its more stringent form of logical positivism) came under significant attack from philosophers, especially from those subscribing to the *naturalistic paradigm*, who argued that there are multiple, inter-subjective realities that can be studied only by value-laden researchers who are interdependent with the phenomena being investigated, and that are best studied using qualitative methods. In response, Popper (1959) and others offered the *postpositivism* perspective to address some of the criticisms leveled against positivism but still preserve many of its basic assumptions (for other discussions of this history, see, e.g., Guba & Lincoln, 1994; Lincoln & Guba, 1985).

Similar to positivists, postpositivists believe that there is an external reality that can be apprehended by researchers. However, postpositivists adopt what is called “critical realism” (Guba, 1990, p. 20), the belief that humans cannot grasp all of the natural forces in the world due to their sensory limitations, which is especially true in the study of human beings (such as in communication research). Moreover, postpositivists do not believe in a single, objective reality, and they acknowledge the interdependent relationship between the knower and the known. G. Morgan (1983b), for instance, argued that social scientists’ interaction with the targets of their investigation is colored by various lenses, or frames of reference, such that what subsequently is observed and discovered is a product of that interaction. Tashakkori and Teddlie (1998) noted that research is influenced, to some degree, by investigators’ values (e.g., what and why they study something), which are influenced by researchers’ cultural experiences and worldviews. Researchers also are influenced by their theoretical underpinnings, with theory “determining method; it indicates what data are appropriate and places limits on how these data may be obtained” (Poole & McPhee, 1985, pp. 100–101). In addition, investigators cannot neatly or completely divorce themselves from their humanity, thereby jettisoning the traditional positivistic ideal of pure objectivity and opting, instead, for a “reason-
able closeness” (Guba, 1990, p. 21) of neutrality. The result of these assumptions, as G. Morgan (1983a) explained, is “to see science as being concerned with the realization of potentialities—of possible knowledges” (p. 13). Subsequently,

the practice of social research can proceed most effectively if we replace the view that science involves a quest for certain knowledge that can be evaluated in an unambiguous way, with the view that it involves modes of human engagement on which we can and should converse to improve our understanding and practice. (G. Morgan, 1983a, p. 18)

Hence, whereas the goal of positivists was to uncover Truths, postpositivists seek to find the most accurate answers possible, or to “get it right as best they can.”

To try to “get it right,” postpositivists value triangulation, the use of multiple, inherently error-filled methods to study phenomena of interest, for any single method can help only partly to understand a phenomenon. Consequently, the use of multiple or mixed methods, what Cook (1985) called “critical multiplism,” has supplanted the positivistic notion that one methodology in particular (i.e., experimentation) is superior to all others. As Guba (1990) concluded, “If human sensory and intellective mechanisms cannot be relied upon, it is essential that the ‘findings’ of an inquiry be based on as many sources—of data, investigators, theories, and methods—as possible” (p. 21).

The understanding and use of quantitative methods in social-scientific research, thus, has experienced significant change over time. It is within this shift from a positivistic to a postpositivistic perspective that we examine the nature and use of quantitative methods in applied communication scholarship.

Quantitative Methodologies in Applied Communication Research

In this section, we provide a brief description of five common quantitative methodologies employed in applied communication research—survey research, experimental research, content analysis, interaction analysis, and meta-analysis—and consider their relative strengths and limitations. To illustrate the prevalence of these methods and how they have been used historically to conduct applied communication research, we provide examples from studies published in a variety of communication journals, including JACR.

Survey Research

Survey research seeks to ascertain the beliefs, attitudes, values, or behaviors of a population of interest from a sample of respondents selected from that population. To accomplish that goal, survey researchers typically select a sample from the population of interest and ask respondents, via a questionnaire or an interview, questions designed to measure the variables of interest. The results obtained from the sample then are generalized back to the parent population.

Babbie (1999) traced the genesis of survey research back to the census-taking procedures used to collect taxes during the Roman Empire. Survey procedures have been used ever since that time, with Babbie reporting that one of the largest survey administrations was a questionnaire administered by Marx in 1880 to approximately 25,000 workers. However, survey procedures came of age in the 20th century, primarily because of their use in applied settings, such as public opinion, market, and evaluation research. In particular, George Gallup created a “scientific” approach to polling during the 1930s (Hogan, 1997) that has been refined into what now is an artful science.
Building on these rich, applied traditions, scholars from many disciplines employ the survey method to conduct research. Indeed, Babbie (1999) concluded that survey research is the "most frequently used mode of observation in the social sciences" (p. 234). Communication research is no exception, with scholars noting that it is the method used most often in published communication research (Anderson, 1987, 1996; Potter, Cooper, & Dupagne, 1993).

In survey research and other quantitative methods, the variables of interest are measured in as precise a manner as possible, preferably using interval or ratio scales in which there are equal distances between the points on the scale, as those scales allow the data obtained to be analyzed using advanced statistical procedures. Numerous strategies also are available to demonstrate the reliability (consistency) and validity (accuracy) of the scaled instruments employed.

Once a case can be made for reliable and valid measurement procedures, survey researchers identify target populations (or segments of populations) that exhibit characteristics (e.g., demographic, psychological, and behavioral variables) they want to measure. In applied communication research, these variables are associated typically with some practical issue affecting the population of interest that has been identified by prior theory or research. Researchers then select a sample of individuals using probability sampling procedures (in which every member of the population of interest has an equal chance of being selected) or nonprobability sampling procedures (in which population members do not have an equal chance of being selected), based on the feasibility of these procedures for the particular research situation (e.g., whether a population list exists) and given the available resources (e.g., time and money).

The data collected from survey research and other quantitative methods typically are analyzed using statistical computer software packages, such as the Statistical Package for the Social Sciences (SPSS), to identify patterns in the data. In survey research, these procedures involve inferential statistics, called estimation, designed to infer population characteristics from sample attributes, which is appropriate when researchers have selected probability samples. One of the most important goals of survey research, therefore, is trying to obtain a representative sample that facilitates generalizations about the population of interest. Assuming that such sampling practices are employed, in conjunction with a sufficient sample size and effective procedures (e.g., appropriate readability of a questionnaire), the data obtained demonstrate normality (e.g., they are distributed in a bell-shaped curve) and, subsequently, can be generalized to the population of interest. However, survey researchers often rely on nonprobability samples for a variety of reasons (e.g., lack of a complete population list, such as those who watch a particular television show). Indeed, the vast majority of scholarly survey studies employ nonprobability samples, and applied communication research is no exception.

Survey research and other quantitative methods (especially experiments) also employ inferential statistics to assess statistical relationships (correlations, typically in the form of shared variance) between the variables studied. Correlation is one of three prerequisites for establishing causation between variables (along with the independent variable preceding the dependent variable in time and ruling out alternative explanations for observed changes in the dependent variable). Hence, survey research can establish relationships between variables but does not indicate whether they are causal relationships (see the discussion of experimental research below).

Survey research also demonstrates other potential limitations, such as most often relying on self-reports (although others' reports often can be obtained) and being susceptible to the adverse impact of social desirability, with participants responding to questions in ways designed to please others (including the researcher) or to follow acceptable social
norms. Another potential concern is that members of a target population may not be very familiar or comfortable with the format of a survey procedure (e.g., many elderly individuals are not comfortable with some instruments that initially were developed from studying college student samples). A final concern is that survey research can impose, to some extent, investigator priorities and values on matters that may not be as germane to the population being studied. Survey procedures also typically compel respondents to use numerical values to indicate their beliefs, attitudes, values, and practices rather than obtaining their native language terms.

In applied communication research, survey procedures allow researchers to gain insight into communicative behaviors that may reveal potential solutions to practical problems or issues within the setting and/or population of interest. Indeed, an examination of early applied communication research published in *JACR*, from 1973 to 1989, reveals that survey research was the most prominent method employed. These studies largely avoided the typical college student samples that were (and still are) studied by many other communication researchers and focused, instead, on other people, often in organizational settings. For example, Rudolph (1973) used a questionnaire to identify informal communication patterns within a large organization, discovering a number of illuminating findings, including that informal information within the organization was 80% accurate and that it was disseminated through downward and horizontal channels rather than through upward channels. Although Rudolph did not discuss whether this information was shared with stakeholders of this organization—which helps to identify a plan of action to ameliorate a problem or to provide empirical support for communication and other behavior patterns within the context that may inform decisions at a later date—the results have a number of implications for understanding patterns of informal communication within similar types of organizations. Similarly, Falcione (1974), using a questionnaire to study employees’ perceptions of their immediate supervisor’s credibility in a large Midwestern U.S. industrial organization, showed that a number of supervisor communicative behaviors predicted supervisors’ perceived credibility, including soliciting subordinates’ views on safety issues and upcoming organizational decisions, and being aware of and responsive to subordinates’ feelings. These findings have implications for understanding and influencing information exchange in organizations and employee satisfaction and turnover.

In later issues of *JACR* during that time period, researchers continued to employ the survey method to study traditional industrial organizations, but they also branched into other applied contexts, such as health-care and family settings. For example, Morse and Piland (1981) studied the communication competencies required in physician–nurse, nurse–nurse, and nurse–patient relationships, identifying differences in communication skills required for these various relationships, as well as constraints on the communication patterns in those dyads based on social norms associated with the respective relationships. DiBerardinis, Barwind, and Wilmot (1981) surveyed nursing home residents to understand the relationship between interpersonal network involvement and perceived life satisfaction/need accommodations, discovering that residents who were more interpersonally involved with their social networks had higher life satisfaction scores and felt that their needs were being met more than people who were less involved. In the field of family communication, Warren and Neer (1986) used the survey method to examine how families talk about sex issues, finding that a family’s sex communication orientation was predictive of children’s open discussion about sex with their parents and with their dating partners.

More recent applied communication survey research, conducted from 1990 to 2006, continued to use the survey method to study health communication topics, including
large-scale, community-based surveys of people's health perceptions and practices (e.g., Egbert & Parrott, 2001; Trost, Langan, & Kellar-Guenther, 1999). However, survey research during this time period also examined new applied topics and contexts, including customer satisfaction (Ford, 2001), community involvement (Rothenbuhler, 1991), and communication anxiety and signing efficacy among deaf individuals (Booth-Butterfield & Booth-Butterfield, 1994).

Survey research, thus, is an important quantitative methodology that applied communication researchers have employed extensively to explore communicative behaviors, with the overarching goal of understanding practical problems and issues across a variety of applied settings (e.g., organizational, health-care, and family contexts). Once those problems and issues are documented and understood more fully, potential solutions can be developed to address them.

**Experimental Research**

Whereas survey research uncovers statistical correlations between variables, experimental research is conducted to discover causal relationships between variables. In their most basic form, experiments involve randomly assigning participants either to a treatment group (or various treatment and comparison groups) in which at least one independent variable is manipulated by the researcher or to a no-treatment (or control) group that does not receive the exposure, and then measuring and comparing the effects of that exposure on the dependent variable(s). Moreover, attempts are made to control for extraneous variables to rule out competing explanations for differential changes noted in the dependent variable(s) between the treatment and no-treatment conditions. If a high degree of control has been exercised, any observed changes in the dependent variable(s) can be attributed directly to the causal effects of the manipulation of the independent variable(s).

One of the most important characteristics of experimental research is random assignment of participants to treatment and comparison/control conditions (also called randomization), such that participants have an equal chance of being assigned to each condition. Randomization is the best procedure for minimizing the most important threat to claiming that the manipulation of the independent variable(s) caused changes in the dependent variable(s): That participants in the different experimental conditions did not start off equivalent with regard to the dependent variable(s) and other variables (e.g., intelligence or communication competence) that might affect observed changes in the dependent variable(s). Random assignment is the best guarantee that all of the other variables (many of which may not be known) that might influence the results are evenly distributed across the experimental conditions. Hence, the overarching goal of random assignment is to create equivalent groups prior to the administration of the manipulation of the independent variable(s).

Another key characteristic of experimental research is whether the independent variable(s) is manipulated or observed by researchers. When researchers manipulate the independent variable(s), a high degree of control has been exercised over participants’ exposure to those modifications. In contrast, when researchers observe someone else manipulating an independent variable (e.g., a health communication campaign conducted by a government agency) or treat something that occurs naturally as an independent variable manipulation (e.g., studying the effects of a hurricane on community mobilization), researchers have less control over participants’ exposure to the independent variable(s).

When participants have been randomly assigned to experimental conditions and researchers manipulate the independent variable(s), researchers have conducted a full experiment that has a high degree of control. However, when random assignment is not
possible, which often is the case when conducting experiments in natural environments (e.g., it usually is not possible to randomly assign patients to physicians or subordinates), regardless of whether the independent variable(s) were manipulated or observed, researchers can conduct only a quasi-experiment that has a moderate amount of control and limits the claim of a causal connection between the independent and dependent variables. In such cases, researchers rely on pretests (measurements taken before the experimental manipulation) to try to rule out initial differences between the participants in the experimental conditions, although only those differences that were assessed can be ruled out. If there is no random assignment to experimental conditions, regardless of whether the independent variable(s) were manipulated or observed, and no attempt is made to assess initial differences between participants in the experimental conditions, researchers have conducted a preexperiment or what some call a nonexperiment (for more information about experimental procedures and types of experiments, see the classic works by D. T. Campbell & Stanley, 1963; Cook & Campbell, 1979).

Experiments have a relatively long history of applied use, especially in the natural sciences, with early experiments often addressing problems such as randomly assigning various types of soil, water conditions, and fertilizer to assess their impact on crop growth (Snedecor & Cochran, 1956). Experiments also are the standard method employed in medical research, with the “double-blind experiment” (in which neither the participants nor the researchers know who belongs to the treatment and control/comparison groups) being the “gold standard” of such research.

Because of the amount of control that is desired, researchers most often conduct experiments in a laboratory. However, applied researchers were instrumental in moving experiments from the laboratory to the field (see, e.g., Frey & SunWolf, this volume; Poole & DeSanctis, this volume). In doing so, researchers encountered many challenges, including not being able to assign participants randomly to experimental conditions and not being able to manipulate the independent variable(s), as well as ethical concerns raised about control group members not receiving the potential research benefits, leading to the use of comparison groups that receive some form of the independent variable or variables (see Seeger, Sellnow, Ulmer, & Novak, this volume).

Perhaps these problems explain why early studies published in JACR show that although applied communication researchers began using experimental designs in the mid- to late 1970s, relatively few experiments were conducted during that period. Moreover, the experiments conducted relied on student samples rather than participants in other settings. For example, Beatty and Springhorn (1977) used an experimental design to examine message discrepancy and attitude change among a sample of undergraduate students. Although the title of the article claimed that these variables were examined in a field setting, the researchers relied on students’ responses to a relevant, simulated university issue (a tuition raise). Beatty and Springhorn, however, did involve several campus entities (e.g., the campus newspaper) to create the appearance of a legitimate tuition raise to strengthen the ecological validity of the procedures (i.e., how well they reflect what occurs in the natural environment, which is one factor, along with sampling and replication, affecting the external validity of research findings). In other experiments conducted during that time period, M. M. Cohen and Saine (1977) studied the influence of profanity and sex on impression formation among a small sample of undergraduate students; Infante, Rancer, Pierce, and Osborne (1980) examined the relationship between physical attractiveness and first-name likeability of journalists on impression formation among undergraduates; and Blau (1986) assessed the influence of source competence on workers’ satisfaction with supervisors, although the “workers” actually were undergraduate business majors.
Although the findings from these and other studies have implications for communication issues across a variety of applied contexts (e.g., university–student relations, journalist credibility ratings, and organizational employee satisfaction), the majority of these studies appear to have been motivated by theoretical concerns rather than particular social problems or issues per se, as is characteristic of applied communication research (e.g., Cissna, 2000; Keyton, 2000). The experimental designs used in these studies, however, did allow researchers to examine the effects of the independent variables studied and simultaneously control for the influence of extraneous variables. Moreover, even early on, several researchers were cognizant of the need to strengthen the ecological validity of experimental research (despite the use of college student samples) to increase the generalizability of the findings to natural settings.

Later experimental studies published in JACR, in the mid- to late-1980s, focused on a wider range of issues than did previous studies, although many researchers continued to study student samples. For instance, Wadsworth et al. (1987) created six 60-second political advertisements to study the effects of female candidates running for political office who used masculine versus feminine communication strategies on students’ perceptions of candidate image and effectiveness, with the results revealing that more masculine communication strategies were associated with greater perceived effectiveness. The experimental design, thus, compared the effectiveness of different types of campaign strategies, information that has practical value in making decisions about which strategies to use in a campaign advertisement prior to spending considerable money on production costs.

There were at least two examples of field experiments conducted during this time period. Hunt and Ebeling (1983), using a pretest–posttest design, demonstrated that a 10-week program designed to communicate both job-specific and general information increased the satisfaction of assembly line workers and work-unit productivity in a large health-care industrial plant. Rosenfeld and Fowler (1983) compared face-to-face communication and telephone communication (and a combination of the two) on unemployment insurance workers’ abilities to share and discuss information in administrative appeals. Employing a randomized factorial block design, the administrative hearing officer’s travel was supplanted by a split phone-hearing condition. In the first experimental condition, participants chose the location from which to make the call connecting them to a conference; in the second condition, participants went to a designated office meeting with the administrative hearing officer to make the conference call. Although the results indicated that there were few differences between these modes of communication for the seven hypotheses tested, three significant differences emerged. First, employees in the designated office condition reported that they shared more information with the hearing officer than did those in the office telephone condition. Second, participants stated that they were better able to stay abreast of the information when using the in-person method compared to the split phone or office phone conditions. Third, participants felt better understood by the hearing officer when using the split phone option than the office telephone. It was not clear, however, whether these findings were shared with the stakeholders of that organization or whether any changes in that organization were enacted.

Experimental designs also were frequently employed in applied communication research from 1990 to 2006. As might be expected because of their use in medical research, experiments were employed most often in health communication research, including an increase over earlier time periods in using relatively sophisticated, community-based intervention designs (e.g., Parrott & Duggan, 1999; Roberto, Meyer, Johnson, Atkin, & Smith, 2002; Stephenson et al., 1999; see also the exemplary applied communication research programs described in this volume by Hecht & Miller-Day; Poole & DeSanctis; Witte & Roberto). However, the majority of applied experimental studies continued to employ undergradu-
ate student samples. Morman (2000), for instance, used an experimental design to assess the efficacy of testicular cancer health-education materials, with the sample comprised primarily of Caucasian undergraduate students, with only one respondent having a family member who had experienced testicular cancer. However, in the absence of sampling participants at higher risk levels (e.g., those who had a family history of the disease or males in this age group with a testicular cancer diagnosis), the subsequent findings were somewhat limited. Lee and Guerrero (2001) also conducted an experiment with students that employed a simulated sexual harassment video vignette created by the researchers, even though the focus was on sexual harassment among coworkers.

Although studying student samples in the laboratory certainly enables researchers to exercise a high degree of control and, thereby, increases the internal validity of the findings (the extent to which findings are accurate for the participants studied), doing so can lead to lower levels of external validity than conducting field experiments with the actual populations that applied communication researchers often want to study (e.g., organizational employees). Such studies, however, can provide a springboard for subsequent research with populations most likely to be affected by the social problem or issue of interest.

Experiments, thus, are employed in applied communication research to ascertain the causal effects of independent variables on dependent variables. Understanding those causal relationships potentially enables them to be controlled by researchers, practitioners, and those most affected by them in the natural setting.

Content Analysis

**Content analysis** involves “the systematic, objective, quantitative analysis of message characteristics” (Neuendorf, 2002, p. 1) embedded in texts (see also classic texts by Berelson, 1952; Holsti, 1969; Krippendorf, 2004). Originally, content analysis was developed as a method for analyzing the message characteristics of mediated and public texts, with its applied use traced back to World War II, when the Allies analyzed how the music played on German radio stations (compared to music played in other occupied territories) indicated troop concentrations in Europe, and to the formulas (e.g., Flesch’s, 1949, reading ease formula) that newspaper editors employed to make sure that the content of news stories was readable at a relatively low educational level (see, e.g., Frey, Botan, & Kreps, 2000; Wimmer & Dominick, 1994). Early content analysis by scholars included Speed’s (1893) study of how leading New York newspapers had decreased coverage of religious, scientific, and literary issues in favor of gossip, sports, and scandals; Mathews’s (1910) investigation of the amount of space that newspapers devoted to “demoralizing,” “unwholesome,” and “trivial” rather than “worthwhile” news items; and McDiarmid’s (1937) analysis of symbols (e.g., national identity and historical reference) in 30 U.S. presidential inaugural addresses. Today, content analysis (which includes both quantitative and qualitative forms) is one of the most widely employed methodologies in the study of media, as well as in other areas of the communication discipline, including applied communication research (Neuendorf, 2002).

Quantitative content analysis essentially involves analyzing types of messages embedded in an appropriately selected set of texts by having coders use a category scheme developed a priori to first identify discrete units and then to code those units into discrete categories. Hence, content analysis is a “systematic, replicable technique for compressing many words of text into fewer content categories based on explicit rules of coding” (Stemler, 2001, p. 1).

Content analysts start by identifying the messages of interest, typically chosen on the basis of theory and previous research, as well as, in applied communication research,
their pragmatic significance (e.g., sexist messages). Researchers then select an appropriate set of texts in which to analyze those messages (e.g., sexist messages represented in particular newspapers, magazines, books, television shows, or Internet sites). In cases where the number of texts is small, content analysts might be able to study the entire population (called a census), but in most cases, like survey researchers, they select a sample of texts and then generalize the results from that sample to the population (called a “universe” for a set of texts). Content analysts, thus, use probability sampling whenever possible to ensure that the results from the sample of texts selected can be generalized to its parent universe. In cases where it might not be possible to use probability sampling, content analysts rely on nonprobability samples, but then must be careful generalizing the results from the sample to the universe.

Once a set of texts has been selected, they are coded by at least two trained coders who are unfamiliar with the research questions or hypotheses being studied. Coders first identify each unit of analysis in the texts (e.g., every sexist message) and then code those units into categories that are equivalent, mutually exclusive, and exhaustive. There also are some computer programs (e.g., Diction 5.0, NUD*IST, and HyperRESEARCH) that can be used to code texts. Coders must demonstrate high reliability, which involves both stability (with coders placing units into the same categories each successive try) and reproducibility (where additional coders can use the same categories to group the data; see Stemler, 2001). Intercoder reliability is calculated using statistical procedures, such as Scott’s (1955) $\pi$, Spearman’s $\rho$, and Pearson’s $r$ for pairs of coders, or J. Cohen’s (1960) $\kappa$ or Krippendorf’s $\alpha$ when using more than two coders. A Program for Reliability Assessment with Multiple Coders (PRAM) also is available to compute intercoder reliability for Excel files (see http://www.geocities.com/skymegsoftware/pram.html). Once units and categories have been coded in a reliable manner, the data can be analyzed using appropriate descriptive and inferential statistics.

Content analysis demonstrates at least two strengths as a quantitative research methodology. First, it is a relatively unobtrusive technique because researchers study texts that already have been produced rather than interact with research participants (such as in survey and experimental research). Second, content analysis can handle large volumes of data, especially when computer coding systems are employed. For instance, Wang and Gantz (2007) examined health content contained in 1,863 local television news stories that aired on four English-language channels and one Spanish-language channel in seven U.S. markets during a composite week in 2000. However, significant challenges associated with using content analysis include the difficulties of precisely defining the unit of analysis, obtaining a representative sample, and training coders to achieve the high reliability needed to obtain useful data (e.g., Schonborn, 1976).

In contrast to survey and experimental methods, relatively few early applied communication studies employed content analysis; most used qualitative approaches to textual analysis (primarily rhetorical criticism; see Condit & Bates, this volume). Schonborn (1976) published one of the only studies in JACR during that time period, content analyzing episodes of violence from a sample of early 1970s television programs, and Shyles and Ross (1984) content analyzed the inducements offered and demands made of potential volunteers in Army recruitment brochures. Schonberg’s study was relatively sophisticated, considering the time period, examining a number of variables, including frequency of violence, realism of the violence depicted, weapons used, and the role of law enforcement officers in violent episodes. Other early applied communication researchers, however, did not discuss the procedures used to classify units of analysis or whether coders actually were used, such as Bryski (1978), who examined the type of evidence used by each candidate during the first 1976 Ford–Carter U.S. presidential debate, procedures
that are crucial to be clear about if future applied communication scholars are to build on past literature.

More recently, applied communication scholars have employed content analysis to examine significant messages across a variety of contexts. For example, Cahudhi and Wang (2007) content analyzed the Web sites of the top 100 information technology companies to ascertain whether they communicated corporate social responsibility; Campo and Mastin (2007) content analyzed three mainstream and three African-American women’s magazines published between 1984 and 2000 for differences in how those magazines placed the burden on individuals for being overweight and obese; Daniels and Loggins (2007) examined four local television stations’ coverage of severe weather; Feeley and Vincent (2007) and S. W. Morgan, Harrison, Chewning, Davis, and DiCorcia (2007) used the method to discern how organ donation is represented in newspaper articles and entertainment television in the United States, respectively; and Edy and Meirick (2007) employed content analysis to examine network television nightly news during late October 2001 about the events of September 11, 2001, and concurrently surveyed 328 Tennesseans to gauge their degree of support for the war in Afghanistan. These examples demonstrate the utility of content analysis for conducting applied communication scholarship, both as a separate methodology and in conjunction with the other quantitative methods discussed in this chapter and the qualitative and rhetorical methods discussed in this section of the handbook.

**Interaction Analysis**

The study of interactions between people employs both quantitative procedures, called *interaction analysis*, and qualitative procedures, called *conversation analysis* or *discourse analysis* (see Tracy & Mirivel, this volume). Cappella (1990) and Heritage (1989) identified the goal of interaction analysis as capturing empirically the sequencing of messages and their related functions within focal conversations by employing a priori categories, and Frey et al. (2000) noted that interaction analysis may focus on linguistic features, content, purposes, and strategies, as well as how those features influence relational outcomes. Interaction analysis essentially mirrors quantitative content analysis in how it is conducted, except that it is directed toward dyadic and group conversations rather than public or mediated texts. Hence, like content analysts, interaction analysts decide what interactions to study, obtain an appropriate sample of interaction (deciding whether that interaction, for instance, needs to be real/natural or can be hypothetical, as well as how to record the interaction, such as via audiotaping, videotaping, iPoding, or observational notes taken by researchers), and then have coders analyze the interaction using a priori developed coding schemes. Consequently, many of the same strengths, limitations, and challenges characterizing content analysis also apply to interaction analysis.

Only a few studies employed interaction analysis during the early years of *JACR*. Examples include Watson and Ragsdale’s (1981) study of linguistic indices of truthful and deceptive responses to employment interview questions, which used an early computerized program to analyze the interactions, and Garvin and Kennedy’s (1986) study of confirmation and disconfirmation in conversations between physicians and nurses. More recently, interaction analysis has been used primarily in applied health communication studies to examine conversational features between physicians and patients. For example, Pittam and Gallois’s (2000) interaction analysis of how heterosexual Australians use language to distance themselves from individuals who are HIV positive revealed that the farther away people with HIV or AIDS were viewed from one’s in-group, the more the language surrounding talk about HIV or AIDS shifted from personal responsibility to
intergroup negative stereotypes. Other examples of interaction analyses of health-related communication include Heritage and Robinson’s (2006) observation and coding of 302 physician–patient visits, which found that general inquiry questions initiated by physicians elicited more than one symptom from patients, that older patients took longer than younger patients to present their medical problem, and that physicians residing in a large urban practice were more likely to use confirmatory-type questions than physicians residing in a rural practice. Roter and Larson (2001) also employed interaction analysis to examine dominant, passive, and egalitarian interactions in provider–patient relationships. More recently, Harrington, Norling, Witte, Taylor, and Andrews (2007) audiotaped and coded “sick child” office visits following an intervention that involved communication skills training for both pediatricians and parents.

Researchers also have used interaction analysis in political communication scholarship. Doerfel and Marsh (2003), for instance, employed semantic network analysis of the 1992 presidential debates engaged in by Bush, Clinton, and Perot to determine (using a computerized program) word frequencies and patterns of similarity among those candidates. More recently, Ellis and Maoz (2007) used a conversational argument scheme to code online arguments between Israeli Jews and Palestinians, with binomial statistical tests of the codes conducted to assess whether arguments were reciprocated.

Applied communication scholars, thus, employ interaction analysis to examine the nature and effects of messages in dyadic and group conversations that are focused on significant problems and issues (e.g., health concerns). The use of interaction analysis in applied communication research has increased over the years, which could be a result of greater training of researchers in this method, the somewhat unobtrusive nature of this type of inquiry in many situations, and the increased number of software programs to aid in the analysis of quantitative interaction data.

Meta-Analysis

Meta-analysis is a statistical procedure that summarizes the results of several quantitative research studies conducted on the same topic (Kerlinger & Lee, 2000) to determine whether there are consistent patterns across the findings. As Rosenthal (1991) explained:

Meta-analytic reviews go beyond the traditional reviews [of the literature] in the degree to which they are more systematic, more explicit, more exhaustive, and more quantitative. Because of these features, meta-analytic reviews are more likely to lead to summary statements of greater thoroughness, greater precision, and greater intersubjectivity or objectivity. (p. 17)

The first meta-analysis, although it was not called that at the time, was performed by Pearson (1904) to overcome the problem of low statistical power in studies conducted with small samples that had documented a correlation between injection of the smallpox vaccine and survival rates. The first published use of the term meta-analysis was by Glass (1976) in an analysis of educational research, followed by Smith and Glass’s (1977) study of approximately 400 research articles on the effectiveness of various methods of psychotherapeutic treatment, with Glass, McGaw, and Smith (1981) soon thereafter writing the first book about the technique.

Conducting a meta-analysis involves researchers first identifying quantitative studies conducted on the same topic and then using statistical procedures to compare the results obtained in those studies. Most typically, average effect sizes are computed to indicate whether the effects obtained across the studies conducted are “small,” “medium,” or
“large” (J. Cohen, 1992). Two problems, however, can occur in the reporting and interpreting of effect sizes. First, because journals typically publish only studies that find significant effects, a “file drawer effect” can occur in which studies that showed “no effects” are placed into researchers’ file drawers and never seen again. Hence, meta-analysis may overestimate the effects demonstrated by studies, because only those in which significant effects were discovered were included in the analysis. Second, effect sizes frequently have been misreported, perhaps because computer statistical programs vary in how they calculate and label them, leading to misinterpretation of data (Levine & Hullet, 2002). Given that the results of meta-analyses may be used to make policy decisions, reporting accurate effect sizes is critical (Hullet & Levine, 2003). Conversion formulas are available for researchers interested in calculating effect sizes from information reported in the research article (e.g., Hullet & Levine, 2003), although doing so assumes such information has been reported fully and properly. As the number of communication scholars who use meta-analysis increases, it may be possible to reach consensus on effective ways to manage this measurement issue and to encourage more uniformity in software developers’ creation of meta-analytical programs; in the meantime, caution should be exercised when interpreting such results. Finally, similar to other data-analytic methods, sample size and its representativeness play integral roles in ascertaining the efficacy and explanatory power of findings discovered using this approach.

Although Noar (2006) contended that relatively few applied communication researchers have employed meta-analysis, applied communication scholars have used it recently to synthesize research on lie detection training (Frank & Feeley, 2003); family communication patterns (Schrodt, Witt, & Messersmith, 2008); the impact of celebrity announcements about health conditions, such as positive HIV status (Casey et al., 2003); mediated health communication campaign effects on behavior change (Snyder et al., 2004); whether sexual offenders possess fewer social skills than nonoffenders (Emmers-Sommer et al., 2004); media influence on body image (Holmstrom, 2004); the relationship between safer sexual communication and condom use (Noar, Carlyle, & Cole, 2006); the perceived versus actual effectiveness of persuasive messages, with implications offered for formative campaign research (Dillard, Weber, & Vail, 2007); the relative persuasiveness of gain-framed and loss-framed messages for encouraging disease-prevention behaviors (O’Keefe & Jensen, 2007, 2008); the presentation of sexual and violent content on primetime television (Hetsroni, 2007a, 2007b); and the effects of messages in the home and in school on dropping out of high school (Strom & Boster, 2007). Scholars also have used meta-analysis to compare research designs, with Ayers et al. (1993), for instance, comparing the effect sizes obtained in their experimental studies of communication apprehension to those reported in studies that relied on self-reported data.

Meta-analysis, thus, is a relatively new quantitative method being employed in contemporary applied communication research. Given its recent emergence, coupled with a somewhat small pool of quantitative applied communication studies that consistently have focused on the same topic or problem, as the body of applied communication scholarship continues to grow, it is likely that researchers will use this quantitative method more often to determine patterns (e.g., effects) among studies focused on the same issues and problems.

Content Analysis of Quantitative Methods Used in Applied Communication Research, 1990–2006

To obtain a more detailed understanding and appreciation of the use of quantitative methods in applied communication scholarship in recent years, we conducted a content
analysis of applied communication studies published from 1990 to 2006. In total, we analyzed 704 quantitative applied studies published during that time in five communication journals that were chosen because of the relatively high number of applied communication studies that regularly appear in them: JACR (129 studies), Communication Quarterly (137 studies), Communication Research Reports (195 studies), Health Communication (156 studies), and Journal of Health Communication (87 studies).

The most frequent method used in this sample of applied communication research studies was the survey method (474 articles), followed by experiments (129), content analysis (68), interaction analysis (29), and meta-analysis (4). (Eighty-eight studies included a qualitative component along with the primary quantitative method employed.) Table 4.1 reports the use of these quantitative methods in the five journals selected; Table 4.2 reports the use of these methods with respect to the applied communication topic studied, indicating, for instance, that the survey method was used most often to conduct health communication and communication education research.

The frequency of using these quantitative research methods is similar to the selected review of JACR articles published from 1973 to 1989, except that meta-analysis was not employed in the earlier period and emerged in the literature during the 1990s. The relative frequency of use of these methods may be due to pragmatic issues (such as ease of administration and the amount of participant completion time required).

In addition to the frequency of particular quantitative methods employed in applied communication research and their association with various research topics, the follow-

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<th>Table 4.1 Frequency of Applied Quantitative Methods within the Sample of Communication Journals</th>
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<td>Communication Quarterly</td>
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<td>Communication Research Reports</td>
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<td>Health Communication</td>
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<td>Journal of Health Communication</td>
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<th>Table 4.2 Frequency of Quantitative Methods by Applied Communication Topic</th>
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Sampling Procedures (Types and Sizes) in Applied Communication Studies from 1990 to 2006

The overwhelming majority of applied communication studies used nonprobability samples \((n = 644)\) rather than probability samples \((n = 60)\). Probability sampling types included simple random, stratified, and cluster samples (e.g., Roberto et al., 2002), with convenience and snowball/network the most frequent types of nonprobability samples (e.g., McPherson, Kearney, & Plax, 2003; Wright, 2002). It seems reasonable to suggest that the use of nonprobability samples is due largely to access and resource constraints of conducting applied communication research in natural settings. However, given the limited ability to generalize findings from nonprobability samples to their population, applied communication researchers benefit from increasing the number of probability samples studied whenever possible.

Regarding observed sample sizes, the median for all studies in the literature sampled was 201 participants (e.g., Ogata Jones, Denham, & Springston, 2006). This summary statistic must be interpreted cautiously, however, as externally funded projects typically have larger sample sizes than nonfunded research (e.g., Palmgreen, Lorch, Stephenson, Hoyle, & Donohew, 2007), although there are at least two notable, recent exceptions (Becker & O’Hair, 2007; Leets & Sunwolf, 2004), and research about highly traumatized populations may be much lower in size than many other populations (e.g., S. W. Campbell & Kelley, 2006).

Reliability and Validity Issues in Applied Communication Studies from 1990 to 2006

In terms of instrument reliability estimates, Cronbach’s alpha was reported in 399 articles and was the most frequent measure employed. Three studies used a test–retest approach to assess instrument reliability, and one study employed the split-half method. Eighty-six studies reported using various intercoder reliability measures, such as Scott’s \(\pi\) and Cohen’s \(kappa\). Hence, the majority of the studies assessed the internal consistency of measures and reported adequate reliability coefficients (.70 or greater for Cronbach’s alpha). The majority of the studies using coders also reported sufficient intercoder reliabilities (e.g., .80 or higher).

An overwhelming majority of the studies in the sample, however, did not provide a detailed discussion of validity issues related to the measurement instruments employed. Only 35 articles referenced construct validity, 22 articles mentioned content validity, and 11 articles discussed criterion-related validity. Part of this lack of coverage of validity is due to the widespread use of established instruments to measure key variables. It may be useful, however, to distinguish between “established” measures that have been employed only in a limited, “one-shot” study and those that have been used and refined in numerous studies. It, thus, is important for applied communication researchers to be concerned with, and provide some information about, the validity of the measurement instruments and other procedures they employ. The majority of the articles in which new measures were developed provided adequate information about validity, but in some cases, the argument for the validity of those measures was weakened by low factor loadings for factor analyses, cross-loadings, and relatively few tests of criterion-related validity (e.g., R. G. Campbell & Babrow, 2004; Dickson-Markman & Shern, 1990; Unger, Cruz, Schuster, Flora, & Johnson, 2001; Waldeck, Kearney, & Plax, 2001).
Effect Size Findings for Meta-analyses in Applied Communication Studies from 1990 to 2006

Although applied communication scholars are using meta-analysis with more frequency to summarize moderately sized bodies of research, they oftentimes do not report effect sizes. Indeed, relatively few studies reported effect sizes for statistically significant relationships among variables. When they were reported, 119 articles used $r$-squared, 53 $\eta$-squared, 7 $\omega$-squared, and 1 employed $\epsilon$-squared. Applied communication scholars, thus, should be more attuned to providing this key piece of information when reporting the results of a meta-analysis.

Toward Furthering the Momentum of Applied Communication Research

Although applied communication researchers have come a long way in using quantitative methods, we offer several suggestions to increase the quality of such research. In particular, we discuss the importance of employing mixed methods and reinforcing the imperative to translate applied communication research for the focal communities studied.

Employing Mixed Methods in Applied Communication Research

As noted toward the beginning of this chapter, postpositivists appreciate the dual nature of reality that only partially can be apprehended using quantitative or qualitative methods, for any data-collection method demonstrates relative strengths and limitations. Rather than privileging one method over another, it is essential to ensure that the nature of the investigation—its research questions and/or hypotheses, both of which should be undergirded by communication theory—plays a fundamental role in the selection of the method employed. It also is essential to contemplate the “assumptive bases, typical practices, and emerging challenges” (Miller, 2001, p. 138) of both quantitative and qualitative methods.

We are especially heartened by the number of mixed-methods designs employed in applied communication research (88 studies published between 1990 and 2007) and fully expect that number to increase significantly in the coming years because such multifaceted designs are better positioned than is a monolithic methodological approach (Tashakkori & Teddlie, 1998; Teddlie & Tashakkori, 2003) to address the complex problems and issues that confront applied communication scholars. Innovative practices also have emerged to “quantitize” narrative data (Tashakkori & Teddlie, 1998). For example, in Sandelowski, Harris, and Holditch-Davis’s (1991) study of infertile couples transitioning to parenthood, narrative interview data were gathered first and coded using a grounded theory approach to discover themes that explained couples seeking amniocentesis and those declining the procedure. Fisher’s exact probability test then was employed on the data to reveal a nonsignificant relationship between OBGYN encouragement and a decision to undergo the procedure. A line of research by Query and associates (see Bible & Query, 2007; Cutsinger & Query, 2007; O’Brien, 2006; Query & Kreps, 1993; Query & Wright, 2003) provides additional examples of using mixed methods in applied communication scholarship, with narrative data obtained from a wide range of populations about pressing social issues through the use of the critical incident technique (Flanagan, 1954), data that then are coded in a grounded theory manner, with the emerging themes analyzed using post hoc chi-square tests. Qualitative data also can be translated into quantitative form in a process referred to as “qualitizing” (Sandelowski, 2003). For instance, cluster analysis (a quantitative technique for grouping objects of a similar type
into respective categories) can be used initially to create distinct participant groups based on participants’ responses to multiple data-gathering instruments, with a grounded theory approach then used “to validate that mutually distinctive groups have been identified and to explicate further the features of the individual members of these groups that make them more like each other than members of the other groups identified” (Sandelowski, 2003, p. 327).

Another impetus propelling the use of mixed methods in applied communication research is the pursuit of external funding from governmental organizations (e.g., the Centers for Disease Control and Prevention [CDC], National Institutes of Health [NIH], and National Science Foundation [NSF]) and nonprofit health-driven organizations and foundations (e.g., Alzheimer’s Association, Kaiser Family Foundation, and Robert Wood Johnson Foundation). Heritage and Robinson’s (2006) longitudinal, multimethodological study, described earlier, for instance, was funded by the NIH. Continuing its longstanding tradition as a leader in the communication discipline, a University of Kentucky team (Palmgreen et al., 2007) secured a large grant from the National Institute of Drug Abuse to conduct a longitudinal, multimethodological study that investigated substance abuse patterns among preteens and adolescents drawn from two Midwestern states using a 4-year independent and interrupted time series design. Their study focused on four variable classes (demographic variables, risk factors, protective factors, and substance abuse) and involved sample sizes of over 4,000 participants. Their findings contrasted with a nationwide representative survey of parents and youth that showed the targeted marijuana initiative campaign had little impact or positive effects on participants’ attitudes, resistance strategies, and use of marijuana. As another example, aided by a grant from the Robert Wood Johnson Foundation, researchers at George Mason University, with communication scholar Gary Kreps as the principal investigator, are training bilingual hospital employees to become interpreters across several ethnic groups to facilitate communication between health-care providers and patients with little or no English-speaking skills.

To compete effectively for external funding, scholars have to embark on an incremental approach spanning some years of preparation, as well as network across related disciplines to become part of interdisciplinary teams proposing longitudinal, mixed-method research. Kreps and colleagues (Kreps, 2003; Kreps, Query, & Bonaguro, 2008; Kreps, Vishwanath, & Harris, 2002) also encouraged scholars to adopt a “big-science” orientation by becoming familiar with funding agencies, developing interdisciplinary networks and research teams, and actively pursuing external funding (see also Kreps & Bonaguro, this volume). Moreover, as Query and Weathers (2005) noted, to increase the chances of receiving external funding, pluralistic research methods and designs are paramount and often viewed by Scientific Review Board (SRB) members as normative and expected. Although these recommendations are quite sound, they are best enacted over time, especially by junior faculty members.

To crystallize those research opportunities, applied communication scholars should be open to building and testing theory by using both qualitative and quantitative methods (Query & Weathers, 2005). A good example is Peterson’s (2002) Group Dynamics Q-Sort (GDQ), a 100-item instrument designed to study group interaction that combines qualitative and quantitative procedures. As Peterson observed:

The GDQ also addresses concern for increased external validity by being compatible with longitudinal research of groups and drawing on a variety of data sources that historically have been available to qualitative researchers and of limited use to quantitative study (e.g., academic historical case studies, popular press accounts of group dynamics, and participant observation). The q-sort method, therefore,
addresses some of the weakness of both qualitative and quantitative (e.g., experimental) methods. It allows for theory testing and detailed group description across numerous (bona fide) groups with a standardized data language. (p. 80)

Translating Applied Communication Research for Communities Studied

In addition to using mixed methods to conduct applied communication research, translation of the findings for focal communities should be viewed as a fundamental component of applied communication research (Cragan & Shields, 1999; Petronio, 1999, 2002, 2007; see also Frey & SunWolf, this volume). If communities are to be positively affected by applied communication research, the research findings, of course, must be shared with those communities.

One exemplar of such applied communication research is the systematic, longitudinal, mixed-methodological, award-winning applied research about communicative practices associated with creating and sustaining community among residents and staff of Bonaventure House, a residential facility for people living with AIDS (e.g., Adelman & Frey, 1997; Frey, Adelman, Flint, & Query, 2000; Frey, Adelman, & Query 1996; Frey, Query, Flint, & Adelman, 1998). As these scholars demonstrated, it is not enough merely to answer research questions and confirm hypotheses quantitatively; investigators also need to honor the lived experiences of those they are privileged to study to provide life-altering narrative accounts of effective communicative practices (Bible & Query, 2007; O’Brien, 2006; Query & Wright, 2003; Siriko, Query, Wright, & Yamasaki, 2005) and to give back the research results to the communities affected (e.g., through reports written for residence administrators and through a video documentary made by Adelman and Schultz, 1991, that was shown on the Public Broadcasting System), as well as help those communities to facilitate needed changes (e.g., through training new staff members and helping administrators to make specific changes in the residence). Thus, although it is theoretically beneficial to demonstrate statistically significant differences between conditions/groups and relationships between variables, it is equally important to hear, through qualitative methods, participants’ voices; to share the results of applied research with those studied; and to document benefits gained from the research conducted, with the understanding that it may take some time before those benefits are recognized.

To enhance the attainment of theoretical and pragmatic payoffs, one strategy that has shown some success in securing external funding of research is the creation of community advisory boards from the outset of a study to its conclusion and follow-up (e.g., Quinn, 2004). Although they are time and labor intensive, advisory boards comprised of interdisciplinary scholars, key stakeholders, opinion leaders, and community members concerned about a particular social issue should guide applied communication inquiry whenever possible, especially because such boards facilitate the dissemination of research findings back to the communities studied and potentially affected.

Conclusion

Nearly 40 years ago, the communication discipline was challenged to conduct theory-based research addressing pressing social issues. In 1991, the “Applied Communication in the 21st Century: Tampa Conference on Applied Communication” (Cissna, 1995a; Cissna et al., this volume) reinforced that imperative, with scholars arguing that applied communication investigators must demonstrate both the scientific rigor and relevance of their work to enhance the likelihood of achieving desirable practical outcomes (see Frey & SunWolf, this volume). Numerous researchers have accepted that challenge and used one or more of the quantitative methods discussed in this chapter. As applied communi-
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As communication scholarship moves forward, it is imperative to capitalize on the inroads that have been made with regard to refining the quantitative methods employed. Applied communication inquiry has matured to where theoretically grounded designs, using quantitative methods, are commonplace among researchers who study pressing social problems and how those problems might be lessened. Furthermore, translation of research findings to focal communities should be viewed as a fundamental component of applied communication research. Many contextual, theoretical, and methodological challenges undoubtedly will continue to confront applied communication scholars who employ quantitative methods. The extent to which these challenges are managed, in large measure, will determine the quality of quantitative (and qualitative) applied communication scholarship in the decades ahead.

Notes

1. A similar approach was employed by Beck et al. (2004) to assess the frequency of health research, topics, methodological approaches, and theoretical frameworks appearing in communication journals.

2. This time frame is comparable to similar reviews (e.g., Allen, Gotcher, & Siebert, 1993; Beck et al., 2004; Greenbaum & Query, 1999), coincided with NCA taking ownership of JACR, and enabled an analysis of articles published across different editors of the same journal. Although there are many other journals that feature applied communication research articles, these five journals provide a fairly representative cross-section of the common types of applied studies conducted within the communication discipline. Following Seibold’s (1995) view of applied communication scholarship, articles were selected when communication theories and quantitative or qualitative methodologies were used in applied settings or to achieve applied outcomes, and when the focus was on issues of social relevance (Cissna, 1995b). Thus, the articles selected are scientifically rigorous and conducted using field research that builds on and extends basic communication research tenets, with a particular focus on how various aspects of communication play a role in addressing pressing social issues.

3. As the review of meta-analysis revealed, a number of studies published in 2007 employed this method but were not included in this content analysis of the literature.

References


