Methods of Small Group Research

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This chapter seeks to inform the reader about how research on group process and outcomes is conducted. But before turning to these topics, we thought that it would be useful to describe just what such research actually studies. The word "group" has a time-honored place in social psychology (Forsyth, 2010. However, as with many terms with a long history in the field, this word has been used in a number of different ways over the years. For instance, the term has often been used – particularly by scholars of stereotyping and intergroup relations – to refer to any aggregate of people who share some socially salient characteristic(s), for example, a racial, ethnic, gender, or national "group." In this chapter, however, "group" refers to something different and quite distinct, a type of social entity that in the literature often has been called the *small group* (e.g., Hare, 1976; Haythorn, 1953). More specifically, the *small group* refers to a collective of persons whose history of shared fate, common purpose, and interaction has led to the perception, by participants and outsiders alike, that this collective is a social unit (Campbell, 1958; Heider, 1958).[1] We view the idea of common purpose – particularly as it involves coordinated task activity – as the essential feature that distinguishes the small group from other types of social units (e.g., close relationships; cf. Weber & Harvey, 1994).

Moreover, many phenomena that occur in small groups also occur in situations that do not involve a real social entity; rather, they occur in settings in which participants (temporarily) work together to accomplish some goal(s) with few, if any, feelings of "groupness." We will refer to the inclusive set of contexts – including both small groups (as defined above) and temporary, task-oriented collectives – as *group contexts*. A broad concern with group contexts rather than more narrowly on small groups, per se, can be justified for many reasons, not the least of which is that most investigations of group process and outcomes have studied these issues by examining people in temporary group contexts rather than actual small groups.

The enduring and often indeterminate time frame of "real" groups, to say nothing of their inherent complexities, makes their systematic study a daunting enterprise. And even the study of collective activities in more easily structured group contexts can be challenging enough, given the complicated phenomena of interest. What are those phenomena? The topics that we present in Table 15.1 reflect the primary questions addressed in classic and contemporary research on group functioning (Forsyth, 2000; Levine & Moreland, 1990, 1997; Wheelan, 1994. Students who are drawn to the complex problems of individuals interacting in groups often ask, as they consider committing themselves to such a labor-intensive enterprise, "What questions are so special to this field that it is worth expending the great effort needed to answer them? What can be learned that can justify investments of such magnitude?" In this chapter we also attempt to address these questions, to explain why the exploration of people's behavior in group contexts is a critical task for social psychology. In doing so, we argue that the phenomena are unique, the methods robust, and the outcomes of great importance to social psychology. The pages that follow, then, attempt to explore contemporary methods for conducting research on group phenomena and to convince the reader that investigating something as complex as individual behavior in groups can be stimulating and rewarding.

Insert Table 15.1 about here

A

Why study groups? When you watch people in their natural habitat, it is clear that the small human group is a (perhaps, the) primary unit of social psychology. Ordinary human behavior, which can be observed on any street corner, occurs between people who live within groups and who go between groups. In their ongoing behavior, people affect each other in ways that cannot be sufficiently explained

by knowledge of the attributes of the individual actors. Groups are one of the primary devices human beings have to accomplish their purposes. What better for a social psychologist to study?

Before turning to the real substance of this chapter,[2] we want to offer a less glib answer to this important question. One common and reasonable answer is that group phenomena (defined restrictively or not) are ubiquitous. We will never have a comprehensive understanding of human social behavior without an understanding of human social groups. This proposition probably would not be very controversial among social psychologists, yet even though practically every social psychologist would say that what he or she studies is highly relevant to a full understanding of behavior in groups, only a minority of our discipline would say they study group phenomena. What distinguishes this remnant of what was once a thriving enterprise in social psychology (cf. McGrath & Altman, 1966; Steiner, 1974) from the currently more dominant individualistic–cognitive paradigm (Steiner, 1986; Moreland et al., 1994)? One thing is a conviction on the part of group researchers that we shall come to that universally desired understanding of group behavior faster and more deeply by focusing our attention on behavioral settings that have certain properties, properties that we might term the "four I's": interaction, interdependence, identification (with something bigger, more inclusive than the self), and imbeddedness (in interpersonal social structures, such as role structures, power relationships, normative systems, etc.).

Implicit, we think, in the working assumptions of most small group researchers is the conviction that it is not always productive to analyze phenomena at the most molecular level possible and that some issues are better, more insightfully addressed at a more molar level of analysis (see Steiner, 1974, 1986). For example, it is possible, in principle, to describe the "behavior" of the helium in a balloon as the net effect of the movements of billions of individual helium molecules. Such an approach might depend on describing the "actions" and interactions of individual molecules and would, of necessity, result in enormously complex descriptive or explanatory models. However, the basic laws of thermodynamics turn out to offer simple relationships between certain summaries of the behavior of those billions of individual molecules – such as the temperature, volume, and pressure of the gas – which are much more useful for most purposes than (literally) more molecular models. Likewise, group researchers assume that there will be times when concepts defined at the group level may be more powerful or efficient for advancing our understanding of behavior than concepts defined at more molecular (e.g., individual) levels. (A similar presumption pervades all of social psychology – we take for granted that analyses of social behavior undertaken at the level of the individual can often be more useful or tractable than analyses at more molecular levels [e.g., physiological, neuronal, cellular, genetic].) This is not just an article of faith; there are many good illustrations in the social–behavioral sciences of the greater utility of molar analytic approaches. For instance, it has been hypothesized (Steiner, 1972) and shown (e.g., Hill, 1982, for a review) that task groups usually fall short of their productive potential. Bray, Kerr, and Atkin (1978), for example, showed that for a certain kind of intellectual task, this suboptimality increased as groups became larger. Now, this phenomenon could be analyzed at the individual level, in terms of the effects of increasing group size on the different perceptions and actions of individual group members. But a simple and efficient understanding of the full pattern of data results from the use of a group-level concept (viz., the group's functional size, which is that group size ñ whose productivity matches the observed productivity of the *n*-person group). In particular, for simple intellective problems, Bray et al. found that ñ was 1 (or, sometimes as much as 2), no matter how large the group actually is. That is, when participants take turns talking about such problems in a face-to-face group, the group ends up functioning about as well as would be expected if there were only one person in the group (cf. Diehl & Stroebe, 1987). Although one could probably also describe this phenomenon by reference to individual perception (e.g., perceived competition for speaking time, felt individual responsibility), in terms of predicting and understanding group performance, little may be gained in doing so.

A GENERIC STRATEGIES FOR SMALL GROUP RESEARCH

It is well-recognized that any single study can, at best, test only some aspects of a proposition (cf. Brewer & Crano, this volume, Ch. 2), much less test all aspects of all related propositions. In research, including group research, students need to recognize that not only are multiple studies needed to confirm a hypothesis but also that entirely different methods may be needed as well. Different methods are required to compensate for the inherent weaknesses in any particular choice of method. Runkle & McGrath(1972) have developed this argument systematically in their circumplex model of research methodologies. They identify eight generic research methodologies that they array like pieces of a pie (see Figure 15.1). Three points on the circumference of the circumplex (marked A, B, & C in the figure) mark points of maximum concern with, respectively, generality over actors (presumed in most surveys and formal theories), precision of measurement and control (maximized in laboratory experiments), and preserving the naturalism ("system character") of some particular context (maximized in field studies). By imposing this spatial representation of methods, Runkle and McGrath underscore the important point that there is no single best method of inquiry—each method has its inherent strengths and weaknesses, and one can never simultaneously enjoy the former and avoid the latter. In choosing a method, one is perpetually on the horns of a dilemma. And it is an illusion to believe that one can, like some nimble matador, so shuffle or position oneself that one is never caught on at least one of the horns of that dilemma. For example, most social psychologists, by dint of their training and adherence to professional norms, opt to avoid at all costs the horn of internal invalidity, and prefer to stick to methods near point B of the circumplex, but by so doing, they insure that their research will be far from both point C (and hence, highly artificial) and point A (and hence, likely to characterize a very particular population—typically, the college sophomore). The only solution for these dilemmas, of course, is to employ multiple methods across investigations, and hope that their findings will converge on some conclusions that transcend each separate method's limitations (Campbell, 1969; Brewer & Crano, this volume).

Below we elaborate on these themes, using the general structure of the circumplex to focus on the use of several generic research strategies for the study of small groups, noting some of the distinctive tools, challenges, and limitations associated with each.

B Field and Archival Research on Groups

Group processes and outcomes can be, and often have been, studied outside the laboratory using nonexperimental methods (e.g., Aronoff, 1967; Moreno, 1953; Roethlisberger & Dickson, 1939; Whyte, 1943), and a good portion of this work has investigated actual small groups. Such field and archival research has a rich tradition in social science, generally, but is not frequently conducted in contemporary social psychology (e.g., Reis & Stiller, 1992). Moreover, a detailed exploration of these approaches would require much more space than we can devote in a single chapter on group process research. Thus, in this section, we provide only a basic overview of these methods as they have been applied to the study of group phenomena, primarily by citing some representative examples from the literature. Other sources discuss these techniques more comprehensively (e.g., Judd, Smith, & Kidder, 1991; Weick, 1985).

C Observational Field Methods

Much can be learned about group processes and outcomes – as well as a host of social phenomena in general – by carefully observing people's everyday (and not-so-everyday) experiences as they occur. The methods available to study group phenomena in field settings include the usual variations of observation and interview (also see Reis & Gable, Ch. 9; Heyman et al., Ch. 14, in this volume). For example, Muzafer Sherif (one of the founding fathers of social psychology) studied the evolution of group structure, entitativity, cohesiveness, and actual intergroup conflict by observing the activities of participants at a boys' summer camp (e.g., Sherif, Harvey, White, Hood, & Sherif, 1961). In this context, subsets of campers (who had never previously met) were formed into aggregates as a function of cabin assignment, given group names (e.g., "Red Devils," "Bull Dogs"), and assigned to perform a number of activities (e.g., preparing a cookout meal, practicing baseball as a team, etc.). Although

participants were informally interviewed periodically, the bulk of the data that Sherif collected was derived from careful observations that he and his staff made of the campers' activities. For instance, Sherif gained understanding into emergent social structure by observing how the boys acted with regard to one another as they went about performing tasks. Here is how Sherif (1966) described a cookout:

> The staff supplied the boys with unprepared food. When they got hungry, one boy started to build a fire, asking for help in getting wood. Another attacked the raw hamburger to make patties....A low-ranking member took a knife and started toward the melon. Some of the others protested. The most highly regarded boy in the group took the knife, saying, "You guys who yell the loudest get yours last." (p. 77)

These and other observations yielded many useful insights into group development and functioning.

The distinctive strength (cf. Runkel & McGrath, 1972; Levy & Cialdini, this volume) of a field study is its naturalness; one can examine behaviors of interest as they naturally occur. Field studies – such as Sherif's (1966) classic work – ideally exploit this strength. One common purpose is to discover natural phenomena that need to be understood. Many of the classic topics in social psychology (rumor transmission, opinion change, organizational effectiveness, obedience, conformity, helping, attraction, prejudice, etc.) began with a special experience or arresting observation of some aspect of ordinary, "real" life. Another common purpose of a field study is to confirm that our knowledge of those phenomena – based largely on more controlled research methods used in settings that are necessarily more artificial – generalizes to natural behavioral settings. Field studies can be difficult, expensive, and tedious, but no other method can better establish whether a social process is important, in terms of its actual effects in real social settings, what range of factors need to be examined, and its full network of associations with other social factors (Reis, 1983).

The weaknesses of studying group phenomena in this way are as clear as its strengths. Beyond certain potential biases discussed later (e.g., bias that can result when an outsider intrudes on a natural groups' functioning or when the author of a hypothesis is directly involved in data collection), research hypotheses are usually causal but the data in a field study are, at best, correlational. The variables being observed may well be markers for quite different, but even more important uncontrolled, unmeasured, and confounding ones. There is often no way to know. In principle, one might be able to resolve such ambiguities by additional measurement or manipulation, but this possibility requires one to have some control of the phenomena in question, and the essence of the natural field setting is that events are controlled by natural processes, not by the investigator.

Traditionally, observational field methods have been divided into two principal types: those in which the researcher strictly maintains his bystander status as events unfold (*nonparticipant observation*) and those in which the researcher, at least to some extent, participates in the activities of interest (*participant observation*). Both types are used to study group processes and outcomes, so each is briefly discussed below.

D NONPARTICIPANT OBSERVATION

The "Bank Wiring Room" Study, which was part of one of the first attempts by behavioral scientists to systematically study the industrial workplace, is a classic example of nonparticipant observational field research on group phenomena (Mayo, 1933; Roethlisberger & Dickson, 1939;). For this study, researchers received permission from a large telephone equipment manufacturing company to relocate a work group, whose job it was to produce banks of electrical switches, to a smaller room that was off to the side of the main plant area. A member of the research team sat at a desk off to the side for the many weeks that the group used this room. This person was basically "a fly on the wall," who observed and recorded what the group members did. Some of the data that the observer recorded were specific regular activities (e.g., who initiated interactions with whom), whereas others were summaries of more singular events (e.g., an incident in which one person ventured into the main plant to fetch supplies).

These records were handwritten – an arduous and labor-intensive task – and the researcher was often required to both observe and record at the same time. However, there have been substantial advances in recording technology since the time of this classic study. Contemporary research of this type would utilize digital videorecording equipment to collect data. Among the manifest advantages are: (a) Videorecording yields records of what has transpired that are verbatim, rich in detail, and permanent. As such, researchers do not have to decide what is important to observe before the events in question take place. They can review the recordings over and over again, before deciding what data should be distilled. (b) Data distillation itself is less stressful and potentially much more accurate from videorecordings than from coding "on-line." Judges and coders who work with recordings essentially are nonparticipant observers with two major advantages: They can "collect" data at their own pace, rather than be forced to record at the speed with which events are unfolding; and they can use the rewind button to reexamine ambiguous behavior. (c) The miniaturization of videorecording equipment now permits a camera to be truly unobtrusive.

The truly raw-data nature of video observational records can also be a major disadvantage. Videorecordings capture everything that the camera "witnesses," for as long as the camera is operating. Recording all the time that the work group spent in the bank wiring room, for instance, would have used a massive amount of memory. It would have been a daunting task just to have coders view the recordings to edit out unnecessary footage. And, coding recordings for particular events of interest, whether from videorecordings or as the events occur, requires a number of strategic methodological choices (McGrath & Altermatt, 2001).

Of course, researchers can opt to time-sample the events of interest (see Heyman, this volume, Ch.14), but this solution also has potential problems. Because the equipment lacks the capacity to judge when to record, the researchers must make that decision. Employing some sort of a priori, intermittent, fixed or variable sampling scheme leaves open the possibility that an important incident will be missed. Another approach is to have a researcher present at all times during observation periods to make moment-by-moment decisions about what should be recorded. This is pertinent when a discrete event is of interest (e.g., a particularly important decision in a group discussion). However sampling is optimal when an extensive record has been obtained and the relative frequency of different "kinds" of behavior (e.g., leadership behavior) needs to be obtained across all members of a group.

From the foregoing discussion, it should be clear that there are no simple criteria for deciding whether to observe and record on-line or use recording equipment to produce verbatim accounts for later use. As with much of the research process generally, such decisions have to be made by informed researchers who understand both their particular circumstances and various advantages and disadvantages of each approach.[3]

D PARTICIPANT OBSERVATION

As noted, field researchers sometimes "observe from within," by becoming actual participants in a group's experiences. Historically, participant observation has been used much less frequently in social psychology than in other social sciences, particularly anthropology and sociology, but there are a few instances of its use in our discipline. One noteworthy example (Festinger, Riecken, & Schachter,1956) involved participant observation of a very unusual group, whose task was to make sure that some humans survived a prophesized destruction of the world. Festinger and his colleagues watched the unfolding events from "the inside." Even though they attempted to maintain a low profile and not do anything that would affect what was transpiring, the researcher still had to "behave normally" as group members; as such they took part in the group's activities and behaved in much the same way as everyone else. (Needless to say, the moment of reckoning did come and go as Festinger et al., 1956, had hoped, and the investigators were able to make interesting observations of what happens psychologically when prophecy fails.)

The obvious advantage of this approach is that it provides the researcher with a unique opportunity to observe particular group processes and outcomes first-hand and in situ. In this way, she or he has the potential to learn about phenomena of interest that are unavailable to external observers. The major disadvantages concern measurement. To some researchers, this method can rarely be scientific because observations are usually impressionistic and nonsystematic. A related problem involves potential reactivity. Ideally, participant observers act in ways that have no impact on the phenomena of interest.But, behaving with complete neutrality is no easy feat, and because there typically is no way to verify that the researcher's presence, appearance, and actions did not influence events, the naturalness which is the distinctive advantage of all field methods may be compromised. Finally, participant observation also tends to be very time consuming and costly..

D **ARCHIVAL STUDIES**

There are a wealth of underutilized archives of many different kinds available to test our hypotheses, longitudinally, cross-culturally, or within any particular culture. Such archives may have been explicitly created and maintained for research purposes (e.g., the HRAF, discussed below) or represent records collected for other purposes altogether (e.g., the US Census, newspapers, or organizational records). The data may be suitably recorded for direct analysis, or may require considerable sifting and recoding. There are several clear advantages and disadvantages of archival research. One of the clear advantages is that the data has already been collected; this can be a significant advantage in research on groups, given the extra-time, effort, and cost that it routinely entails. And since someone other than the investigator has collected the data, the risk of experimenter expectancy effects is reduced. In some instances, an archive's data can also be much more voluminous and varied than might be possible through planned, direct observation. Archival research can also often simplify matters of institutional review for participant protection, particularly when the records are public or the original participants had already given permission for their behavior to be recorded. Archives can also permit examination of questions that might be unfeasible to address otherwise. For example, studies of life span development (including the development of long-standing groups) or even longer historical comparisons (jury composition in early vs. contemporary American history) may require archival data. Or events that are unpredictable or infrequent may be easier to locate in archives than to await and observe. Most of the disadvantages stem from the fact that the investigator usually has little or no control over what has been recorded or how it has been recorded. This may mean that important observations may be missing or retrievable only through labor-intensive search and coding, measurement criteria may have changed across time, or the reliability of measurement may be low or indeterminable.

An archival approach to hypothesis testing may be illustrated by Tetlock's (1979) investigation of Janis' groupthink hypothesis. The public statements made by key decision makers (presidents, secretaries of state) in five U.S. foreign policy crises were coded for the integrative complexity of the decision makers' thinking and their positivity/negativity toward in/outgroup symbols. Three of these crises had previously been identified by Janis as exemplars of groupthink (e.g., the invasion of North Korea); the other two exemplified well formulated, vigilant decision making, where groupthink was avoided (e.g., the Cuban Missile crisis). Tetlock was able to confirm certain groupthink predictions (e.g., leaders were more simplistic in their thinking in the groupthink crises), but get less support for others (e.g., leaders were not more negative toward outgroup symbols in the groupthink crises).

B Field Experiments

A field experiment introduces direct manipulation of some variable of interest within a field setting. This method can combine the strengths of a field study with the distinctive strengths of an experiment – the ability to draw causal inferences. However, as Runkle and McGrath (1972) caution us, by imposing some degree of control over context and measurement, one inevitably makes the research setting less natural than a field study, while never achieving the high degree of control of a lab experiment. Field experiments are rarely undertaken because having all the necessary elements in place

at the right time can require special access to and control of field settings. Such control can be difficult to acquire and maintain, particularly when experimental requirements (e.g., random assignment, intrusive measurement) interferes with the usual operation of the setting, or when the results of the field experiment might threaten the norms, status, or even continued existence of the groups or organizations being studied.

One nice illustration of a field experiment on small groups is Hannaford, Hans, and Munsterman's (2000) study of the effects of predeliberation discussion of a case among civil jury members. As part of a review of jury procedures, the state of Arizona considered several innovations, including allowing jurors to discuss the trial evidence prior to their formal deliberations. Armed with an Arizona Supreme Court administrative order permitting trial judges to depart from the usual instructions (prohibiting any pre-deliberation discussion), the authors were able to get trial judges to give instructions that permitted pre-deliberation discussion to 84 randomly selected civil juries, and traditional, no-discussion instructions to 73 other juries. With the assistance of the court administrators, they not only were able to collect publicly available outcomes (e.g., verdicts, awards), but were able to get attorneys, judges, and jurors to fill out questionnaires probing their reactions. A number of interesting findings emerged—juries that could discuss the case were more certain of their preferences prior to deliberation, and were less likely to reach unanimous agreement. For present purposes, equally interesting were some of the methodological ambiguities that arose from doing a field experiment. For example, even though cases were purported assigned to condition randomly, systematic differences in cases emerged (e.g., cases assigned to the No Discussion condition were rated by the judges as significantly more complex than those assigned to the Discussion condition). This could be due to chance, but could also reflect hard-to-detect departures by court personnel from strict random assignment. And court procedures in this real-world context meant that the manipulation could only vary jurors' permission to discuss the case. As it turned out, a substantial fraction (31%) of those juries that could discuss the evidence never did so. This is much like a clinical drug trial where one could be misled about the effectiveness of a drug if a third of those in the drug-treatment group failed to take the medication. And, since it was not possible to know in advance which trials would be in each condition, it was not possible to test jurors' memory of trial content, which has been alleged to be improved via jurors' discussions. In short, lack of control and opportunity for measurement necessarily limited this field experiment's internal validity and scope.

B Experimental Methods

All the methods "above the equator" in Runkle and McGrath's circumplex (see Fig. 15.1) could be classified as experimental methods. To varying degrees, they all strive to emulate the idealized "true experiment" (Anderson, 1966), which manipulates one or more potential causal variables, controls all other variables, and measures one or more dependent variables of interest (Smith, ch. 3, this volume). As noted above, field experiments sacrifice a good deal of control to preserve greater naturalness of context; experimental simulations try to retain certain essentials of the natural context of interest while gaining even more control and opportunity for observation. The laboratory experiment generally achieves maximal control and observation opportunity, but can, at most, focus on a generic or abstract set of natural contexts of interest. In judgment tasks, there is even less concern with the fidelity of context, but maximum concern with how carefully chosen and presented stimuli are judged. Within research on the psychology of juries, for example, this spectrum of methods is illustrated by 1) field experiments like Hannaford et al.'s (2000); 2) jury simulation studies, which strive for fidelity to the essence of the jury's task and courtroom context (cf. Kerr & Bray, 2005); 3) highly-controlled lab studies of social influence in groups seeking consensus on an arbitrary issue (e.g., Godwin & Restle, 1974); and 4) a study of what features of a human face make it memorable (e.g., to an eyewitness of a crime; e.g., Chance et al., 1975).

Although a well-controlled experiment cannot provide confidence that a phenomenon is important (in any real-world setting of interest), robust, or widely relevant to aspects of the larger society, it nevertheless provides the best method that we have to get a reasonable grasp on the causal antecedents of a social process (see Brewer & Crano, this volume, Ch. 2). . These virtues have led to this becoming the preferred method for social psychological inquiry (Rozin, 2001; Sears, 1986), including inquiry on group behavior.

We have mentioned that experimentation on groups entails a number of unique costs compared to experimentation on individuals. The most obvious cost is that of obtaining n participants for every replicate in a study of n-person groups. Some studies, like Kerr & MacCoun's (1985) experimental comparison of 3-, 6-, and 12-person mock juries, can require very large participant pools indeed. Besides large pools, deep pockets, and persistence, there are a few other ways of reducing such costs. For example, one can minimize wasted sessions (because of too few participants) or wasted participants (when more show up than are required) by over scheduling and running multiple groups at each experimental session. Of course, this can also require more experimenters and lab space per session. The possibility of distributed or virtual groups, discussed below, may offer one means of overcoming some of the logistical problems associated with scheduling face-to-face groups.

A related difficulty arises when one wishes to compare groups with particular compositions of ability (e.g., Laughlin et al., 1969), attitudes (e.g., Anderson, 1975), personality (e.g., Lampkin, 1972), gender (e.g., Kent & McGrath, 1969), or whatever. Again, composing many groups from a large and diverse set of participants is most efficient in such cases.

C Systematic Observation of Groups

Many theories and frameworks underlying research on small groups imply that group process is a key component of group outcomes (McGrath, 1984; Hackman & Morris, 1976). Although it is usually straightforward to assess outcomes, assessing group processes can be much more difficult (Weingart, 1997). In many instances, group processes are either inferred by the outcomes (e.g., good outcomes stem from good processes) or are assessed retrospectively through questionnaires. Retrospective reports can be useful and in some settings may be the only means available for studying group process. However, with advances in both theoretical precision and technological sophistication, greater emphasis has been placed on assessing process through systematic observation and analysis of actual group interaction (although, given its labor intensiveness, such analyses are still the exception rather than the rule, Moreland et al., 2010).

Two rather different approaches toward measuring group process have been prevalent in the literature (Weingart, 1997). The first involves developing a scheme for coding group interaction that will work in almost any small group context (Bales, 1950; Futoran, Kelly, & McGrath, 1989), while the second attempts to design the scheme around the specific task of interest (e.g., Hastie, Penrod, & Pennington, 1983; Weldon & Weingart, 1993). A fairly recent example of this first type was developed by Futoran et al. (1989) and called TEMPO (Time by Event by Member Pattern Observation system). The system attempts to combine aspects of activity-based coding systems (those looking at who talked to whom with what frequency – Chappel, 1970) and more process oriented schemes (e.g., Bales, 1950, IPA system). Thus, units of time are coded for instances of various different types of acts or behaviors. Each act is assigned to a specific member and a function category. The function categories fall into two broad classes – content vs. process. Within each class, acts are coded as either proposals or evaluations. Content statements refer to task relevant ideas or concerns while process statements refer to goals or strategies associated with carrying out the group task. A series of non-task related categories are also defined (see Futoran et al., 1989, for a more complete description). The strengths of the system include its focus on time and temporal contingencies,comprehensiveness, and appropriateness for virtually any type of task oriented group.

Among the many task/situation specific group interaction coding schemes, a particularly nice example is the one was developed by Hastie, Penrod, and Pennington (1983) for studying jury deliberation. Because the purpose of their study was to assess jury performance, they designed the process measures around five performance criteria that well-performing juries should meet: juries should provide a representative cross section of the population, they should express a variety of perspectives, they should be accurate fact finders, they should accurately follow the pertinent law, and they should reach an accurate verdict. All mock juries saw the same trial, so one of the coding schemes focused on whether key pieces of evidence were recalled and discussed. Hastie et al. also coded the video recordings of jury deliberation for accurate and inaccurate mentions of the judge's instructions and key aspects of the verdict definitions. A third coding scheme took a more functional view (like TEMPO)) and coded statements as questions, suggestions, etc., but with some categories being specific to jury discussions (suggested verdicts, corrections to mis-stated evidence, etc.). In addition to coding statements into categories, Hastie et al. also looked at process from three additional perspectives. First, they looked at participation rates by juror and by verdict preference in order to assess whether different perspectives were given equal time. Second, they looked at deliberation time as another aspect of process, not only in terms of overall deliberation time but also time associated with different types of deliberation content and at what point in time certain types of statements were made (e.g., when legal issues were discussed vs. evidence in terms of the deliberation sequence). Finally, they tracked influence processes in the juries by estimating transition probabilities for groups moving from one particular verdict distribution to another (see Kerr, 1981). Both generic process measures and more tailored versions have their benefits and costs. More general schemes can be used to compare groups working on different types of tasks and can also be used to track changes in processes over time as groups move from one task to the next. They may also come with training manuals so researchers do not have to "reinvent the wheel" for each new attempt at measuring group process. However, their generality also impedes their usefulness for assessing the importance of task specific content and processes. As was evident in the Hastie et al. (1983) example, even systems designed for a specific type of group often borrow from general schemes that have proved useful in the past. Thus, most instances of group interaction analysis tend to use a combination of general systems with adaptations to the current task and group environment.

Although there is no one "best" way to study group process, McGrath and Altermatt (2001) provide six partially conflicting rules that researchers would be wise to consider when thinking about studying group processes. First, they suggest researchers plan ahead to make sure that their coding scheme or assessment procedure can capture the aspects of process they believe will be important. Thus, planning based on previous theory and research is typically fruitful. However, they also suggest that researchers remain flexible and be willing to alter their measures based on pilot data or initial attempts at coding that imply new issues not previously addressed. In essence, one should plan ahead but be open to some improvisation as the need arises. They suggest that a more focused approach to the aspects of process that are most theoretically interesting will generally lead to better results. However, they also suggest that a wide data net be cast (i.e., collect as much information about the group process as one can) so that information thought less important early on can still be assessed if later it appears more relevant. With digital recording and computer technology, keeping a complete record of all verbal and nonverbal behavior during group interaction makes following the "wide net" suggestion far easier than it used to be. Finally, they suggest researchers build their coding schemes from well formulated theory so as to insure a degree of coherence in the analysis process. But, they also tell researchers to pay attention to their data so that interesting patterns that may not have been predicted are not overlooked.

C Surveys and Interviews.

Although survey and interview studies of groups are not common in social psychology, they are quite useful when appropriate—viz., when the behaviors of interest can safely be assumed not to be

highly dependent upon the setting where responses are sought. For example, in surveys of political factions, it can usually be assumed that within fairly broad limits, the respondents' preferred policy will not depend upon the survey type (telephone, mail, in-person) or the particular setting where the faction or its representative is contacted. Another reason to rely upon such methods is because it may be impractical, unethical, or even illegal to observe or manipulate the group of interest, but possible to survey or interview group members afterwards. For example, direct observation of actual jury deliberation is (with very few exceptions) illegal in the US, and hence most data from such groups must rely on post-trial juror interviews.

Doing surveys or interviews of group members, for the most part, raises the same methodological concerns that arise in any survey or interview (e.g., obtaining large and representative samples, establishing rapport and avoiding respondent response biases, composing unambiguous and nondirective questions; see Krosnick's Ch. 10 in this volume; Bartholomew et al., 2000; Hyman, 1978; Cannell & Kahn, 1968). A couple of distinctive issues that arise when group behavior is of interest are a) how many group members must be surveyed/interviewed?, and b) should group members be surveyed/interviewed separately or together? For the first question, the ideal, of course, is for every group member to be questioned, but this is often not possible for a variety of reasons (e.g., locating group members, refusal to participate). When the information sought is available to all group members and there are unlikely to be distorting response biases, only the reliability of measurement is likely to be compromised by relying upon the responses of a subset of the full group. However, when only certain group members are likely to possess the sought-for information, when there are good reasons to suspect response distortions (e.g., hindsight bias, social desirability biases), or there is considerable within-group variability among members around the collective, group's response, partial sampling of the group can introduce both systematic and random error. For example, Kerr and Huang (1986) showed that a variable that accounted for a single group member's preference to some degree would account for far less (typically more than 20 times less) variance in the group's preference. This was true for a wide range of group sizes, strength of prediction at the individual level, and group decision making processes. As to the second question, generally speaking it is preferable to survey/interview group members separately (to minimize statistical dependence and mutual social influence on responses). However, where the accuracy of memory of some event occurring in the group is paramount, the demonstrated ability of group members to catch and correct one another's memory mistakes (Betts & Hinsz, 2010) could justify questioning group members together. [Focus groups, another type of collaborative interviewing technique, is discussed in more detail below.]

Studies attempting to estimate the operative social decision scheme linking predeliberation juror preferences with the final verdict of actual juries can illustrate the use of survey methods to study group processes. For example, Sandys and Dillehay (1998) did telephone surveys of ex-jurors to assess the vote split at the first jury ballot. Using this method, they replicated in actual juries several results found in jury simulation experiments (e.g., that initial majorities nearly always prevail; that juries with even splits were most likely to hang; Stasser et al., 1989). Surprisingly, even on so public an event as the first ballot of the jury, there was considerable disagreement among surveyed jurors; for a sample of 50 focal trials for each of which 3 jurors' responses were sought, in only 22% of the trials did the polled jurors agree unanimously on the first ballot split. Hence, the results for a much larger sample of 190 non-focal trials (with only a single juror interviewed) were probably far less reliable.

C Computer Simulations.

Computer simulations are a particularly useful technique for studying groups or collective behavior more generally (Davis & Kerr, 1986). . Using basic assumptions drawn from data on a variety of groups in conjunction with formal models of group processes can provide insights into how such groups might operate and how various procedural variations might influence their final judgments A number of group research domains have put computer simulations to good use. Computer simulations of jury

decision making have been used extensively to assess the potential impact of various procedural variations on jury performance (Davis & Kerr, 1986; Kerr, MacCoun, & Kramer, 1996; Tindale & Nagao, 1986; Filkins, Smith, & Tindale, 1998; Tindale & Vollrath, 1992). Using extensive data from mock jury studies to set parameters, procedural factors such as jury size, assigned decision rule, jury selection procedures, and jury instructions were evaluated in terms of their potential effects on jury verdicts. Research on social dilemmas has used computer simulations to address such questions as how cooperation can evolve in groups when defection is more individually rational (e.g., Takagi, 1999; Watanabe & Yamagishi, 1999). Recent work using evolutionary game theory approaches have shown that majority processes are very accurate (i.e., tend toward optimal choices) and extremely efficient for resolving group member preference differences (Kameda, et al., 2003). They have also shown that ingroup favoritism and outgroup distrust in combination is more stable in a dynamic intergroup environment than other possible combinations (Choi & Bowles, 2007). Computer models have also been used to study issues of diversity in small groups (Larson, 2007). Recently, multi-agent computational models have been used to simulate both transactive memory systems (Ren, Carley, & Argote, 2006), and how person perception processes influence and are influenced by individual, dyadic, and social network information helping to understand how socially shared cognitions are created and used (Smith & Conrey, 2007). Each of these examples helps to both demonstrate and capture the complexity inherent in group behavior and future work along these lines will continue to inform and enhance our ability to understand complex group interactions.

B Methods for Analyzing the Structural Properties of Groups

As the preceding discussion of group observational methods suggests, a central question in the study of groups is how groups are structured – that is, what is the pattern of relationships (power, influence, status, liking, etc.) among the members of the group? A number of special techniques for analyzing group structure have been developed to address this central question.

C SOCIOMETRY

A traditional method of exploring the structure property of relations among group members is Moreno's (e.g., 1953) sociometric technique. It begins with each group member choosing some number of other group members preferred on one or more dimensions. The simplest (and probably most common) choice is for each group member to choose the single other group member he or she likes best, but the dimension(s) of judgment could reflect any interest of the investigator (e.g., who are preferred coworkers?; who are most respected?). These preferences are recorded in a *sociomatrix*, where rows represent judges, columns represent targets, and the entries are the (presence or absence of) expressed preferences. Column totals summarize each target's social acceptance or *sociometric status*. Other summary indices can be derived from this matrix, such as the number of group members choosing one (social receptiveness or choice status) or the number of mutual choices in the group (as an index of group cohesiveness; Northway, 1967).

A *sociogram*, a graphical summary of the information contained in the sociomatrix, can also be created. Every group member is designated by a geometric shape (typically a circle, although one can represent subtypes of interest [e.g., men and women] with different shapes). Then group members' preferences (typically their first or strongest preferences on a single dimension) are indicated by arrows connecting judge to preferred target. A more easily comprehended picture of the group's structure can usually be created by rearranging the group members on the page to highlight patterns of choice (e.g., by putting a person chosen by many group members in the middle of a cluster; by putting those rarely chosen at the edges of the figure). Group members who are distinctive can be easily identified in the final sociogram. These designated individuals include those who are preferred by many group members (so-called *stars*), those preferred by few or no group members (so-called *isolates*), those who comprise subsets or cliques within the group that are mutually connected (so-called *chains*), and pairs of group members that choose one another (*reciprocated pairs* or *friends*). There are also more complex

statistical techniques (Cillessen, 2009; Kafer, 1976; Lindzey & Borgatta, 1954; Sherwin, 1975) and software (e.g., Levin, 1976; Noma & Smith, 1978; SociometryPro, http://www.ledisgroup.com/en/topsocioen) that can be used when one's data set is large or varied (e.g., containing preferences on several dimensions).

C SOCIAL NETWORK ANALYSIS

Social network analysis is similar to Moreno's (1953) sociometric approach, but is a far more flexible, powerful, and widely used method (primarily in sociology, political science, and anthropology, but in social psychology as well, cf. Katz et al., 2005) for analyzing a group's structural properties. Like sociometry, network analysis utilizes dyadic relationships as the basic unit of analysis, matrix summaries of the raw data, indices summarizing aspects of group members' position in the group, and occasionally (particularly for smaller groups) graphical summaries of the structure relationships. However, social network analysis has a much more fully developed set of analytic techniques (exploiting advances in graph theory; cf. Scott, 1991) and can be applied to a much larger variety of relationships, to relationships varying in strength as well as existence, to summarizing aspects of the full network, and to structural patterns in much larger and more complex social aggregates (e.g., at the organizational, national, or international levels).

It is well beyond the scope of this chapter to provide a full overview of the techniques of social network analysis. Rather, we shall simply note a few basics of these techniques. There are a number of good introductory texts available (e.g., Knoke & Yang, 2008; Scott, 2000; Wasserman & Faust, 1994) where interested readers can pursue the study of this sophisticated technique.

Network analysis begins with a set of *nodes* or *actors*. In small group research, this is likely to be the set of group members, but it could also be other objects, either social (e.g., organizations, clubs) or nonsocial (e.g., events, locations). The set of actors examined may represent a tractable and well-delimited collective (e.g., an intact group), but could also be a random or snowballed sample from some very large or amorphous collective. The basic relational data reflect the existence, nonexistence, and/or strength and frequency of relationships (or *links* or *ties*) between these actors. What kind of relationship is assessed will depend on the investigators' objectives and hypotheses, but could, in principle, be of any sort. Commonly studied relationships include sentiment (e.g., liking) relationships, exchanges of information or commodities, social influence relations, workflows, or kinship relations.

Network data can be obtained in any of several ways (e.g., from archives, by direct observation of group interaction, by self report via questionnaire or interview). The raw data can be tabulated in any of several equivalent matrix forms. Probably the most straightforward means of compilation is the $N \times N$ (where N is the number of actors) sociomatrix described earlier. When the relational data are uni- or nondirectional, the matrix is symmetric, and the $N(N-1)/2$ elements below the diagonal suffice; when the relational data are directed (i.e., Actor A's relationship to Actor B cannot be assumed to be equivalent to Actor B's relationship to A) then the matrix need not be symmetric, and entries both above and below the diagonal must be specified.

Network analysis presumes that "the structure of relations among actors and the location of individual actors in the network have important behavioral, perceptual, and attitudinal consequences, both for the individual units and for the system as a whole" (Knoke & Kuklinski, 1982, p. 13). Thus, this technique seeks to relate behavior of interest to features of the network. The latter can be statistics associated with specific actors, such as an actor's number of direct links with other actors (*degree*), the ease of an actor reaching all others (*closeness*), an actor's *centrality* in the network, or relative level of being the object rather than the source of relations (*prestige*). Actors who occupy distinctive positions in the network may be assigned distinctive roles. Some of these (e.g., star, isolate) are similar to sociometric roles mentioned previously; other roles of note include an actor who connects clusters of which he or she is not a member (*liaison*), an actor who belongs to two or more clusters (*bridge*), or an actor who connects one part of the network with another (*gatekeeper*). Other features describe a

particular or the average link, such as its temporal stability, symmetry, or directness. Such analyses can be extended to focus on aspects of a particular or the average triad (e.g., what's the degree of transitivity of links?). Finally, the analysis may focus on features of the entire network, such as its size, the average path distance between actors (*connectivity*), the ratio of mutually reachable pairs of actors to all possible pairs (*connectedness*), the relative centrality of the most central actor to all other actors (*centralization*), the ratio of connected to possible links (*density*), etc. Such analyses are aided by social network analyses software packages (see Scott,2000; Hansen, Shneiderman, & Smith, 2010; http://en.wikipedia.org/wiki/Social_network_analysis_software). Study of the range of applications of social network analysis (e.g., Scott & Carrington, 2011) can provide a fuller appreciation of this technique's power and versatility.

A INNOVATIVE METHODS AND TOOLS FOR GROUP RESEARCH

Traditionally, research on small group processes has been a fairly low-tech affair. For example, early observation of group process (e.g., Stephan & Mishler, 1952) relied on on-line coding by live observers. Clearly, the quantity and quality of data that could be obtained were severely limited. Similarly, manipulation of interesting features of groups' environment, structure, or process were generally crude and intrusive in many early studies. For example, the structure of group communication might be varied by physically arranging group members so that written notes could be passed physically only through certain slots (e.g., Guetzkow, 1968). The apparent content of intermember communications might be manipulated by the investigator originating or intercepting and replacing such written notes (e.g., Schachter, Ellertson, McBride, & Gregory, 1951).

The rapid growth of technology during the last few decades has certainly increased the potential for more detailed, reliable, varied, and sophisticated small group research. Below, we will describe a number of the particular ways in which modern technology has been and could be applied to such research. We make no claims that this overview is comprehensive, which is precluded, in part, by the fact that new types of hardware and software are appearing regularly; "cutting edge" technologies can become obsolete in even the relatively short lag time between writing a chapter and its publication. We also wish to stress that whenever we mention a particular piece of technology, we do so only to illustrate how technology has been or might be applied, and not as an endorsement. Interested readers should take any of our illustrations only as starting points, and undertake their own investigation into the advisability of applying any particular technology to their own particular substantive questions. To aid in such investigations, we occasionally provide Internet links that contain and maintain product descriptions, reviews, and other sources of relevant information. (Also note that although these websites appear useful at present, they may or may not continue to be in the future.)

B Audio-Video Hardware and Software

As we mentioned earlier, arguably the most important technological innovations for observational research on small groups is the development of reliable, affordable, compact, and easy-to-use equipment to make audio or video recordings of group interaction. Of course, audiotaping or filming group interaction has technically been possible since the advent of modern social psychology, but these technologies either lost much information that was of interest (e.g. identity of speaker, target of communications, all other overt nonverbal behaviors in the case of audio recordings) or were expensive and cumbersome to use (in the case of film and early, reel-to-reel video). However, with the advent of compact video cameras and digital recording, it has become fairly simple and inexpensive to make high resolution video recordings of group behavior.

Earlier we noted some of the advantages of video recording over live observation – for example, multiple observers and investigators can examine and code the same interactions at their convenience and with less risk of fatigue, slow-motion replay can reveal subtle or easily missed behaviors, and distracting or biasing information can be masked. Easily available video technologies such as remote camera controls, video-mixing boards, and video-editing hardware also make it feasible to focus on

particular and subtle aspects or combinations of observable behavior (e.g., a particular group member, simultaneous actions of a speaker and listener).

With or without permanent video recordings, observational research of group behavior can be labor-intensive. However, there are also a number of technologies currently available that make the task less onerous and more flexible. For example, several computer programs (e.g., The Observer XT) enable one to use the computer keyboard to encode multiple events of interest in real time. These are particularly useful where videorecording is not feasible for reasons of practicality (lack of hardware) or methodology (e.g., the use of a camera would be intrusive or unethical). There are also a number of hardware/software packages (e.g., MacSHAPA, Anvil, ODCS, CowLog, The Observer XT; Sanderson, 1994; Tapp & Walden, 1993; Hänninen & Pastell, 2009; Noldus et al., 2000; MacLin & MacLin, 2005; http://academic.csuohio.edu/kneuendorf/content/cpuca/avap.htm or http://bama.ua.edu/~wevans/content/csoftware/software_menu.html) that are designed for coding data from videotape or digital video files. Such software can not only tally particular events, but other interesting features (e.g., durations). Some of this software also permits the integration and synchronization of multimodal signals from various sources, such as observational, video, tracking, and physiological data (Zimmerman et al., 2009). When the research is at an exploratory stage, several computer assisted qualitative data analysis software (CAQDAS) packages (e.g., see http://en.wikipedia.org/wiki/Computer_assisted_qualitative_data_analysis_software) are also available.

Such programs can include a number of useful features, such as large numbers of possible coding categories, keyboard control of the video source, precise timing of event occurrence and duration, visual or auditory feedback of entered codes, and the ability to annotate event coding. Thus, rather than coding a single variable through laborious procedures (e.g., manually rewinding, using a recorded timer or visual content to find the start of the event), using such technology one can simultaneously code several features of interaction, mark and automatically return to points of interest, and use feedback features to detect unanticipated patterns in the data. One can also either do a number of standard (e.g., interjudge reliability) or not-so-standard (e.g., lag sequential analyses, transition analyses, analyses of cyclic activity; see Bakeman, 2000, or Heyman, this volume, Ch. 14) analyses within such programs or export the data for analysis with other statistical packages.

Such video software still requires the decisions of human judges. For certain simple aspects of group interaction, one may design equipment to obviate the human judge. For example, Dabbs and Swiedler (1983) developed a system for automatically monitoring the onset and ending of speech in group discussions. As technological advances occur in shape, movement, and voice recognition by computer, it is likely that it will be possible to automate many other coding tasks (e.g., see Cohn & Sayette, 2010, for coding facial expressions), which should bring attendant gains in accuracy and efficiency of coding.

B Computer Technology: Data Collection at Arbitrary Group Tasks

An even more revolutionary technological innovation of the late 20th century for social psychology (as for nearly every other discipline, as well as for the general public) is certainly the development of powerful, small, and affordable microcomputers. Here we focus our attention on how the computer can and might be used as a tool for conducting group research.

Three generic approaches to computer-mediated experimentation on groups might be distinguished for our immediate purposes.

1. The first approach has a group working together at a single computer. In this setting, the computer serves as an instruction and/or stimulus-presentation device, and/or as a data recording device (typically for group responses through the keyboard, but possibly for individual member responses [e.g., via turn-taking] and via other input devices, such as joysticks, analog/digital boards, etc.). For example, rather than have a single pad for recording ideas generated by a brainstorming group (cf. Diehl &

Stroebe, 1987), one could provide the group with a computer to record ideas, making possible richer data collection (e.g., the rate as well as the number of ideas generated).

2. The second approach has each member of a real or purported group working at separate, stand-alone computer stations. This approach is particularly appropriate for research questions about those group processes that do not involve any actual interpersonal activity (e.g., social facilitation) or that, at most, involve restricted patterns of interaction (e.g., a context in which group members are allowed to talk to one another as they work at their computers; cf. Olson, Olson, Storreston, & Carter, 1994), but it can also be used for certain group simulations where the experimenter programs in and controls the apparent responses or communications of other group members. For example, Messick et al. (1983) led participants to believe that they could monitor each other's harvests from a shared resource pool through computer feedback. In fact, there was no feedback of actual choices, but rather false feedback preprogrammed by the experimenters to examine participants' reactions to various patterns of resource use (e.g., a steadily declining resource pool; high vs. low variance in members' harvests).

3. The third approach provides each group member with his or her own station and permits intermember communication via a computer network. A striking example of this approach is Latané and L'Herrou's (1996) study of different allowable communication links – modeling different spatial arrangements of group members – and their effect on patterns of social influence. The use of asynchronous computer communication (e.g., e-mail) allowed these investigators to both control channels of communication and overcome the difficult logistic problem of composing 24-person groups for several rounds of communication.

There are, in turn, several generic means of acquiring the software needed to undertake these approaches:

a) One can identify and obtain existing software. There are many such application-specific programs that have been developed for small group research (e.g., in social dilemma research, see Messick et al., 1983, for an illustration). Such software is usually identified through careful study of the existing empirical literature, by word of mouth, or by examining databases of psychological software (cf. http://www.psychology.org/links/Resources/Software/, http://psych.hanover.edu/Krantz/software.html, http://www.psywww.com/resource/bytopic/software.html). Of course, the chief drawback of using preexisting software is that it is generally inflexible, not permitting alterations in procedure or experimental parameters. In a few cases, investigators have tried to build flexibility into their programs so that other investigators could adapt them to new purposes. Illustrations are CDS (Li, Seu, Evens, Michael, & Rovick, 1992), which captures typed dyadic communication, and GROUPCOM (Levine, 1978), which permits interpersonal communication among up to six group members. Another, related option is to use widely available chat rooms or instant messaging services (e.g., AIM, Google Talk, Skype) to structure asynchronous or synchronous group interaction. Such services either have their own options for recording text, audio, or video content, or one can obtain add-on software (e.g., Hotrecorder, MX Skype) and hardware (e.g., a video capture card) to record such content for later analysis.

b) If one is (or can afford to hire) a talented computer programmer, one can program one's computer or computer network and apply any one of these approaches to one's substantive research question. This approach, of course, carries maximal flexibility, but is beyond the training or resources of many investigators.

c) There also exist a number of general-purpose programs developed specifically for psychological experimentation. Several such packages were developed early on by experimental and cognitive psychologists for the Mac platform (e.g., Cohen, MacWhinney, Flatt, & Provost, 1993; Chute, 1993; Haxby, Parasuraman, LaLonde, & Abboud, 1993; Hunt, 1994; Vaughan & Yee, 1994). Today, there are several such programs available for the Mac (e.g., PsyScope, SuperLab), or the PC platform (e.g., MediaLab, DirectRT, E-Prime, SuperLab, Inquisit, Authorware). These packages typically include many useful tools for conducting experiments, such as options that permit counterbalancing orders of stimulus

presentation, precise timing of stimulus and response, etc. Unfortunately, at present, none of them is designed to take advantage of computer networking, so that they can typically only be used for those applications without actual interaction among group members. Although, to our knowledge, there currently is no general-purpose experiment generator that is networked, there have been attempts to extend general-purpose authoring software from use for stand-alone experimental applications (e.g., Wolfe, 1992) to networked applications (e.g., Hoffman & MacDonald, 1993). Currently, one can incorporate web-based applications (e.g., chat rooms) as stand-alone segments within a MediaLab questionnaire/experiment. There is also a theoretical capability of capturing the data collected in such applications and integrating them with those collected directly by MediaLab, although this capability is not yet well developed (Jarvis, 2011).

d) The market for sales of hardware and software for all of experimental psychology is, compared to the larger IT market, a relatively small one (Schneider, 1991). Consequently, little research and development in the computer industry has focused on the requirements of psychological researchers in general, let alone those interested in the study of small group behavior in particular. However, there is both a considerable market for and commercial interest in technology that aids in interpersonal communication – what McGrath and Hollingshead (1994) generically termed group communication support systems (GCSSs) – and that assists organizational groups or teams to improve their productivity – group performance (or decision) support systems (GPSSs; McGrath & Hollingshead, 1994). So, a final means of applying technology to the study of group process is to directly utilize or adapt technology developed for these more applied purposes as group research tools.

GCSSs are simply tools for extending human communication beyond its most basic form (viz., face-to-face verbal/nonverbal interaction). GCSS technologies currently exist that permit synchronous or distributed (in both time and space) communication via various modalities (audio, video, video & audio, typed text, handwritten text, graphics; McGrath & Hollingshead, 1994). These technologies range from the mundane (telephones, surface mail) to the commonplace (e.g., cellular phones, voice mail, electronic mail) to the relatively novel (e.g., interactive chat rooms, video conferencing via the Internet; see http://thinkofit.com/webconf/ or http://www11.informatik. tumuenchen.de/cscw/ for introductions to a few of the possibilities currently available). Although such GCSSs are not commonly used as tools in small group research at present, we believe that they have considerable potential to be used in this way (see McGuire, Kiesler, & Siegel, 1987, or Hollingshead, McGrath, & O'Connor, 1993, for illustrations of this potential). In organizational settings, this potential is already being realized in the burgeoning literature on *virtual teams*, whose members may be geographically dispersed as they undertake their collective tasks. Such virtual teams have provided a new and fascinating context wherein research questions about group dynamics and performance can be posed and answered (e.g., Hertel et al., 2005; Curseu & Wessel, 2008).

Although social psychologists have not put GDSS or other technological innovations to much use as research tools, the recent interest in teams in engineering and technology has led to a few interesting examples (e.g., Paul, Haseman, & Ramamurthy, 2004; Matsatsinis, Grigoroudis, & Samaras, 2005). More collaborative work between social psychology, engineering, and information technology researchers would probably lead to new and interesting ways for GDSS systems to be used as research tools.

GPSSs attempt to do more than simply facilitate communication among group members. They attempt to restructure common group tasks, often incorporating innovative communication technology, so as to enhance group productivity. GPSS technologies have given birth not only to an industry aiming to exploit the commercial possibilities of such systems (e.g., http://www.ventana.com) but also to a burgeoning group of scholars with sophisticated research centers (http://www.uasabilityfirst.com/groupware), major conferences (e.g., the biennial Computer Supported Cooperative Work [CSCW] meetings; the annual Human Computer Interaction [HCI] meetings; cf.

http://www.acm.org/events/), and specialized scientific journals (e.g., *Communications of the ACM, Information Systems Research*).

One product of this marriage of commercial and scholarly pursuits is a rich empirical literature (McGrath & Hollingshead, 1994). Another is an impressive and varied collection of "groupware," hardware and software products designed to facilitate collaborative work (see http://www.telekooperation.de/cscw/) – ranging from collaborative editing tools to message systems to group meeting support systems to conferencing systems. Ventana Corporation's GroupSystems package is an illustration of a GPSS. It contains modules for generating and categorizing ideas, outlining topics, commenting on ideas, and evaluating and voting on proposals.

Of course, the scientific study of group performance has been a major topic of social psychology since its inception (Kravitz & Martin, 1986). It is thus a bit surprising to find so few social psychologists actively involved in the study and application of technology to group work (see McGrath & Hollingshead, 1994; Kielser, 1997, for noteworthy exceptions). We suspect that these emerging disciplines hold tremendous potential not only to provide us with useful tools for controlling and observing group behavior but also to raise fascinating new questions about group behavior that would never occur to us without the many new possibilities for structuring group work that modern technologies create. The study of brainstorming in electronically linked groups, described below, is an excellent illustration.

A GROUPS AS A CONTEXT/MEANS FOR RESEARCH AND APPLICATION

Thus far we have been emphasizing methodological tools that are useful when the primary goal is the study of group behavior, per se. In this section, however, we shift focus somewhat. Here we examine a number of methodologies in which some guided form of group interaction has been held to provide a useful context and means for achieving some other goal, such as solving a problem, assessing opinion, generating ideas, and so on. In effect, these are also "group productivity/decision support systems," but ones which usually require no exotic technologies. For the most part, these methodologies have not been developed by nor are they commonly used by social psychologists; in these senses, they represent innovative group techniques. And, for the most part, there is little conclusive research evidence on the efficacy of these techniques. However, because they are employed (at times quite widely) outside social psychology and because the use and goals of these techniques pose a number of interesting and patently social psychological questions, we have chosen to describe them here. We have been somewhat selective, however; in particular, we have excluded methods of using groups for various therapeutic ends (see Forsyth, 2009, chapter 16, for an introduction to the latter methods).

Below we briefly present the genesis, rationale, basic procedures, a sourcebook or two, and (when available) evidence for efficacy for each of the following: group brainstorming, focus groups, quality circles, nominal group technique, the Delphi method, and judge-advisor systems. These are roughly ordered in terms of increasing structure and constraint on interpersonal interaction.

B Group Brainstorming

Brainstorming was developed by advertising executive A. F. Osborn (1957) as a means of facilitating the generation of creative ideas through face-to-face group interaction. Osborn prescribed four rules for such brainstorming groups. First, members are instructed to express any ideas that come to mind without concern for their quality, practicality, etc. Spontaneous and uninhibited "free-wheeling" is encouraged. Second, during brainstorming there should be no evaluation of any ideas expressed. Emphasis should be entirely on the generation of ideas, not their evaluation. Third, the brainstorming group should strive for as many ideas as possible; the more ideas, the better. Fourth, group members should try to build on others' ideas, combining, improving, and extending wherever possible. Osborn (1957) made rather extravagant claims for the efficacy of group brainstorming – for example, "the average person can think up twice as many ideas when working with a group than when working

alone" (Osborn, 1957, p. 229). Unfortunately, systematic research has failed to substantiate these claims. To the contrary, a sizeable literature (see Diehl & Stroebe, 1987; Mullen, Johnson, & Salas, 1991; Nijstad, 2009, for reviews) has consistently shown that brainstorming groups produce both fewer and poorer quality ideas than equal-sized, identically instructed nominal groups (i.e., groups whose members work in isolation and whose total output is determined by pooling members' output, eliminating any redundant ideas).

Substantial progress has been made in identifying the sources of this process loss in brainstorming groups, with production blocking (i.e., the fact that only one person can talk [and, perhaps, think] at a time in the face-to-face group), production matching (i.e., social comparison and modeling of low levels of productivity), and evaluation apprehension (i.e., fear of negative evaluation for voicing ideas in the group context) all emerging as contributing processes (Diehl & Stroebe, 1987; Paulus & Dzindolet, 1993; Stroebe & Diehl, 1994). Hence, procedural variations that neutralize these mechanisms (e.g., individual recording of ideas, including periods of silence, turn taking) may close the gap between nominal and brainstorming" groups (Philipsen, Mulac, & Dietrich, 1979; Ruback, Dabbs, & Hopper, 1984). Also, the standard brainstorming rules can be better realized by training a group facilitator to minimize production blocking and evaluation apprehension; such a facilitator can reduce or even eliminate the usual process loss (Offner et al. 1996, Oxley et al. 1996).

The most exciting procedural innovation in brainstorming is so-called "electronic brainstorming" (EBS). Each group member has a terminal that is networked with all other terminals. Group members type in ideas at will. At any time, a group member can see a sample of the ideas generated by the group simply by hitting a key; by repeatedly doing so, he or she can examine all the ideas generated so far. Because ideas are not attributed to particular group members, member anonymity is maintained. Recent research suggests that for small- to moderate-sized groups (less than 10 persons), EBS groups perform as well as comparably sized nominal groups, and for larger groups (around a 12 or more), the EBS groups actually outperform the nominal group baseline (Dennis & Valacich, 1993; Dennis & Williams, 2003; Valacich, Dennis, & Connolly, 1994). Such apparent "process gain" – group performance exceeding the group's apparent potential productivity – has been very rare in the social psychological literature (e.g., Laughlin et al., 2006) and is of special interest for theory development and application. The source of this apparent process gain in EBS groups appears to arise from the stimulating effect of exposure to others' ideas (Leggett-Dugosh et al. 2000, Nijstad et al. 2002) and to the benefits of heterogeneity/diversity in idea-generating groups (Stroebe & Diehl 1994).

B Focus Groups

The *focus group* has been used most in marketing and advertising research. It is a qualitative, semistructured interview technique in which a small group, typically 8–10 people, discusses a topic of interest under the supervision of a moderator. The information sought is usually fairly narrowly delimited (e.g., how do consumers react to a new product or product idea?; how is a product actually used?; how do competing products compare?). The information gleaned from focus groups may directly guide decision making or may prompt more systematic and quantitative techniques.

Considerable preparation should precede focus group sessions. The objectives of the sessions first need to be specified – what information is desired? The moderator(s) must be selected and briefed on the objectives. A moderator guide must be prepared. This guide is a detailed outline of topics that should be covered in the focus group, when each might be addressed, and how available time will be used. The appropriate respondent population must be identified and a method of participant recruiting chosen. Because the sample sizes of focus group studies, even those including several groups, are rarely large, and quantitative data (e.g., population estimates with confidence intervals) are not sought, a probability sample of the target population is usually not attempted. Consequently, generalization to larger populations is problematic. Instead, certain participant characteristics are specified (e.g., women between 30 and 45 years of age who regularly use a particular product) and the groups are then

composed of samples of paid volunteers obtained in any of several ways (e.g., from community groups, via telephone or mail screenings, from firms providing names). For a number of reasons (to avoid distractions, to target specific respondent populations), focus groups are typically fairly homogeneous demographically. If information is sought from diverse subpopulations (e.g., men and women; old and young), this is typically achieved by running separate homogeneous focus groups.

Focus group sessions follow no specific set of procedures. However, in practice, there are a number of common features. Although they sometimes are conducted via teleconference, the discussion is nearly always conducted face-to-face and is recorded; these days, video recordings are the norm. The moderator leads the focus group through usual stages of group discussion – general orientation (introductions, ground rules), orientation to the topic (via more general discussion), focus on specific topics of interest (defined in the moderator guide), and wrap up. The moderator attempts to act as a facilitator, encouraging and guiding but not dominating discussion. Any of a number of mechanical (e.g., presenting product samples or commercials; having respondents write down ideas before discussion) and social (e.g., soliciting views of quiet participants; seeking reactions to most active participants) methods can be used in this pursuit. Several special steps may be taken with unusual respondent groups (e.g., children, experts). There may be postgroup discussions among investigators (e.g., the moderator and the client). There may also be a formal report prepared by the moderator to summarize and interpret the content of the focus group discussion. There are also several variants of the generic focus group, including two-way groups (where two groups may observe and comment on one another's interaction), dual-moderator groups, dueling-moderator groups (where a pair of moderators take opposing positions), client-participant groups (where one or more client representatives participate), and virtual focus groups (using telephonic or video links).

The purported benefits of the focus group technique include the following: (a) it can often be easier and less expensive to use focus groups than more traditional survey or interview techniques (although the cost-per-respondent can be considerably higher for some focus groups); (b) the group setting can provide insights into social forces of interest (e.g., peer pressure on product use); (c) the group setting permits reactions not only to questions from the moderator, but to the comments of other group members; (d) the group setting encourages greater honesty, spontaneity, involvement, and thoroughness of responding; and, consequently, (e) one has access to more useful information, including respondents' emotional reactions, vivid anecdotes, novel ideas, vernacular expression, etc. Unfortunately, such claims, as well as prescriptions for focus group practice, are based primarily on "experienced validity" – the subjective evaluations of focus group users and proponents. There is very little published research documenting these claims (e.g., Bristol & Fern, 1996, 2003; Seal et al., 1998). Moreover, there clearly are limits to the applicability of focus groups—e.g., when the topics are considered private and anonymity is desired, when one wants to generalize to broad populations. However, if the purported benefits could be verified, focus groups might provide an effective technique for a variety of objectives--assessing attitudes, probing for suspicion postexperimentally, doing introspective process analyses of social processes, or for exploratory hypothesis-generating research (see Fern, 2001; Krueger & Casey, 2008; Liamputtong, 2011; or Stewart et al., 2006, for more detailed descriptions of focus group methods).

B Quality Circles

Quality circles (or quality control circles; QCs) are used primarily in business and industrial settings. They are seen as an alternative to more traditional and hierarchical systems of management, an alternative which involves workers themselves more actively and directly in their work and organization. QCs were developed in the 1960s in Japan and have grown in popularity in many Western industries.

Hutchins (1985) defined a QC as

> "…a small group of between three and twelve people who do the same or similar work, voluntarily meeting together regularly for about one hour per week in paid time, usually under the leadership of their own supervisor, and trained to identify, analyze, and solve some of the problems in their work, presenting solutions to management and, where possible, implementing solutions themselves." (p.1).

To this end, a number of group techniques and principles are incorporated into QC procedures. For example, heavy reliance is placed on group brainstorming techniques for identifying workplace problems and solutions, the groups are limited in size to permit general participation in face-to-face meetings, and decision making is democratic – one person, one vote. Various aspects of the QCs' functioning are not distinctively social in nature, such as collecting relevant data, analyzing the causes of workplace problems, and preparing clear and persuasive presentations of recommendations to management. Implementation of QCs and achieving their purported benefits (described below) is not simply a matter of forming groups of coworkers, but requires fairly extensive organizational commitment and support (e.g., a willingness to invest organizational resources, a willingness to seriously consider QC proposals).

The participation and involvement of workers achieved through QCs is alleged to have extensive benefits: reduced turnover, fewer grievances, improvements in productivity, improvements of quality, higher worker morale, and stronger corporate loyalty and identification. Attempts to verify these claims empirically have produced mixed, negative, or null results (Barrick & Alexander, 1987; Park, 1991; Pereira & Osburn, 2007; Steel & Shane, 1986)., and there are indications that the effectiveness of QCs are strongly moderated by other factors (e.g., the duration of the QCs; management's attitude toward QCs; see Park & Golembiewski, 1991). Although there are very difficult methodological problems in the evaluation of QCs (e.g., participant self-selection; reliance on quasi-experimental designs), the growing popularity of QCs and several indications of positive results certainly justify more careful empirical attention. Besides posing interesting substantive questions for research on group and organizational processes, QCs might be usefully applied within research teams themselves. (See Hutchins, 1985, or Ingle, 1982, for more detailed descriptions of QCs.)

B Nominal Group Tecnique

The nominal group technique (NGT), developed by Delbecq and Van de Ven (e.g., Delbecq, Van de Ven, & Gustafson, 1975), was designed to overcome certain aspects of unconstrained face-to-face discussion that can interfere with effective group problem solving and decision making. Of particular concern were those small group processes that tend to prevent full and thorough participation by all group members. These included (a) the reluctance of some members to participate, especially in larger groups; (b) domination of group discussion by an opinionated, loquacious, repetitive, or high-status individual or faction; (c) the diversion of time and effort to organize and maintain the group that might be devoted to generating and evaluating ideas; (d) getting stuck on a single line of argument for long periods; and (e) hurrying to reach a speedy decision before all relevant information has been considered. NGT attempts to counter such problems by using nominal groups (as described above for brainstorming research) for idea generation.

Another set of problems can arise from explicit requirements or implicit pressures to achieve consensus in groups. Group members might (f) become overcommitted to their initial publicly expressed opinion (cf. Kerr & MacCoun, 1985), (g) decline to participate or defend a position to avoid social sanctions from a leader or the majority faction, or (h) compromise or shift position simply to avoid such sanctions. NGT attempts to minimize such problems by having no explicit consensus requirement or decision rule and by pooling preferences statistically to define a group product.

Formally, there are four stages in the NGT. First, a moderator poses the problem to a group. The members of the group are given time (typically 10–20 minutes) to silently write down as many ideas or solutions as they can, much as the nominal groups used in brainstorming research. It is recommended

that the group be large enough to generate a substantial pool of ideas but not too large to make the following stages unwieldy; 7–10 members are thought to be optimal. During the second stage, group members state the ideas that they have written using a round-robin procedure. After each idea is stated, the moderator writes it down on a blackboard or flip-chart. Stage 3 consists of open group discussion of the recorded ideas. The emphasis here is on clarifying and evaluating each idea; there is no goal of consensus. A group decision or a preference ordering for ideas is determined by a nominal voting procedure at the fourth and final stage. Nominal voting requires each group member to privately evaluate the alternatives (e.g., rank ordering one's favorite five alternatives). The moderator pools these evaluations (e.g., computes mean rank orders) to identify the group's overall preference(s). Optional additional stages are another group discussion (this time focusing on the group decision) and another vote.

Proponents of the NGT take the sizeable literature demonstrating the superiority of nominal to brainstorming groups as indirect evidence for a superiority of the NGT to normal, face-to-face groups for idea generation. Van de Ven (1974) confirmed this claim empirically and also found that group members were more satisfied under a NGT than free interaction, a finding which he attributed to fuller, more uniform input under the NGT (cf. Stephenson et al., 1982). There is also some evidence that allowing group members first to share likelihood-ratio estimates before group discussion (consistent with Stages 1 and 2 of the NGT) produces more accurate aggregated postdiscussion estimates (Gustafson et al., 1973), relative to groups without such prediscussion sharing. It seems fair to conclude that the evidence for the NGT, although fragmentary, is encouraging (e.g., Arunachalam & Dilla, 1995; Delbecq et al., 1986; Duggan, 2003; Frankel, 1987; Henrich & Greene, 1991;). The availability of GCSSs also raises new opportunities to examine innovative modifications of the traditional NGT, much as it has for group brainstorming (e.g., Dowling & St. Louis, 2000; Lago et al., 2007). (See Delbecq et al., 1986; and Korhonen, 1990, for more detailed descriptions of the nominal group technique.)

B Delphi Technique

The Delphi technique seeks to pool the opinions of a group of people who are well-informed or expert on some topic of interest, but without direct, face-to-face interaction. Rather, an iterated sequence of questionnaires are sent to the group by a monitor. The monitor (who could be an individual or project team) is the conduit through which all communications are channeled. The monitor begins by identifying a panel of experts to whom an initial questionnaire is sent. In addition to dealing with several preliminary issues (e.g., explaining the projects' purposes and procedures, seeking respondent commitment to the project), the initial questionnaire poses some root questions on which subsequent rounds of the procedure are built. These questions would typically be few, very general, and open-ended; the goal is to let the group members (and not the moderator) define the domain of relevant opinions or issues. After the questionnaires are returned to the moderator, his or her next task is to develop a new questionnaire which (a) accurately and objectively summarizes group members' opinion from the initial questionnaire and (b) poses a revised, more focused set of questions for the next round. The new questionnaire is then sent back to group members. The feedback from the previous round keeps group members' identities anonymous and should ideally provide more than indices of central tendency. For example, in a Delphi application seeking technology forecasts, respondents might be given the median and interquartile range for estimates of when each of several events is expected to occur (e.g., "when will 90% of all university faculty have and use electronic mail?"), along with summaries of the supporting arguments provided by advocates of high, middling, and low estimates. Ideally, the procedure of questioning, summarizing responses, and requestioning is repeated as long as there seems to be progress (e.g., opinion continues to converge; positions are not static). At least two rounds are required for Delphi; the original developers recommended four rounds as optimal.

Delphi technique was developed at the Rand Corporation (Brown, 1968; Dalkey & Rourke, 1971; Helmer, 1966) as a means of pooling expert opinion. It has often been used to make technological

forecasts (Rowe & Wright, 1999, 2001), but is not restricted to such tasks; "it can be used for any purpose for which a committee can be used" (Martino, 1983, p. 16). It is seen as particularly useful when informed yet subjective judgments are the only or best data available for decision making, when face-to-face discussions are impractical (e.g., because the best-informed respondents are numerous, dispersed, or hard to schedule), or where one wants to avoid certain social psychological consequences of face-to-face discussion, which are presumed to undermine effective decision making (e.g., see the factors listed above in our discussion of the NGT).

The Delphi technique also has drawbacks. It requires respondents to complete and return several questionnaires. This requirement is likely to be a special problem when group members are busy (as genuinely expert respondents are likely to be) and the questionnaires seem complex or the iterated versions seem redundant. The process can also be expensive and time consuming (typically taking at least a few weeks when mail questionnaires are used); the advent of computer-mediated communication has helped reduce the latter problems. (See Kerr & Tindale, 2011, for an analysis of Delphi's strengths and weaknesses relative to alternative group aggregation methods.)

A final problem with Delphi, as with several of the other techniques described here, is that there is little empirical research documenting its efficacy. There are some suggestive findings (e.g., Dalkey, 1968, 1969–1970, Rohrbaugh, 1979); Dalkey reported that Delphi was superior to face-to-face interaction group estimates for almanac-type questions, but the validity and generality of the claims made for Delphi await systematic research attention. (See Alder & Ziglio, 1996; Delbecq et al., 1986; Keeney et al., 2011, for more detailed descriptions of the Delphi technique. See Sackman, 1975, for a pointed critique of the method.)

Judge Advisor Systems

A relatively recent technique for both simulating some real group decision settings and furthering our understanding of social influence processes in groups is the Judge-Advisor Systems approach (Sniezek, 1992; Sniezek & Buckley, 1995). In many settings, final decisions are made by an individual person or judge (military leaders, CEOs, etc.) but only after soliciting advice from a number of others (advisors). Sniezek (1992) argued that such decisions are a group product and by conceptualizing group decisions in this way, one could attempt to isolate the influence of each person (either judge or advisor) on the decision outcome. By manipulating the amount of information advisors could provide for judges (action preference, confidence level, rationale, etc.) and the number of advisors, she and her colleagues have attempted to assess how judges used advice in making decisions.

Variation among advisors in expertise, past performance accuracy, and stated confidence can be observed or created in order to assess how each factor influences the final decision by the judge. Two relatively robust findings from this approach are that an advisor's stated confidence is a strong predictor of influence (Sniezek & Buckly, 1995) and that judges tend to weigh their own preference more heavily than their advisors', even when the advisors have more expertise and accuracy (Harvey, Harriea, & Fischer, 2000: Yaniv & Kleinberger, 2000). Judges are also more influenced by advisors who tend to agree with them (Harvey et al., 2000).

B Afterword: On the Illusion of Group Effectiveness

A curious anomaly has been reported by brainstorming researchers (Paulus & Dzindolet, 1993; Stroebe et al., 1992). Although interacting brainstorming groups consistently perform less well than comparable nominal groups, participants in both conditions believe that they are and were more productive in a group than working alone.

In this section we have considered a number of methods, all of which extol the particular effectiveness of group settings for accomplishing varied tasks. And indeed, as Steiner (1972) has shown theoretically, for most tasks the potential productivity of a group is greater than mean individual productivity. The illusion of group effectiveness documented in brainstorming groups may stem (in part or in whole) from some confusion between what the average individual can do and what a nominal

group of such individuals can do. It may also stem from there being more instances when working alone of feeling stumped or unsure how to proceed; the higher rate of such apparent failures can also explain the greater task enjoyment and satisfaction observed in brainstorming groups, compared to nominal groups (Nijstad et al., 2006). It is important to keep this illusion in mind when considering group methods that are highly touted but inadequately evaluated.

A CONCLUSIONS

We hope that we have been able to show that the distinction between individual and group phenomena is an important one. Group processes are fundamentally different from individual psychological phenomena in important ways. In this area of social psychology (as well as related areas, such as the study of interpersonal relationships) we must examine the behavior of individuals as they are simultaneously being affected by the overt or implicit behaviors of others. The investigator must ensure that his or her methods create a truly "social" experience. Hence, to study group and other interpersonal phenomena routinely requires not only a different, more complex set of concepts and units of analyses but also a different, more complex set of methods than is needed to study individual behavior.

Allport (1962) suggested that the contrast of individual and group behavior represents the master question of social psychology. Steiner (1986) has suggested that the dominant meta-paradigm of social psychology at the end of the 20th century featured individual-level analyses and focuses on single-factor, intrapsychic, cognitive mediators of behavior. He argues persuasively that this metaparadigm is inimical to the study of group phenomena. The many forces – theoretical, professional, and cultural – that have produced this meta-paradigm (cf. McGrath & Altman, 1966; Steiner, 1986) are powerful and show no signs of abating. Yet as scientific social psychology enters its second century, we continue to be optimistic that it will not lose sight of the master question that dominated the initial decades of its first century. Analyses of publication trends (Moreland, Hogg, & Hains, 1994; Moreland & Wittenbaurm & Moreland, 2008) have suggested that interest in group phenomena has been increasing after several decades of decline. A hopeful sign is that much of this new interest reflects the integration of traditional topics of intragroup process (see Table 15.1) with some topics that have received much attention during social psychology's past few decades, such as social cognition and intergroup relations. Although the study of group phenomena does present a number of special difficulties, both conceptual and methodological, whether these trends continue will have less to do with overcoming such difficulties than with how clearly we recognize the centrality of group phenomena for human social behavior and accept the challenge of tackling the master question of our field.

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TABLE 15.1. Major Topics, Paradigms, and Variables of Group Research

Substantive Topic/Area & Core Questions	Representative Paradigms (& Articles)	Representative Independent Variables	Representative Dependent Variables
Intragroup processes			
Group formation & development	Festinger's cohesiveness paradigm (p. 238) (Back, 1951)	Relevance of task to the group	Level of group cohesiveness
What functions does group membership serve?		Other members' resources & knowledge	Distribution of speech acts
How are group members recruited and socialized? Do groups go through standard phases of development or work?		Task type	Desire to affiliate
	Newcomb's acquaintance-process paradigm (p. 188) (Newcomb, 1961) The affiliation paradigm (p. 193) (Schachter, 1959) Levine & Moreland's newcomer paradigm (Moreland, 1985)	Group size	
Group structure		Task features	Task performance
What is the pattern of relationships (liking, power, status, communication, etc.) among group members?	Schachter's productivity-norm paradigm (p. 123) (Schachter et al., 1951)	Allowed patterns of communication	Evaluation of group members Allocations to self vs. others
What is the effect of such patterns on group functioning?		Group cohesion	Perceived social norms/role
What expectations of member behavior (e.g., roles & norms) develop and guide behavior in the group?	Adam's inequity paradigm (p. 204) (Walster, Walster, &		

	Bersheid, 1978)		
Group Communication	Bales's Interaction Process Analysis (IPA) paradigm (p. 142) (Bales & Strodtbeck, 1951)	Size of group	Participation rates
Who says what to whom?		Type of problem	Distribution of comments within a coding scheme
How are member characteristics related to amount and type of communication?	The Communication Network paradigm (p. 168) (Leavitt, 1951)	Permitted communication links	Subjective ratings of influence or leadership
How does the amount and type of communication affect one's status in the group?			
	The Valence Coding paradigm (Hoffman & Maier, 1964)	Distribution of shared and unshared information in the group	Solution quality
Can group preference or solution be predicted from patterns in the content of communication			
How efficiently do groups elicit task-relevant information from their members?	The Hidden Profile paradigm (Stasser & Titus, 1985)		
Social influence processes	Asch's conformity paradigm (p. 235) (Asch, 1951)	Task type	Level of compliance
What are the basic processes through which group members exert influence on one another?	Sherif's group norm paradigm (p. 234) (Sherif, 1936)	Level of group cohesiveness	Imitative behavior
What personal and situational factors lead to leadership emergence and effectiveness?	Milgram's obedience paradigm (p. 181) (Milgram, 1974)	Levels of power/status of influencer	Inclusion/exclusion from the group
	Bystander-intervention paradigm (p. 231) (Latané, & Darley 1970)	Relationships between members	Group performance
	Social-learning paradigm (p. 230)	Leadership styles	

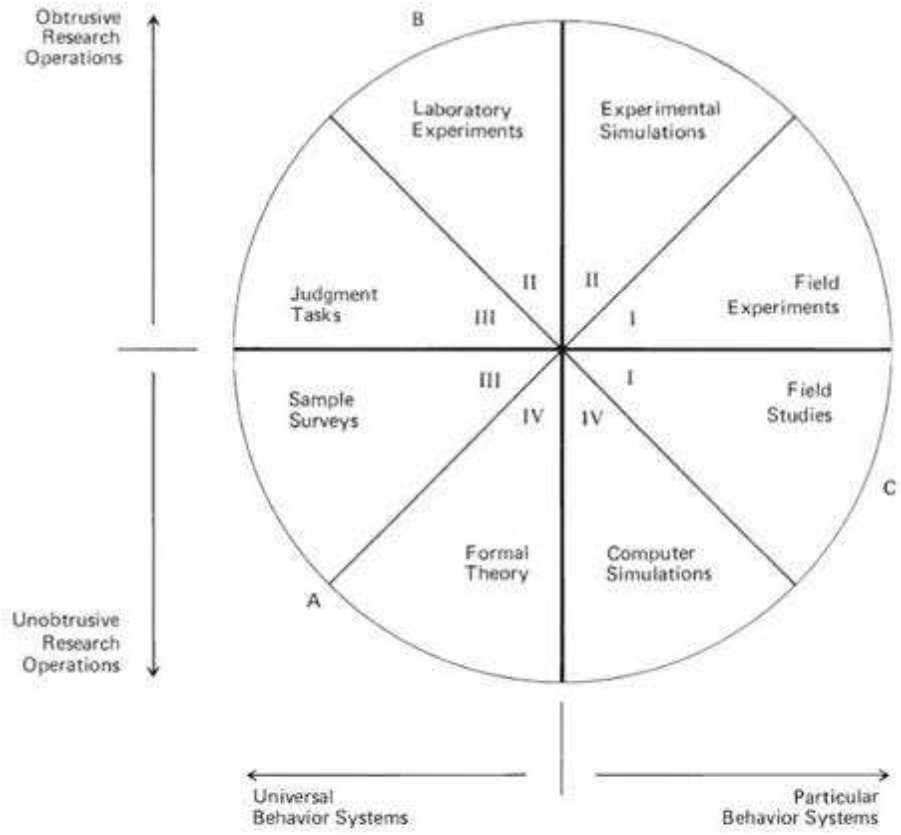
	(Bandura, 1962) Reaction to deviate paradigm (p. 239) (Schachter, 1951) The leader style paradigm (p. 255) (Lewin, Lippett, & White, 1939)		
Group productivity How do member, group, and task features affect group productivity? What factors affect whether groups achieve, fall short of, or even exceed their nominal potential productivity?	Social-facilitation paradigm (p. 228) (Zajonc, 1965) Laughlin's concept-attainment paradigm (p. 70) (e.g., Laughlin & Johnson, 1966) Participatory decision making paradigm (p. 123) (Coch & French, 1948) Social loafing paradigm (Latané, Williams, & Harkins, 1979)	Presence of others Distribution of member abilities, personalities, etc. Group size	Task performance Member arousal Member contributions
Group decision making Are there systematic rules linking individual and group choices? Under what conditions are group decisions of higher or lower quality than individual decisions? What unique processes distinguish group from individual	Lewin's group discussion paradigm (p. 232) (Lewin, 1953) The Risky-shift paradigm (p. 81) (Wallack, Kogan, &Bem, 1962)	Public vs. private discussion Type of decision task Procedural factors Group composition Game/task features Prior training	Fulfilling intentions expressed in groups Contrast of individual and group judgment

decision making processes?	Davis' mock-jury, SDS paradigm (p. 85)	& experience	Distribution of group decisions Functional relation between individual and group
Intragroup conflict	(Davis, Kerr, Atkin, Holt, & Meek, 1975) Groupthink paradigm (Janis, 1982) Collective induction paradigm (Laughlin, 1996)	Social motives	
How do patterns of group member interdependence guide member behavior?	The prisoner's/social dilemma paradigm (p. 103) (Rapoport, 1976; Brewer & Kramer, 1986; Dawes, McTavish, & Shaklee, 1977)	Functional distance between	decisions (social decision scheme)
What are the ways members exchange resources to resolve such conflicts (e.g., through bargaining, negotiation, coalition formation)	The bargaining paradigm (p. 99) (Siegal &-Fouraker, 1960)	group members Seating positions Temporal demand	Absolute & relative gain of group members Levels of cooperation and competition
	Deutsch's Trucking game (p. 106) (Deutsch & Krauss, 1962)		Territorial behavior Task performance Interpersonal attraction/hostility
How do group members reconcile conflicts between	The Coalition paradigm (p. 110) (Komorita & Chertkoff, 1973)		
personal and collective interest?	The Westgate-Westgate West paradigm		
Environmental processes	(Festinger, Schachter, & Back, 1950) Sommer's personal space paradigm		
How do features of the physical environment affect group and group-member behavior?	(p. 217) (Sommers, 1959) Groups-in-isolation paradigm (p. 218)		

How do groups regulate their use of physical environments	(Altman & Haythorn, 1967) Crowding-performance paradigm (Freedman, Klevansky, & Ehrlich, 1971)		
Extra-group processes **Groups as contexts for action**	The deindividuation paradigm (Diener, Lusk, DeFour,&Flax, 1980) Kelley's emergency-escape paradigm (Kelley, Condry Dahlke, & Hill, 1965)	Group/crowd size Level of anonymity	Antisocial behavior Counternormative behavior
How does being in a group, particularly in a very large groups or crowd, alter thinking and action?		Group membership Permeability of group boundaries Level of intergroup conflict of interest	Intergroup conflict Allocation of resources to in/outgroup members Perception/evaluation of in/outgroup members
Intergroup relations	Sherif's Robber's Cave paradigm (p. 118) (Sherif et al., 1961) The minimal-group paradigm (Tajfel, Billig, Bundy, & Flament, 1971) The in-/outgroup homogeneity paradigm (Judd&Park, 1988)		
What are the causes and cures of intergroup conflict? How does group membership alter social perception?			

Note: All page references enclosed in () brackets refer to McGrath (1984).

Figure 15.1. Runkle & McGrath's Method Circumplex



I. Settings in natural systems.
II. Contrived and created settings.
III. Behavior not setting dependent.
IV. No observation of behavior required.

A. Point of maximum concern with generality over actors.
B. Point of maximum concern with precision of measurement of behavior.
C. Point of maximum concern with system character of context.

Footnotes

[1] Historically, the defining features of the small group have also been the focus of some debate (cf. Forsyth, 2009). As a way of demarking a set of research question and substantive phenomenon, we like McGrath's (1984) flexible, fuzzy-set definition of the group: "an aggregation of two or more people who are to some degree in dynamic interrelation with one another" (p. 8). However, in the present context, we believe that the definition that we present here is both serviceable and consistent with most perspectives on group phenomena.

[2] We should note that we will not address all of the methodological issues that arise in the study of groups in this chapter. In particular, see Kashy, Ch. 19, this volume, for a detailed discussion of how to handle some of the statistical problems that arise in the analysis of group data, and see Klein and Kozlowski (2000) for an introduction to the conceptual and methodological problems that arise when studying collective phenomena at varying levels of analysis.

[3] Note that consideration of observation-recording techniques is also relevant to some laboratory-based research, particularly the type, discussed more fully later, that has participants interact face-to-face with few constraints on behavior.