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GROUPS: INTERACTION AND PERFORMANCE

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A CONCEPTUAL FRAMEWORK FOR THE STUDY OF GROUPS

There are many different perspectives from which one can view a group, and many ambiguities already noted in defining groups and their membership. For such a complex and ambiguous set of concepts, it is often useful to adopt a frame of reference, a map, that models or lays out systematically the various parts of the topic as a research problem. This section offers such a conceptual model for the study of groups (see Figure 1-1).

The point of such a model is to lay out the underlying logic of the problem in a way that can serve as a guiding framework for exploring the problem in its various aspects. For a complex problem, you cannot study everything at once, you cannot think about everything at the same time. This kind of model lets us take the total problem apart, so we can think about and examine evidence about a manageable chunk of it, and then be able to fit the parts back together again. Furthermore, such a framework tells us what batches of things to look at—what sets of variables are likely to be important—and at the same time offers a logic for deciding what sets of relations among these variables are likely to be important to consider.

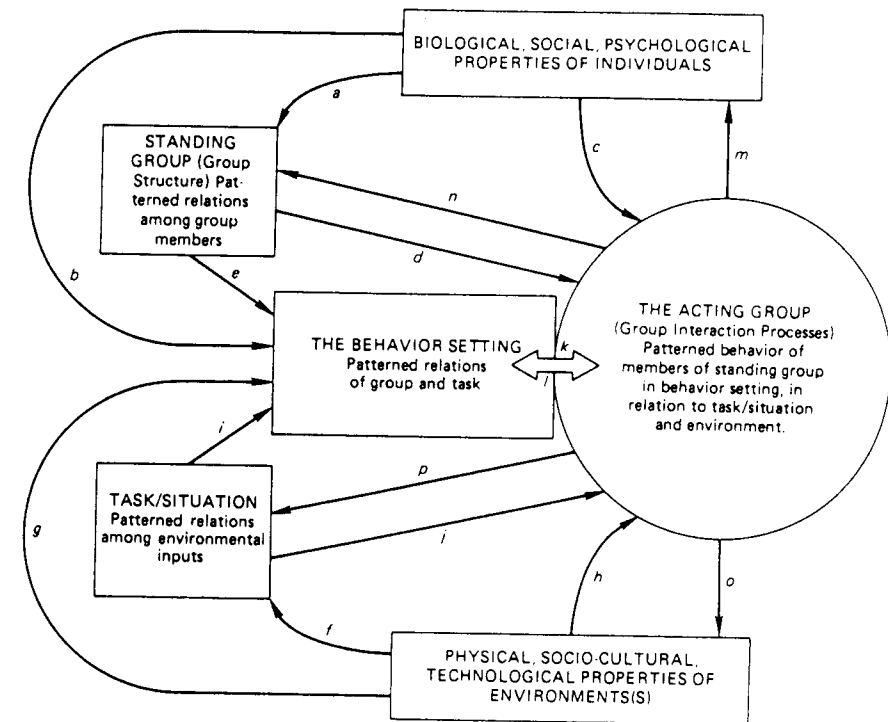
Note that this is intended to be a model of the problem (i.e., studying groups systematically), rather than a theory or model of groups. Such models are sometimes called “metatheories.” They reflect a way of looking at the problem that encompasses a whole family of possible substantive theories. But they do not specify any one particular theory. Here, we are talking about *classes* of properties or variables, and the logical relations between those classes. But there is no specification of specific sets of relations between specific sets of variables—as there would be in a substantive theory.

Main Classes of Variables

The central feature, the “essence,” of a group lies in the interaction of its members—the *behaving together*, in some recognized relation to one another, of two or more people who also have some past and/or future relation to each other. So *group interaction process* is the centerpiece of the model.

Certain things go into that group process. For one thing, there are participants, or group members. They come to a group interaction with all their “properties” (traits, characteristics, beliefs, habits, etc.). A member may be strong, or extroverted, or wise, or old, or female, or bellicose, or clumsy, or many other things. *Some* of these properties of members may affect group interaction. So, if one wants to understand and perhaps predict aspects of group interaction process, one must take these group member properties into account.

These participants make up the group being considered, and one can think about the pattern of relations among group members, *prior to* any group interaction process, as another batch of potentially important properties or



Arrow in the Model

Relations Implied

a	Member composition of focal group.
b and c	Extramember effects of individuals on Behavior Setting and on Group Interaction Process.
d and e	Effects of Standing Group (group structure) on Behavior Setting and on Group Interaction Process.
f	Environmental factors as they structure the Task/Situation.
g and h	Extratask effects of Environment on Behavior Setting and on Group Interaction Process.
i and j	Effects of Task/Situation on Behavior Setting and on Group Interaction Process.
k and l	The dynamic relation between the Behavior Setting and Group Interaction Process.
m and n	Effects of Group Interaction Process on members, and on the Standing Group.
o and p	Effects of Group Interaction Process on Task/Situation, and on the Environment.

FIGURE 1-1 A Conceptual Framework for the Study of Groups

variables. Do group members like each other? Do they have differential influence on each other (for example, does one person exercise more leadership or dominance than the others)? How many members are there and how long have they belonged to this group? Group members are related to each other in many ways; a lot of those relations affect how they behave in relation to one another when they interact. These patterns of relations among members—*aspects of group structure*—also must be taken into account if one wants to understand and predict group interaction process.

Group interaction takes place somewhere, in some *environment*. It may involve a group of workers doing their jobs in an assembly plant; a set of executives holding a conference in a company meeting room; a County Planning Board having its monthly meeting; a family eating dinner on a Wednesday evening in April; a football team getting a dressing room talk between halves of a game; a group of kids playing with some old tires in a dump; two couples at a night-club; an airplane crew flying from Texas to Toronto; a Broadway company rehearsing in a theater. In all of these cases, the group interaction is taking place in an environment that includes both physical and social aspects. Many of these can make a difference in how members behave, hence can alter group interaction process.

Group interaction not only takes place somewhere, it involves the group *doing something*. One very important aspect of all of those settings just enumerated is the “task.” Any group interaction (actually, any intact portion of such an interaction) can be characterized in terms of the task(s) that the group (or its members) is trying to carry out: giving (and receiving) a lecture or a sermon or a play; processing steel; assembling an auto; choosing a new vice president; deciding on a zoning variance; preparing a budget justification; arbitrating a grievance; enjoying dinner; having a good time at the nightclub, on the backpacking trip, or in the dump. The task, as you can see from those examples, involves informally assumed goals (e.g., having a good time) as well as assigned jobs (e.g., assembling an auto). What the group is doing, or trying to do, as well as where this is taking place, affects group interaction process in many ways. So, the task situation represents another class of “factors” one must take into account if one wishes to understand and predict group interaction process.

These major classes of inputs—properties of group members; properties of the standing group (group structure); properties of the task/situation; and properties of the surrounding environment—set the conditions under which group interaction takes place. Furthermore, the effects of these four sets of properties, singly and in combination, are forces that shape the group interaction process.

The group interaction process itself is both the result of these shaping forces and the source of some additional forces. While group interaction is greatly affected by those sets of input variables—properties of members, of the group, of the task, and of the environment—it is also patterned, in part, by forces internal to (or indigenous to) the interaction process itself. The latter part of this chapter delves further into the internal forces of group interaction process.

Furthermore, the interaction process and its results represent sources (forces) that potentially lead to changes in those very input conditions: changes in the members themselves; changes in the group structure, or the patterns of relations among members; and changes in the relation of the group to its tasks and to its environment. So, these sets of outputs (or outcomes, or consequences) of group interaction process are parallel to the input classes and, in fact, represent changes in those input variables.

These classes of factors, or “panels” of potentially important variables, are related to one another in relatively complex ways. These panels, and the relations among them, are diagrammed in Figure 1-1. The parts of that model are discussed next.

A Model of Effects by and on Groups

The conceptual framework for study of groups starts with two givens: individual people, who are the members of the group in question (what will be referred to, at times, as the focal group, for clarity of reference); and the environment in which those people are embedded. So we begin with two panels of potentially relevant properties: properties of the group members as individuals; and properties of the physical, socio-cultural and technological environment(s). The former panel includes biographical and demographic characteristics (age, gender, etc.); personality dispositions; beliefs, attitudes and values; moods, feelings, states of mind; and drives, needs, motives, goals and expectations. The latter, environmental, panel includes conditions of the general physical environment (noise, heat, lighting, etc.) and of the social environment (inter-group conflict, loyalty, alienation, etc.).

Both of these panels of variables are huge, perhaps even infinite. So it is necessary to be very selective in terms of what properties are to be included in a study. Such selectivity is one of the functions of theory, as noted earlier. That is, theory functions as a guide to the investigator in selecting variables for study that are thought to be germane to the problem.

When people become interrelated, as when they are members of a group, they develop patterned relationships among themselves—patterned in terms of status, of power, of affection, and of many other aspects. These patterned relationships among group members constitute a group structure. There are many such patterns, such group structures—as many as there are variables or properties on which members can be connected to one another. These include, *at least*: structures defined in terms of composition of members; structure defined in terms of division of labor on tasks; communication structures; power structures and interpersonal relations structures. In the model, the *collection* of all these structures is called the *standing group* (to distinguish it from the *acting group*).

Environmental properties, too, are patterned; and one particular portion is of special importance in the present discussion. That important part is the set of environmental demands/constraints/opportunities that combine to form a

particular task and situation. Environmental properties “play into” more than one task/situation, of course, and even more than one at the same time, just as group members “belong to” more than one group, and even more than one at the same time. So, for clarity, we probably should designate our referent as the focal task/situation, recognizing that the environment abounds with “tasks.”

We can consider the juxtaposition of the standing group and the task as the Behavior Setting. The term, behavior setting, is borrowed from the work of Roger Barker and his colleagues (Barker, 1965; Barker & Wright, 1955). But the reader should be warned that I am changing the use of that term in one important respect. When Barker talks of the behavior setting, he is dealing with individuals behaving in environments, or individuals behaving in task/situations; but Barker does not use concepts of group, group structure, or group process at all. Barker sees individuals, and their behavior, as related to one another primarily through the demands of the situation.

In the model, the behavior setting represents a pattern—a fit—between the group as a structured entity (the standing group) and the task/situation as a structured set of requirements/demands/opportunities/possibilities/constraints. Notice, too, that the framework has both properties of individuals and properties of the environment “playing into” the behavior setting directly, as well as indirectly through the group and the task. This is equivalent to saying that, while a particular concert (behavior setting and group interaction process) is to be viewed as *mainly* a juxtaposition of a particular orchestra (standing group) with a particular set of musical compositions (task/situation), properties of the orchestra members (M) and of the concert hall, the city, and perhaps the time of year (E), can also have effects on the results.

All of these form the “inputs” for what I am calling group interaction process (GIP), or the *acting group*. GIP refers to the *processes* that take place when group members actually interact, in behavior settings that carry task structures and environmental effects. Such activity can be described in terms of many processes, including (at least) general structural properties such as level and rate of interaction, distribution of participation, extent of member involvement, and so forth, all of which might be labeled *morphological properties*; the flow of work; the flow of information or communications; the flow of influence; and the flow of interpersonal affect. The *acting group* is the term used in this book for the collection of all of these interactive processes. In a sense, the behavior setting refers to the time-place-thing-person complex that serves as the site for the behavior of the acting group. The acting group and the behavior setting are the “action” and “state” sides of the same coin. In Barker’s terms, the behavior setting is “circumjacent to” the group interaction process. This is represented in Figure 1-1 by showing the behavior-setting-to-group-interaction-process relation, and the reciprocal relation, as a double arrow, K and L.

The group interaction process feeds back into, and has effects on, all the panels of input variables out of which it has sprung. Individuals are often changed (for example, their attitudes are influenced) as a result of being members of an acting group. Group interaction can change the structure of the standing group; for example, it can change the pattern of attraction among members. Group interaction sometimes results in effects on the environment;

and it quite often results in a shift in the relation of the focal group to its task/situation. Such changes are usually dealt with in terms of task performance effectiveness or task productivity.

All of these effects (the eleven input arrows, *a* to *k*, and the five feedback arrows, *l* to *p*, in Figure 1-1) are important in principle, and are worthy of study. But many of them have been more thoroughly studied than others, and some of them are of more theoretical or practical significance than others. So the organization of later parts of this book will reflect selective treatment of some of these classes of relations more thoroughly than others. One basis for the selection of particular sets of relations for special attention is my particular conception of the interaction process and what it entails. That conceptualization will be presented next.

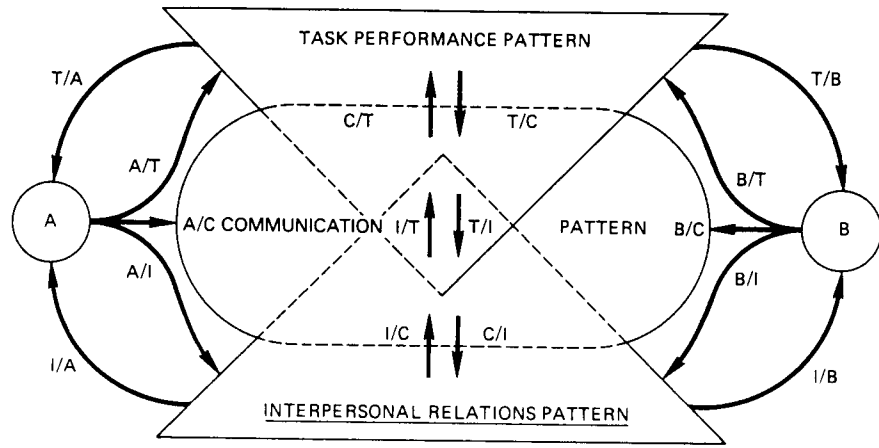
A MICRO-VIEW OF THE INTERACTION PROCESS

When two or more people interact—that is, when they do something together—a rather complex set of processes take place. That interaction can be viewed in terms of three stages or modes. First a behavior by one member (A), verbal or otherwise, can be regarded as a *communication* from A to others (B, C, and so on). A series of such behaviors, by a set of interacting persons, can be regarded as the *communication process*. The *form* or structure of such a series of interactive behaviors or communications entails such factors as the communication channels and modalities used, the distribution of acts among persons and over time. That form or structure can be regarded as a *communication pattern*.

Each such behavior also can be considered with respect to its *content*. In principle, every interactive behavior can be regarded as having both a *task component* and an *interpersonal component*. The task oriented aspects of the participants’ activities can be viewed as the *task or action process*, which results in a *task performance pattern*. The interpersonal oriented aspects of those activities can be viewed as the *attraction or acquaintance process*, which results in an *interpersonal relationship pattern*.

The third stage of the interaction process has to do with its *impact*. The three patterns resulting from the interaction (the communication pattern, the task performance pattern and the interpersonal relationship pattern) in turn have effects on one another and on the participants. Such effects constitute the *influence process*, which involves the outcomes or consequences of the interaction for the participants, for their relationships to one another, for their task performance and for their subsequent communications. These relations are shown in Figure 1-2 and listed in Table 1-1.

This trimodal perspective, along with the overall conceptual framework presented earlier, provides the basis for the organization of much of the rest of the book. Part II, (chapters 5 through 11) is devoted to the *task content* of group interaction; that is, the task performance process. In terms of the overall



A, B	Group members	<u>Outcome</u> T/A, T/B	Effect of task performance on members
<u>Form</u> A/C, B/C	Communication process	I/A, I/B	Effect of interpersonal relations on members
<u>Content</u> A/T, B/T	Task Activity (Action Process)	C/T, T/C	Effect of communication pattern and task performance on one another
A/I, B/I	Interpersonal Activity (Attraction Process)	C/I, I/C	Effect of communication pattern and interpersonal relations on one another.
		T/I, I/T	Effect of task performance and interpersonal relations on one another

FIGURE 1-2 Interaction as a Three-Stage Process

conceptual framework, those chapters deal with “arrows” i, j, and p. (See Figure 1-1). By treating the task performance material earlier in sequence than the logic of the models would imply, I want to give that material special prominence. Much of the continued interest in groups over the years has focussed on groups as potential vehicles for improving task performance. Following those chapters on task performance, Part III deals with groups as systems for structuring interaction. Chapters 12 and 13 deal with the form or pattern of interaction and with the communication process. Chapters 14, 15 and 16 deal with the interpersonal content of interaction; that is, with the *acquaintance or attraction* process. Chapters 17 and 18 deal with outcomes or consequences of interaction; that is, with the *influence process*.

Before these presentations, though, the remaining chapters of Part I (chapters 2, 3, and 4) provide some background needed to make the detailed analyses of later parts of the book understandable. First, in chapter 2, there is a brief outline of past research on groups, of trends in that research, and of the role that theory (and its absence) has played in past group research. Chapter 3 presents a discussion of some general features of research methods in the social

TABLE 1-1 Interaction as a Three-Stage Process

PROCESS	<i>Communication Process</i>	<i>Action Process</i>	<i>Attraction Process</i>	<i>Influence Process</i>
ASPECTS OF INTERACTION	<i>Form of Interaction</i> Modalities Participation patterns Temporal patterns	<i>Content of Interaction</i> Task component: Generate Choose Negotiate Execute	<i>Attraction component:</i> Affect Control	<i>Consequences of Interaction</i> Impact of communication, task and interpersonal patterns on participants A & B and on each other
RESULT	<i>Communication Pattern</i>	<i>Task Performance Pattern</i>	<i>Interpersonal Relations Pattern</i>	<i>Pattern of Change in:</i> Participants; Communication; Task; Interpersonal relationships

and behavioral sciences and how those features both enable and constrain research on groups. Chapter 4 takes the concern with method one step further, providing a discussion of the various kinds of social units that have been used in the study of groups and classifies them in terms of their relations to the definition of groups given earlier in this chapter.

**STRATEGIC LEVEL ISSUES:
CHOOSING A SETTING
FOR A STUDY**

Research evidence, in social and behavioral sciences, always involves *somebody doing something, in some situation*. When we get such evidence, we can, therefore, “reference” it on three aspects or facets: Whose behavior is it about (which Actors)? What behaviors is it about (which Behaviors)? What situations is it about (which Contexts)?

When you gather a batch of research evidence, you are always trying to maximize three things:

1. The *generalizability* of the evidence *over populations* of actors (A).
2. The *precision* of measurement of the *behaviors* (and precision of control over extraneous facets or variables that are not being studied) (B).
3. The *realism* of the situation or *context* (in relation to the contexts to which you want your evidence to refer) (C).

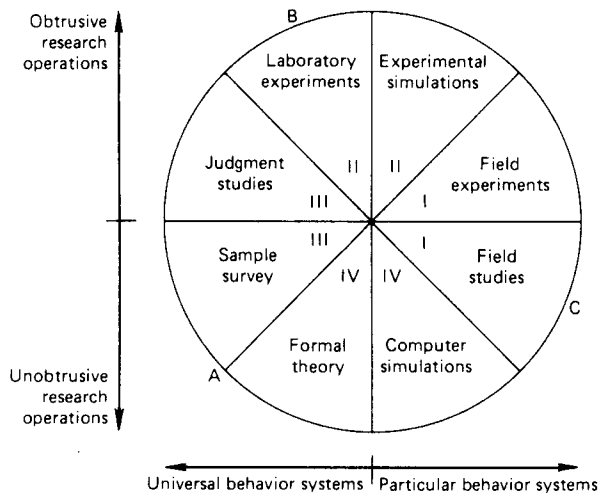
While you always want to maximize A, B, and C simultaneously, *you cannot*. This is one fundamental dilemma of research methods. The very things you can do to increase one of these reduces one or both of the other two. For example, the things you do to increase precision of measurement of behavior and control

of related variables (B) necessarily intrude upon the situation and reduce its "naturalness," or realism (that is, reduce C). Conversely, the things you can do to keep high realism of context (C) will reduce the generality of the populations to which your results can be applied (A) or the precision of the information you generate (B), or both.

The nature of this strategic dilemma is made clearer in Figure 3-1, which shows a set of eight alternative research strategies or settings in relation to one another. That figure shows where among the strategies each of three desired features—generalizability over populations (A), precision in control and measurement of behavior (B), and realism of context (C)—is at its maximum. It also shows, though, that strategies that maximize one of these are far from the maximum point for the other two. The spatial relations in Figure 3-1 emphasize the dilemma just discussed: the very things that help increase one of the desired features—A, B, and C—also reduce the other two. *It is not possible to maximize, simultaneously, all three.* Any one research strategy is limited in what it can do; and research done by any one strategy is flawed—although different strategies have different flaws.

The strategies listed in Figure 3-1 are in four pairs. Some are familiar ones. Field studies refer to efforts to make direct observations of "natural,"

FIGURE 3-1 Research Strategies



- 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 measurement of behavior.
- C. Point of maximum concern with system character of context.

ongoing systems (in the present context that means existing groups), while intruding on and disturbing those systems as little as possible. Laboratory experiments are attempts to create the "essence" of some general class of systems (for the present case, groups) in a context in which the researcher can control all (or at least very many) of the extraneous features of the situation, in order to be able to maximize the essential features with precision. The two strategies in between refer to mixtures or compromises. Field experiments are field studies with one major intervention, the deliberate manipulation of some feature whose effects are to be studied. An experimental simulation is a laboratory study in which an effort is made to create a system that is like some class of naturally occurring systems (such as what are called mock juries later in this book), but which are artificial in that they are created by the researcher for study, and people perform in them for research purposes rather than for purposes stemming from their own lives.

Sample surveys are efforts to get information from a broad (and well devised) sample of actors, usually in the form of verbal responses to a relatively small set of questions. Judgment studies are efforts to get responses (usually from a very small and somewhat casually selected sample of "judges") about a systematically patterned and precisely calibrated set of stimuli. Surveys gain much generalizability over populations (A), but give up a lot in precision of measurement (B) to do so. Judgment studies have less generalizability over actors (A), but retain considerable precision of measurement (B). Both surveys and judgment studies try to deemphasize context—actually, to uncouple the behavior (judgment) from the context in which it is done. Thus, both are very low on realism of context (C).

The fourth pair of strategies are theoretical, not empirical. The term formal theory is used here to mean general theory. Such theories are high on generalizability over populations (A) because they attempt to be general; they are not very high on realism of context (C) because by being general they do not deal very concretely with any one context; and they are very low on precision of measurement of behavior (B), because, since they are theoretical rather than empirical, they in fact involve no behaviors. The strategy called computer simulation refers to attempts to *model* a specific real life system or class of systems. Such effects are also theoretical rather than empirical; hence they are low on B because they do not involve behavior. In comparison to formal theories, computer simulations are higher in C, because they are system-specific; but they thereby lose in A, because they are limited to populations indigenous to that class of systems.

To sum up: Field studies gain realism (C) at the price of low generalizability (A) and lack of precision (B). Laboratory experiments maximize precision of measurement and control of variables (B), at the price of lack of realism (C) and low generalizability (A). Surveys have high generalizability (A) but get it by giving up much realism (C) and much precision (B). Formal theories get generalizability (A) by giving up some realism (C) and much precision (B). The other four strategies are combinations located in between those four just discussed; they have the intermediate gains and losses implied by their positions in the "strategy circle" of Figure 3-1.

Doing research is *not* to be regarded as trying to find the right strategy.

There is no right one. Indeed, they are all “wrong” in the sense that each is inherently limited, flawed. But they are all potentially useful. In considering any set of evidence, one should take into account what strategies were used in obtaining various parts of it, hence the strengths and limitations of that evidence at the strategic level.

DESIGN LEVEL ISSUES: WHAT WILL YOU COMPARE AND WHAT WILL YOU LEARN?

Any study needs a plan for what data will be gathered, how that data will be aggregated and partitioned, and what comparisons will be made within it. Such a study plan is often called a *research design*. As is evident from the preceding discussion, choice of one or another of the various strategies will limit the kinds of designs you can use. But there are also some general features of study designs, and it is those features that are to be discussed here.

Correlation versus Comparison

All research questions can be boiled down to variations of a few basic question forms. One is the *baserate* question: How often (at what rate, or what proportion of the time) does X occur? That is a purely descriptive matter, but is often a very crucial underpinning of other information. A second general form of question is the *relational* question: Are X and Y related? Do they occur together? That question has two major forms. In the correlational form, it is: Is there systematic *covariation* in the value (or amount or degree) of X and the value of Y ? For example, does age covary with happiness? A high correlation between X and Y means that when X occurs at a high value, Y is also likely to occur at a high value; and when X is at a low value, Y is also likely to be at a low value. In the example from above, this would mean that older people were, by and large, happier than younger ones. The correlation between X and Y could equally well be high and *negative*, if high values of X went with low values of Y and vice versa. If that were the case for the example, then younger people would be, by and large, happier. There is little or no correlation between X and Y if knowing X doesn't help predict the value of Y . In the example, that would mean that older and younger people both vary in happiness, with some of each having high levels and some of each having less.

Given the example chosen here, of age and happiness, it certainly might occur to the reader that the highest level of happiness might occur, systematically, at some time other than in extreme old age or extreme youth. For example, happiness might increase up to age fifty, then decline. That would describe a nonlinear correlation (and, technically, a nonmonotonic one). There are statistical tools to test for such nonlinearity, although social scientists far too often do not use them when the evidence to be examined might well require them. But as the shape of the relation becomes more complicated—for exam-

ple, if happiness decreased from young child to adolescent, then increased to age fifty, then decreased, but flattened out after sixty-five—our statistical tools become more cumbersome to use and many of them become less adequate to the task of assessing such complex forms of relation.

Much research in the social and behavioral sciences makes use of correlations, linear and nonlinear, that involve two, three, or more variables. Such a correlational approach requires being able to measure the presence or values of X , and of Y , for a series of “cases” that vary on X and on Y . It can tell you whether X and Y go together; but it *cannot* help you decide whether X is a cause of Y , or vice versa, or neither.

Another form of the relational question is the *comparison* or *difference* question. The difference question involves asking, essentially, whether Y is present (or at a high value) under conditions where X is present (or at a high value), and absent (or low) when X is absent (or low). For example: Do groups perform tasks better (Y) when members like each other (X) than when they do not (X' or “not- X ”)? You could approach this question in either of two ways. You could go around collecting measures of “liking” until you had found a bunch of groups high on it and another bunch of groups low on it (and perhaps a bunch at intermediate levels), and then compare their average performance scores. That would be, in effect, just a messy version of the correlational approach. The other approach would be to set up some groups with members who do like each other and set up some other groups whose members do not like each other; then to give both sets of groups some common tasks to perform; and then to see if the average task performance (Y) of the “high liking” groups (X) is higher than the average task performance of the “low liking” groups (X'). For the comparison to be most useful, you would need to make sure that the two sets of groups were the same, or comparable, on all the other factors that might affect task performance—such as difficulty of the task, availability of task materials, quality of working conditions, task-related abilities, experience and training of members, and the like. You might render the groups comparable on some of these factors by *controlling* them at a single *constant* value for all groups of both sets. For example, you probably would want to have all groups in both conditions do exactly the same tasks. For some other variables, such as intelligence or abilities of members, that you could not hold at a constant value for all cases, you might want to *match* the groups, on the average, between the two conditions. You might even want to manipulate a second or third variable in addition to group liking—perhaps group size, for example. But you can only manipulate, match, and control a limited number of variables in any one study. You have to do something else about all the rest of the rather large set of potentially relevant factors.

That something else is called *randomization*, or random assignment of cases to conditions. Randomization means use of a random assignment procedure to allocate cases (groups) to conditions (high liking versus low liking, or, if you were also manipulating a second variable such as size, high-liking-large-groups versus high-liking-small-groups versus low-liking-large-groups versus low-liking-small-groups), so that any given case is equally likely to be in any of the conditions.

To do what has been called a “true experiment” (see Campbell & Stanley, 1966), you *must* have randomization of cases to conditions. If you do, then you

strengthen the credibility of your information about high X going with high Y (and low X with low Y); and, since *you* caused X to be high in one set of groups and low in the other, it is at least plausible that X is a cause of Y . If instead of doing such a true experiment, you had just let things vary, measured X and Y , and correlated them, then X might have caused Y , or Y might have caused X , or both X and Y might have been caused by something else that you didn't pay attention to.

You can see that true experiments are potentially powerful techniques for *learning about causal relations among variables*. But, as in all aspects of research methodology, you buy this high power at a high price in two ways: (a) a reduction in the *scope* of your study, insofar as you hold variables constant, and insofar as you make your experimental variables (the X 's) occur only at a couple of levels (high or low liking, or three-person versus six-person groups, for example) so that the results of that study will be thereby limited in generalizability; and (b) a reduction in realism of context, inasmuch as your activities (rather than "nature") have created the groups, designed the tasks, and elicited behavior that served your purposes, not the group members' purposes. It has been said that such an experiment lets you learn a lot about very little, whereas a correlational study may let you learn very little about a lot.

Forms of Validity

A study needs to have high validity in regard to four different types of validity questions (see Cook & Campbell, 1979). One, to which we have been attending in the preceding description of the "true experiment," is called *internal validity*. That has to do with the degree to which results let you infer about causal relations. A second form of validity has been called *statistical conclusion validity*. That refers to the confidence with which you can say that there is a *real difference* (in Y scores) between X cases and X' cases. Internal validity deals with a logical question, how to rule out alternative explanations (such as, that Y caused X or that both X and Y stemmed from unmeasured factor Z). But statistical conclusion validity is a statistical question, usually posed in some variation of the following form: How likely is it that the difference in average Y values, between the X batch of cases and the X' batch of cases, could have occurred by *chance*? If the probability of such a chance occurrence is less than 1 in 100 (written $p < .01$), or sometimes if it is less than 1 in 20 ($p < .05$), the researcher may conclude that results cannot be attributed only to chance. Usually, such results are said to be "significant" at the .01 or the .05 level.

When results are significant, the researcher may conclude that the hypothesis that only chance was operating *does not* account for the results; but he or she *may not* logically conclude that the hypothesis of interest (" X causes Y ") *does* account for them. It is only if the researcher can eliminate most other plausible rival hypotheses (e.g., that Y causes X ; that Y is caused by factor Z that also differed between groups, etc.), by the logic of his or her study design, that he or she can continue to entertain the X -causes- Y hypothesis as a plausible—but by no means certain—explanation for the results.

A study also needs to have clearly defined theoretical concepts and conceptual relations, and clearly specified mappings (or translations) of those concepts into empirical operations. This is called *construct validity*. Finally, the

researcher needs to have some basis for estimating how the obtained results would hold up if the hypothesis were tested on other populations of actors, using other measures of the same variables, in other situations and on other occasions in this same situation. Such estimates of generalizability refer to what is called *external validity*.

It will probably be apparent that the devices used to increase internal validity and statistical conclusion validity—the techniques used to gain precision—will threaten the external validity of that particular set of data. But the relation is not a symmetrical one. One should *not* leap to the conclusion that the converse is true. Things that aid external validity (e.g., large and varied samples) may either hinder or help internal validity or have no effect on it. Moreover, it is certainly *not* the case that things that *decrease* internal validity (e.g., not using randomization, or not using experimental manipulation) will somehow increase external validity. If you don't know what you found out in your study (i.e., if your study is low in internal validity or in statistical conclusion validity or in construct validity) then you cannot really determine whether or not, or how broadly, you can generalize it (i.e., what external validity it has)—but it doesn't matter anyhow. If you do know what you found out (i.e., if your study has high internal, statistical and construct validity), then it is important to try to determine how robust and general (i.e., how externally valid) those findings are likely to be.

There is much more to be said about study design, about difference versus correlation studies, about forms of validity, and about ways of dealing with plausible hypotheses that are alternatives to the hypothesis being tested—far more than can be said here. (For further reading on these questions, see Campbell & Stanley, 1966; Cook & Campbell, 1979; Runkel & McGrath, 1972). But perhaps what has been said serves to make several important points:

1. Results depend on methods.
2. All methods have limitations, hence any one set of results is limited, flawed.
3. It is not possible to maximize all desirable features of method in any one study; trade-offs and dilemmas are involved.
4. Each study—each set of results—must be interpreted in relation to other sets of evidence bearing on the same questions.

Some of these same points were made in regard to strategic issues, and some will apply, again, in the discussion of issues at the operational level that now follows.

CHAPTER FIVE

A TYPOLOGY OF TASKS

If we want to learn about groups as vehicles for performing tasks, we must either (a) assume that all tasks are alike, in regard to how groups of various kinds can and do perform them; or (b) take into account differences in group performance as they arise from differences in tasks. Virtually all students of groups would reject the notion that group task performance can be studied generically, without regard to the task, just as they would reject the notion that an individual's task performance is not affected by type and characteristics of the task being performed. Yet, there has really been very little study devoted to the second alternative, namely to the analysis of task differences, in a systematic way, that takes into account how those differences affect group task performance.

All studies of group task performance, of course, use some task. Many use two or three; very few use more than that. But the choice of task is often a matter of convenience and fairly arbitrary. Even when a study uses two or three tasks, those tasks may be selected haphazardly; or, at best, they may be selected ad hoc to represent simplified classifications (such as motor versus intellectual, or easy versus difficult). If tasks really make a difference—and everyone agrees that they do—then it seems worthwhile to devote some of our efforts to analyzing and classifying tasks in ways that relate meaningfully to how groups perform them.

There have been about a half dozen notable and substantial efforts in this regard. The first part of this chapter will review those efforts, and take from them their main ideas. Then in the second part of the chapter, I will try to integrate those formulations into one coherent task classification system that

seems to be very useful in understanding differences in and relations among tasks performed by groups. The task framework, called a Task Circumplex, serves as the main schema for organizing a review of empirical evidence about group task performance in the several chapters to follow.

PAST EFFORTS TO CLASSIFY TASKS AND MODEL GROUP PRODUCTIVITY

Early Task Distinctions

People studying groups have always made distinctions among different kinds of tasks. But those distinctions have often been matters of convenience, sometimes post hoc convenience to account for differences in outcome. For example, from the late 1800s into the first part of the twentieth century, researchers found major contradictions in outcomes of studies of so-called social facilitation effects. Social facilitation refers to how the presence of other people affects individual task performance. (There is a more extensive discussion of this in Chapter 17.) Some studies found that the presence of others improved task performance; others found that the presence of others led to poorer task performance. There were efforts to account for these differences in terms of different kinds of tasks. One such distinction was between intellectual tasks (for which presence of others was expected to hinder performance) and motor tasks (for which presence of others was expected to help performance). Another distinction was between simple and complex tasks. Still another task distinction, which had been shown in experimental psychology to yield systematic differences in reaction times for individuals, was between tasks with a "stimulus set" and tasks with a "response set." These ad hoc task categories did not work very well as bases for clarifying the social facilitation evidence, for several reasons. They did not clearly separate the "gain" and "loss" outcomes of prior social facilitation experiments. Moreover, even if they had, there was really no theoretical basis for expecting one of those to help, the other to hinder, so there would still have been a need for further concepts to explain the difference. But most of all, the distinctions used were oversimplified dichotomies, that could not be applied clearly to most tasks used or potentially used in group research.

Another factor hindering the development of an effective task classification is that there is some overlap and intermixing between task distinctions and group distinctions. For example, the dichotomy of formal versus informal groups implies something about the tasks those groups do, as well as about the way members of those groups relate to one another. Similarly, a dichotomy of task groups versus social groups implies a difference in what these groups do. It is not always possible to keep the two classifications—of groups and of tasks—distinct.

In one early effort, Carter and his colleagues (e.g., Carter, Haythorn, & Howell, 1950) went beyond a dichotomy. They classified tasks into six types: clerical, discussion, intellectual construction, mechanical assembly, motor

coordination and reasoning. These types distinguish tasks on the basis of the kinds of activities that groups (or individuals in them) must carry out in order to complete the task. In the terms to be used later, the differences have to do with the *performance processes* involved in the tasks, and with the *task as a set of behavior requirements* on the members. This set of categories does not deal with the nature of the task products, nor does it deal with the relations between members (for example, the extent to which members must work in coordination). Carter and his colleagues (e.g., Carter, Haythorn, Shriver, & Lanzetta, 1950) used these six kinds of tasks to study the degree to which leadership behavior is affected by task differences or is general across task types. (They found some of each, by the way. There was some generality of effective leadership behavior, but some specificity by task types as well. This kind of question is treated in the discussion of leadership in chapter 18.)

McGrath and Altman (1966), reviewing small group research done before the mid-1960s, argued strongly for the need for systematic conceptual analysis of tasks and their relations to group members. They suggested that tasks could be classified on any of several different bases: classification in terms of the physical/environmental properties or dimensions of tasks qua tasks (e.g., mechanical assembly; arithmetic problem); classification in terms of behaviors required by the task; classification on the basis of the behaviors usually elicited by the task (e.g., creativity tasks, or discussion tasks); classification in terms of the relations among the behaviors of individual group members—interdependencies or lack thereof (e.g., cooperation requirements); classifications in terms of the goal, or product, or criterion of the task (e.g., seeking speed, minimizing errors). All of these bases and others have been used in systems classifying group tasks.

Shaw's Classifications of Group Tasks

Although concerns about task differences have been with us always, the first really programmatic effort to lay out the different characteristics of group tasks in a systematic way did not begin until the 1960s and was carried out by Marvin Shaw (Shaw, 1973). Shaw surveyed the tasks that had been used in past published studies of small groups; he also surveyed a large number of then-active small group researchers. He extracted *six* properties, or characteristics, or dimensions along which group tasks varied—dimensions that he and other researchers thought might have appreciable effects on group task performance. Shaw's six dimensions are: intellectual versus manipulative requirements; task difficulty; intrinsic interest; population familiarity; solution multiplicity versus specificity; cooperation requirements.

Shaw's six dimensions make use of several of the bases of classification suggested by McGrath and Altman (1966). The first of these dimensions (intellectual versus manipulative requirements) has to do with *properties of the task qua task*. The next three have to do with *relations between the task and the group that works on it*. Difficulty, intrinsic interest and population familiarity all can vary depending on what group is to work on the group task. The fifth has to do with the *ways the outcome of the task is to be "scored,"* so to speak.

Solution multiplicity or specificity implies that *someone* knows a “correct” answer, or knows which of many kinds of answers would be good ones. The last dimension (cooperation requirements) refers to *what group members must do in relation to one another*. Many of these same distinctions are important in later, more extensive classifications.

Hackman's Task Types and Product Dimensions

Hackman took a different approach to classifying task differences and relating them to group performance (Hackman, 1968, 1976; Hackman, Jones, & McGrath, 1967; Hackman & Morris, 1975, 1978). First of all, he restricted his domain of concern to intellectual tasks, ones that yield written products. Second, he decided to concentrate on developing a classification of the *products* that result from performance of those tasks (by groups or by individuals). Third, he collected and developed a large set of tasks, had groups generate products by doing those tasks, and had a number of judges make extensive ratings of those products. He summarized those results by applying factor analysis. (Factor analysis is a statistical technique that summarizes the interrelationships among a number of properties over a number of cases. Here, the properties are the ratings and the cases are the products.)

Results suggested three types of tasks and a half dozen dimensions on which products of those tasks could be assessed. The first task type Hackman called *production*. It referred to tasks asking the group to *generate ideas* on something. It is similar to what others have called creativity tasks and is one case of what I will later call tasks requiring the Generate process. The second task type he called *discussion*. He called the third task type *problem-solving*. It referred to tasks asking the group to describe how to *carry out some plan of action*. It is similar to what I will later call planning tasks. (Hackman's problem-solving category needs to be distinguished from what many others have called problem-solving, namely, tasks that call for calculations or logical reasoning.) These three task types are based on the behavior requirements of the task, or what performance processes are needed to carry out the task.

Hackman's six product dimensions were: action orientation; length; originality; optimism; quality of presentation; and issue involvement. Note that these six product dimensions can be judged by examining the written product resulting from the task, without reference to the specific task giving rise to it or the type of that task, and without reference to who did the task (including whether it was a single individual or a group). He noted two other dimensions, creativity and adequacy, that reflect interaction between the product, as such, and the specific task giving rise to it.

Steiner's Task Types and Models of Group Productivity

The idea of task classifications has long been associated with study of questions regarding group size and group productivity. Often, these studies centered around the old question of how groups perform relative to individuals,

and the related question of how groups combine skills, talents, and activities of their members into a coordinated performance of a group task. There is a relatively long history of study using formal mathematical models of group productivity. (See Davis & Restle, 1963; Lorge, Fox, Davitz, & Brenner, 1958; Lorge & Solomon, 1955; Restle & Davis 1962; Taylor & Faust, 1952; Thomas & Fink, 1961, 1963.) Much of the early work dealt with tasks of a so-called Eureka type. Eureka problems are the kind of task for which there is a correct answer so intuitively compelling that, once someone offers it in a group, the group immediately recognizes it as the correct answer.

For such tasks, one model of how groups might combine the talents of their members suggests that the probability that that group will solve the problem is equal to the probability that that group will contain at least one member who (had he or she been working alone) would have gotten the right answer. If one knows the proportion of members of some population of individuals (e.g., the sophomore class) who are “solvers” for that problem, then by fairly direct arithmetic (an expansion of the binomial equation) one can compute the probability that a group of any given size, drawn at random from that population, will get the right answer. It is then possible to compare such predictions with the actual problem-solving success for groups of various sizes. This is a “truth, if present, wins” model. A set of theoretical predictions based on such a model, when compared to performance of actual groups, systematically *overpredicts* how well groups actually do.

We could develop a contrasting model that assumes that the group will somehow “average” the inputs of all group members, whether right or wrong, and that the group's answer will be a right answer only on a probabilistic basis. Such an “averaging” model greatly *underpredicts* actual group performance. Truth lies somewhere in between these two models—“truth wins,” and averaging.

Steiner and Rajaratnum (1961) formalized some of the considerations involved in the “truth wins” type of task and some others. Later, Steiner (1966, 1972) offered what he termed a partial classification of tasks that further elaborated these notions. He distinguished between tasks that are divisible and those that are unitary. Unitary tasks are ones that have a single outcome or product, into which the individual contributions of group members must somehow be combined. For example, a jury must reach a single verdict out of the disparate views of its members. As another example, a group may need to obtain a single, exact answer to a specific problem. Steiner divides such unitary tasks into types on the basis of how member contributions are combined to yield that single product. One such type is what Steiner calls a *disjunctive* task. The Eureka type problems described earlier exemplify this. In a disjunctive task, if one member of the group “does” the task, it is done for the group. So, if any one member can (and does) solve the problem, the group solves it; if any one member can fix the electric switch, the group can fix it. A second type of task is what Steiner calls a *conjunctive* task. It is the obverse of the disjunctive task; it is the kind of task implied by the saying that a chain is only as strong as its weakest link. It is the kind of task for which *all* group members must succeed for the group to be successful. For example, for a patrol to slip unnoticed through enemy lines requires that *every* member remain unseen and unheard.

The group fails that task if any one member is noticed. Obviously, whereas performance of disjunctive tasks depends on the talent and knowledge of the group's best member, performance of conjunctive tasks depends on the talent and knowledge of the group's poorest member. *Additive* tasks are those for which the contributions of group members are combined by summation to yield the meaningful outcome. Obviously, performance of additive tasks depends on the ability of the group's "average" member.

Notice that Steiner's unitary task types depend on the way in which members' contributions are combined into a final product—the way in which group performance is "scored," so to speak. They don't necessarily translate directly to relations among the behaviors of members during their task performances; nor do they depend on physical/environmental properties of the task; nor do they relate to the performance processes called for by the task (for example, mechanical versus intellectual). What type of task the group is doing in Steiner's schema depends on what aspects of its output one considers. For example, for a football game the criterion "number of points scored" might be considered an additive task; the criterion "number of penalties" is a conjunctive task; the criterion "number of touchdowns scored" might in part be a disjunctive task; while a complex criterion like "won or lost" is certainly a mix of many such "tasks." So, if the task classification is to be based on relations among member contributions, then a group is often to be regarded as doing a whole "cluster" of tasks at the same time.

Steiner's divisible tasks take into account that, for many tasks, some members of the group do one set of things while others do other things; and that task performance is related to the coordination of their efforts, rather than simply to the ability of the best member, worst member or average member. In fact, most "natural" tasks, such as the football game discussed above, are highly complex divisible tasks, requiring not so much a summing of member outputs as a complicated coordination of their efforts.

Nevertheless, Steiner's task classification is useful because it can be directly tied to productivity of groups for at least a number of tasks that have been used in studies of groups; and it can be expressed in strong mathematical form (as an expansion of the multinomial). Shiflett (1979) has shown it to be a special case of a more general mathematical model. Predictions from such models can be used to compare actual group performance for tasks of different types, and, of course, for groups of different sizes and types.

Steiner uses these models to reconsider much of the group task performance research that dealt with group productivity models. He notes that groups seldom perform up to the level of their best member. Often, the quality or quantity of their performance is about what the second best member's ability would predict. Steiner considers the combined abilities of individual members—combined according to whatever rule is suitable for that type of task, disjunctive, conjunctive or additive—as representing the group's *potential productivity*. *Actual* group productivity, he argues, falls below potential productivity because of "process losses," losses incurred in the process of performing the task. He identifies two main types of process losses: motivation losses (or, potentially, gains) and coordination losses. He goes on to show that the dif-

ferent degrees to which the actual productivity of groups of different sizes falls below their potential productivity (based on a combination of members' abilities) can be accounted for in terms of such motivation and coordination losses.

As we go from one individual working alone to a two-person group, a three-person group, and so forth, we are likely initially to find some increase in member motivation, reflected in feelings about and in effort on the task. Many people find working in very small groups more rewarding and more motivating than working alone. But as size of the group increases—five, six, seven. . . twenty. . . and larger—there apparently is a drop of considerable degree in the motivation (effort, morale, etc.) of individual group members. In additive and conjunctive tasks, of course, a reduction in the average member's motivation may well produce a serious reduction in group task effectiveness. The loss might be less on disjunctive tasks.

Thus, as groups get larger, there will be a larger and larger gap between potential productivity and actual productivity, even on additive tasks for which more members ought to be an advantage.

Laughlin's Group Task Classification

In reviewing the small group research of recent years (Davis, Laughlin, & Komorita, 1976), and in discussing results of some of it (Laughlin, 1980), Laughlin and his colleagues have offered a classification of group tasks that deals with both the relations among the group members and the kind of performance processes involved in executing the task. They distinguish tasks being done by cooperating groups from those being done by competitive and/or mixed-motive groups. Within the former, they make a distinction between two types of problems. For one type, there is—or is considered to be—a demonstrable right answer. The group's task is to discover that answer, so to speak. They call these *intellective tasks*. The other type consists of problems for which there is not a demonstrably correct answer. Rather, the group's task involves deciding what the right answer will be. These tasks ask for a group preference among possible answers, but not an existentially correct answer. The distinction is one between right answer as in "true" and right answer as in "moral" or "valued" or "proper" or "preferred." For the latter, the group's task is not so much to discover the existentially right answer, but to reach consensus. They call such tasks *decision tasks*. (There are some additional distinctions that are worth making in regard to demonstrability of right answer, and the intuitive compellingness of such an answer once demonstrated. These will be raised later in this chapter).

On the other side, Laughlin and colleagues offer a classification of interpersonal conflict or mixed-motive tasks that mixes two bases of classification. They distinguish the following types: (a) two-person, two-choice tasks with the prisoner's dilemma game (see chapter 9) as the prototypical case, and with an N-person two-choice game as a special case; (b) *bargaining and negotiation tasks*, with the two distinguished from each other in terms of whether conflict and its resolution is unidimensional or multidimensional; and (c) *coalition for-*

mation and resultant reward allocation. These distinctions reflect both relations between group members, who are the contending parties, and the nature of the conflict between them.

Summary of Task Classification Attempts

Many of these efforts, from Carter's six types of tasks to the Davis/Laughlin/Komorita types of cooperative and competitive group tasks, offer useful ideas on how differences in tasks may lead to differences in group task performance. They differ but overlap in terms of their bases of classification. Some classify on the basis of performance processes; some on the basis of task interdependencies of members; some on product differences and product scoring or criterion differences. The Carter system, part of the Shaw classification, and one level of the Laughlin classification, deal with what kind of thing the group members do as they are doing the task in question. Do they work with numbers, or words, or objects? Do they calculate or compose or carry out clerical operations? Do they solve problems with right answers or choose solutions to problems for which the right answer is "in the eye of the beholder"? Do they cooperate toward the same goal, or try to compete with one another for limited resources? The Steiner system, and some of Shaw's dimensions, deal with how the results of members' efforts are combined, hence how task outcome is related to member abilities (of best, or worst, or average member). The Hackman task types deal with the kind of performance process that is reflected in the resultant product, and that in turn was reflected in the group's task instructions: Did they try to generate ideas? Did they discuss and try to decide about issues? Did they problem-solve—that is, did they lay out a plan to implement action? The Hackman product dimensions reflect criterion qualities of the group task performance outcomes. In a way, they assess how well the group did the kind of task it was given to do.

This array of distinctions is a long way from the early "intellectual versus motor," "difficult versus easy" and "simple versus complex" task dichotomies. Yet, no one of these systems alone provides a full classification. The next section is an attempt to combine these into one integrated scheme.

A CIRCUMPLEX MODEL OF GROUP TASK TYPES

The past work of Shaw, Carter, Hackman, Steiner, Shiflett, Taylor, Lorge, Davis, Laughlin, and their colleagues, has provided important bases for a task classification. I want to extract main ideas from several of these, elaborate on some of those ideas, and fit them together into a conceptually related set of distinctions about tasks. Ideally, the categories of such a classification schema should be (a) mutually exclusive (that is, a task fits in one and only one category); (b) collectively exhaustive (that is, all tasks fit in some category); and (c) logically related to one another. They also should be (d) useful, in that they

should point up differences between and relations among the items (tasks) that would not otherwise have been noticed. The framework offered here should be judged against those standards—especially the last one, usefulness. That framework is diagrammed in Figure 5-1, and listed in Table 5-1.

Begin by considering Hackman's three types of task: production (actually, *generating ideas* or images); discussion (dealing with issues); and problem-solving (actually, *generating plans for action*). These can be regarded as labels for the particular performance processes that are engaged by the task. In other words, they indicate what the group (or individual) is to *do*. I would like to propose that there are four general processes: to Generate (alternatives); to Choose (alternatives); to Negotiate; and to Execute.

FIGURE 5-1 The Group Task Circumplex

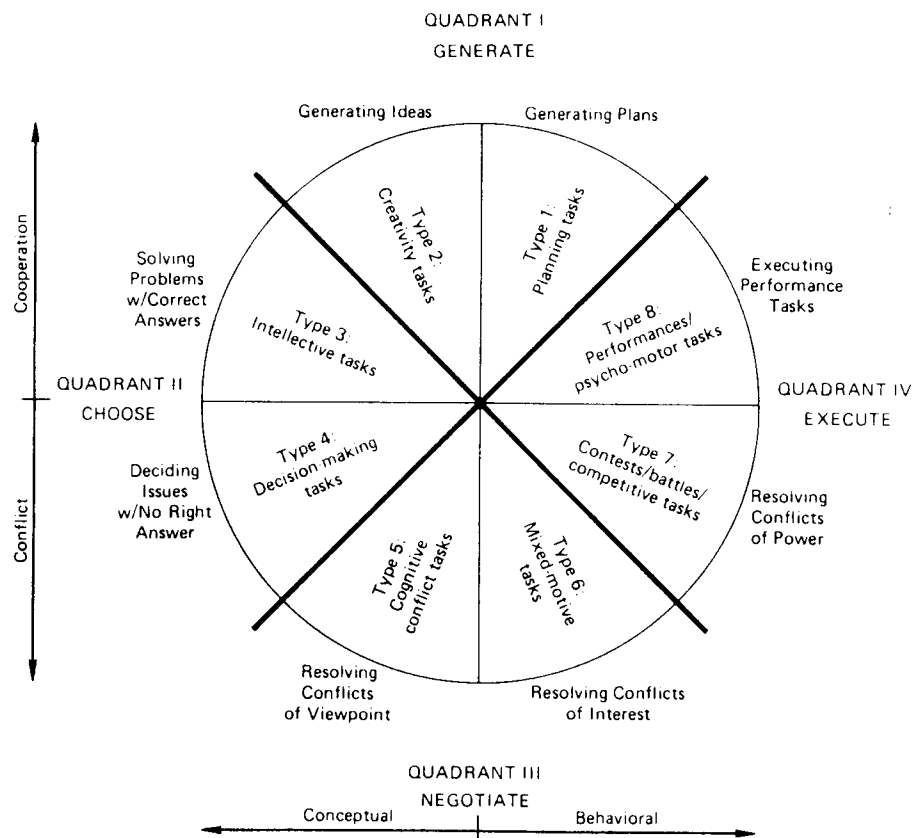


TABLE 5-1 Quadrants, Task Types, and Key Concepts of the Task Circumplex

QUADRANT I: GENERATE	
Type 1.	<i>Planning Tasks</i> : Generating plans. E.g.: Hackman's "problem-solving" task type. Key notion: Action-oriented Plan.
Type 2.	<i>Creativity Tasks</i> : Generating ideas. E.g.: Hackman's "production" tasks; "brainstorming" tasks. Key notion: Creativity.
QUADRANT II: CHOOSE	
Type 3.	<i>Intellective Tasks</i> : Solving problems with a correct answer. E.g.: Laughlin's intellective tasks, with correct and compelling answers; logic problems and other problem-solving tasks with correct but not compelling answers; tasks for which expert consensus defines answers. Key notion: Correct answer.
Type 4.	<i>Decision-Making Tasks</i> : Dealing with tasks for which the preferred or agreed upon answer is the correct one. E.g.: tasks used in risky shift, choice shift, and polarization studies; juries. Key notion: Preferred answer.
QUADRANT III: NEGOTIATE	
Type 5.	<i>Cognitive Conflict Tasks</i> : Resolving conflicts of viewpoint (not of interests). E.g.: cognitive conflict tasks used in social judgment theory work; some jury tasks. Key notion: Resolving policy conflicts.
Type 6.	<i>Mixed-Motive Tasks</i> : Resolving conflicts of motive-interest. E.g.: negotiations and bargaining tasks, mixed motive dilemma tasks, coalition formation/reward allocation tasks. Key notion: Resolving pay-off conflicts.
QUADRANT IV: EXECUTE	
Type 7.	<i>Contests/Battles</i> : Resolving conflicts of power; competing for victory. E.g.: wars, all winner-take-all conflicts, competitive sports. Key notion: Winning.
Type 8.	<i>Performances</i> : Psychomotor tasks performed against objective or absolute standards of excellence, e.g., many physical tasks; some sports events. Key notion: Excelling.

Consider Laughlin's distinction between intellective tasks, for which there is a demonstrably correct answer, with the group's task being to find and choose that correct answer, and discussion tasks, for which the right answer is the group's consensus, and the group's task is to attain consensus. These represent two different aspects of the Choose process. Davis, Laughlin, & Komorita (1976) also distinguish between groups engaged in cooperative interaction and those engaged in competitive or mixed-motive interaction. When the group's task is to resolve conflicts, the process involved is not so much to Choose as it is to Negotiate. Some of these conflicts among group members are conflicts of viewpoint. Brehmer (1976) calls them cognitive conflicts. Some of the conflicts among members are conflicts of interests or motive; these are the kind Davis, Laughlin and Komorita had in mind in their competitive interaction category.

While Hackman's production and his problem-solving categories both refer to the Generate process as used here—generate creative ideas, on the one hand, and generate plans for action on the other—his work suggests another process: an implementation or action-oriented process. Hackman's work, however, was limited to tasks of a paper and pencil variety that could and did yield written products (words, numbers and perhaps pictorial displays). But much of the work of the world involves *performance of physical tasks* that require manipulations, motor behaviors and complex psychomotor activities. So an Execute (or Implement, or Perform) process is certainly needed in any task classification that aspires to completeness. Within this Execute process, at least two subsets of tasks are involved: (a) tasks for which the focal group is engaged in competition (combat) with an opposing (or enemy) group, with results of that contest (win/lose) determining the pay-offs; and (b) tasks for which the focal group is not in contest with an opponent, but rather is striving in relation to "nature," and for which pay-offs are determined by the group's performance in relation to some objective or external or absolute performance standards.

When all these distinctions are taken together, the results can be presented in a circular array that, in some usages, is called a circumplex. This Task Circumplex, presented in Figure 5-1, contains a number of distinctions and relations between types of tasks. First of all, the four quadrants are the four performance processes already discussed (a variation of the Hackman trio, plus Negotiation). Each of the processes is divided into two subtypes, using some of the distinctions noted here. Quadrant I, Generate, is divided into Generating Plans and Generating Ideas. The former is similar to Hackman's problem-solving type; it is related to the adjacent performance category in having an emphasis on action-orientation. The latter, Generating Ideas, is similar to Hackman's production type. It is the locus for "creativity" tasks; it is related to the adjacent intellective problem category in having an emphasis on cognitive matters.

Quadrant II, Choose, is also divided into two types: (3) Intellective tasks and (4) Decision-Making tasks. The terms and the distinctions are borrowed from Laughlin (1980). The former refers to tasks for which there is a demonstrable right answer, and the group task is to invent/select/compute that correct answer. The latter refers to tasks for which there is not a demonstrably correct answer, and for which the group's task is to select, by some consensus, a *preferred* alternative. For intellective tasks, at least three subsets can be identified, based on differing criteria of correctness. The first subset includes those tasks for which the demonstrably correct answer is also intuitively compelling once it is put forth (i.e., the Eureka tasks). Probably, such intuitively compelling right answers are based on very widely held cultural norms and beliefs. A second subset of intellective tasks includes those for which there is a demonstrably correct answer—in terms of the "facts," logic and criteria of some more or less technical area—but it is relatively difficult to demonstrate that logic in a way that is intuitively compelling to members of the task performing group. The third subset of intellective tasks includes those for which the "correct" answer is based on a *consensus of experts*. Such tasks have been used, for example, in studies developing models of the "accuracy" of judgments of freely interacting groups as compared, for example, to individuals, or to statistized

groups, or to groups whose interaction has been experimentally constrained. (See, for example, Eils & John, 1980; Einhorn, Hogarth, & Klempfer, 1977; Rohrbaugh, 1979.) These three subtasks represent a progression from correctness defined solely in cognitive idea terms toward correctness defined in consensus terms.

A similar but less clearly distinctive set of subtypes can be distinguished within the Decision-Making category. Whereas the correct answers of intellectual tasks are based either on cultural norms, logic and broadly known facts, or on expert consensus, the "correct" answers for decision-making tasks are based on peer consensus about what is morally right or what is to be preferred. For some of these, answers draw on cultural values, presumably broadly shared in the population from which group members are drawn. Others may involve social comparison and other social influence processes operating among the particular individuals who are the group's members. Still others may involve consensus attained by sharing relevant information. Thus, decision-making tasks, like intellectual tasks, have internal differentiations that shift, by degrees, from being very similar to the category adjacent to one of its "borders" (i.e., intellectual tasks) to being similar to the task type adjacent to its other border (i.e., cognitive conflict tasks).

Quadrant III, Negotiate, is more or less an extension of Quadrant II, Choose, under conditions where there is intra-unit conflict. The key word here is not *solve*, but *resolve*. It, too, has two types: Resolving Conflicts of Viewpoint and Resolving Conflicts of Interest. The first refers to cases where members of the group do not just have different *preferences*, but have *systematically different preference structures*. They may interpret information differently, may give different weights to different dimensions, and/or may relate dimensions to preferences via different functional forms. Davis (1980) suggests that such differences of viewpoint may occur for subpopulations who are potential jurors, at least for certain types of cases. Hammond, Brehmer, and colleagues (e.g., Hammond, Stewart, Brehmer, & Steinmann, 1975; Brehmer, 1976) in their development of Social Judgment Theory, have induced such "judgment policy" differences experimentally and have studied their effects on group decisions. They insist that such cognitive conflicts are far more pervasive than we have recognized, because conflict is almost always construed as conflict of interest or of motive.

Such conflicts of interest form the other task types of the Negotiate quadrant. We can distinguish several subtypes, including: (a) tasks involving conflicts of both viewpoints and interests or pay-offs, and involving multiple dimensions of dissent, perhaps exemplified by labor/management negotiations; (b) tasks requiring resolution along a single, quantified dimension, such as those studied under the label of bargaining; (c) tasks in which the two (or more) parties' joint choices determine pay-offs to each, such as the prisoner's dilemma game, the N-person prisoner's dilemma, and studies of other social dilemmas; and (d) tasks in which opposing members try to establish subsets (coalitions) that can control allocation of payoffs. These subtasks range from those with an emphasis on resolution (compromise, agreement) to those with an emphasis on power. Again, these subtypes shade from one border of the category to the other.

Quadrant IV deals with overt, physical behavior, with the execution of manual and psychomotor tasks. Such tasks are very heavily represented in the workaday world and, against that base rate, are quite underrepresented in research on groups. Again, there are two types: *Contests* and *Performances*. *Contests* are tasks for which the unit of focus, the group, is in competition with an opponent, an enemy, and performance results will be interpreted in terms of a winner and a loser, with pay-offs in those terms as well. These range from "battles," where the focus is on conquest of an opponent and winner-take-all distribution of pay-offs, to "competitions," where there is a lot of emphasis on standards of performance excellence over and above the reckoning of winners and losers. The former are power based conflicts of interest that are adjacent to the *Negotiation* task type, especially the winning-coalition subtype. The latter approach *Performances*, the other adjacent task category.

Performances are those overt task executions that do not involve competition against an enemy, but rather involve striving to meet standards of excellence (or, sometimes, standards of "sufficiency"), with pay-offs tied to such standards rather than to "victory" over an opponent. These ordinarily involve complex sets of activities requiring coordination between members and over time. Much of the work of the world—lifting, connecting, extruding, digging, pushing—falls in this category, but not much of the study of small groups. These tasks can be subclassified in a myriad of ways, including type of material being worked upon, type of activity involved, intended product of the activity, and many others. Perhaps one useful subclassification is the distinction between *continuous process* and *batch process* tasks. A related distinction is between those in which the internal timing of activities is and is not crucial. Consideration of time dependent tasks brings us back to the planning tasks of Quadrant I, for which sequence and schedule are crucial parts.

Thus, not only are the four quadrants (the four performance processes) distinguished from but related to one another, each of the eight task types is related to its neighboring types on each side. Furthermore, the subtypes within each task type can be ordered, more or less, in a progression that moves, by small transition steps, from one boundary of the category to the other.

The task circumplex is a two-dimensional representation, and it is possible to describe the two dimensions of that space. If the circumplex is placed so that Quadrant I spans "12 o'clock" (with task type 1 to the right, and task type 2 to the left, of that point), the horizontal dimension reflects a contrast between behavioral or action tasks to the right (types 1, 8, 7, and 6) and conceptual or intellectual tasks to the left (types 2, 3, 4, and 5). The vertical dimension reflects a contrast between cooperation or facilitative compliance at the top (types 3, 2, 1, and 8) and conflict or contrient interdependence at the bottom (types 4, 5, 6, and 7). These two dimensions—intellectual versus behavioral, and cooperation versus conflict—are relatively familiar distinctions about groups and group tasks. Another very familiar set of concepts, the trio of cognitive, affective (or evaluative) and conative, can also be located within this circumplex space. Each of these three components of tasks reaches a maximum at a different point around the circle. The cognitive component of tasks peaks in the vicinity of task types 1 and 2. The affective or evaluative component of tasks peaks near task type 5. The conative or behavioral component of tasks peaks near task type 8.

Thus, the task circumplex seems to represent a reasonable attempt to classify group tasks. Collectively, the eight types can accommodate virtually all tasks used in group research, and many that might have been used but have not been used in that work. The crucial test, of course, is whether or not this taxonomy of tasks can be used to summarize, compare and clarify the research on group task performance, and whether that leads to new insights about the task performance process.

The next six chapters use this task taxonomy as an organizing basis for reviewing past research on group task performance. The order of treatment of task types is for convenience of presentation, and departs from the logical order implied by the task circumplex. The next four chapters will review research on tasks of Quadrants II and III, which are the most fully used task types. Chapter 6 reviews intellectual tasks (type 3). Chapter 7 covers decision-making tasks (type 4). Chapter 8 reviews the relatively limited work that fits the cognitive conflict task type (type 5). Chapter 9 covers the fairly voluminous work on mixed-motive tasks (type 6). Chapter 10 reviews group task performance with regard to both task types of Quadrant IV: contests and non-competitive physical performances (types 7 and 8). Chapter 11 deals with both task types of Quadrant I: creativity and planning tasks (types 1 and 2). It is perhaps ironic that, while three of these latter four task types are relatively underrepresented in group research, they are very prominent types of tasks for groups in everyday life. This notion is certainly related to the ideas expressed in the preceding chapter, regarding the relatively high use of quasi-groups, and the relatively infrequent use of natural groups (with concocted groups intermediate in frequency), as objects of study in group-related research. Some reasons were given there, and in chapter 3, why natural groups are not only much harder to study but also offer some special limitations to what information can be gained from such study. That same relation tends to hold here, for the study of tasks of types 7, 8, and 1 (contests, performances and planning) which frequently occur in natural groups. They are probably harder to study, and they offer some limitations on what can be learned from their study, compared to the less frequently occurring, but more experimentally tractable, tasks of types 2, 3, 4, 5, and 6 (that is, creativity tasks, intellectual tasks, decision-making tasks, cognitive conflict tasks and mixed-motive tasks).

CHAPTER TWELVE

GROUP INTERACTION

PROCESS: THE

ACTING GROUP

Group interaction process is at the heart of the study of groups. The arrangement and logic of the model in chapter 1 implies that the acting group is the focal point of all of the forces or inputs; and that all of the effects or consequences also flow from it. Group interaction process, as used here, refers to all of the behavior of *all of the members of an acting group*, in relation to each other and in relation to the task/environmental aspects of the setting, *while that group is in action*. The acting group is a summary term for all the behavior that is to be subsumed under the group interaction process term. The first main step in considering groups as systems for structuring social interaction will be to examine the general concept of group interaction process, how it has been observed, and what those observations have shown. That examination is the task of this chapter.

THE OBSERVATION OF GROUP INTERACTION

The dynamics of interaction of people in groups has been a topic of major concern for students of groups for a long time. One of the earliest analyses that stressed such interaction was Simmel's (1950) concern with how two- and three-person groups operate internally. But his analysis was mainly theoretical and speculative, based on his own experience rather than on systematic observation of such groups actually interacting. Another early contribution to interest in

group process was Whyte's (1943) detailed case study of an adult male street corner gang during the Depression. Whyte's work provided a number of key insights about the nature of interaction, about leadership, about group structure and status; all of these were drawn from intense observation of a single group over a long period of time. Many other early efforts dealt with changes in group structure, or shifts in members' attitudes (e.g., Newcomb, 1943; Lewin, 1953), from which inferences were made *about what processes must have intervened* between prior factors and subsequent changes. But such studies did not really observe interaction *per se*; rather they used it as an "intervening variable" in interpretations of data about input-output relations.

Bales's Interaction Process Analysis

While there were a number of early efforts to chart group interaction empirically (e.g., Chapple, 1942), the first really effective and extensive attempt to observe group interaction directly, and to do so in terms of systematic observation categories, was the work of R. F. Bales and associates (e.g., Bales, 1950a, 1950b, 1953; Bales & Slater, 1955; Bales & Strodtbeck, 1951; Borgatta & Bales, 1953). Bales developed a system of interaction process analysis (IPA) that combined both a structured set of categories for observation and a set of theoretical concepts underlying those categories. While we will touch upon some other observation systems elsewhere, Bales's IPA so dominated the field for several decades that a review of its basic premises, its successes, and its problems, provides a reasonable view of the waxing and waning of research that attempted direct observation of group interaction.

The basic theoretical ideas underlying IPA are as follows. Problem-solving groups (groups with a purpose, or a goal, or a task—but quite broadly construed) are continually faced with two distinct but related sets of concerns: *instrumental* or task oriented concerns associated with the effort to deal with the group's task; and *expressive* or social-emotional concerns associated with the interrelationships of the members. Both instrumental and expressive concerns operate continually. Group attention and effort devoted to one of these is not devoted to, and may produce strains for, the other. A given group will give emphasis to one over the other at various times. In fact, one of the facets of Bales's theoretical structure is the idea that there is an orderly series of *phases* involved in the instrumental activities of problem-solving groups, and a parallel cycle of phases of expressive behavior. The instrumental phases focus first on *orientation* (gathering information), then on *evaluation* of that information, and then on *control* and decision-making. Concentrating on such instrumental activities will produce strains in the social-emotional aspects of the group. These strains increase as the three task phases continue; but efforts to counter these social-emotional strains also increase. Hence, there is an increase in both positive and negative aspects of social-emotional activity as the group progresses through its task activity phases.

Bales built an observation system based on a set of twelve intricately inter-related categories. (That set of categories is shown in Table 12-1). (See, also, EXRT 25.) The twelve categories cover task instrumental (4 through 9) and

TABLE 12-1 The Categories of Bales's Interaction Process Analysis Observation System

POSITIVE SOCIAL-EMOTIONAL / EXPRESSIVE	
1. Shows Solidarity	
2. Shows Tension Release	
3. Agrees	
ACTIVE TASK / INSTRUMENTAL	
4. Gives Suggestion	
5. Gives Opinion	
6. Gives Orientation	
PASSIVE TASK / INSTRUMENTAL	
7. Asks for Orientation	
8. Asks for Opinion	
9. Asks for Suggestion	
NEGATIVE SOCIAL-EMOTIONAL / EXPRESSIVE	
10. Disagrees	
11. Shows Tension	
12. Shows Antagonism	
CATEGORIES	FUNCTIONS
6 and 7	Orientation
5 and 8	Evaluation
4 and 9	Control
3 and 10	Decision
2 and 11	Tension Management
1 and 12	Group Identification

social-emotional (1 through 3 and 10 through 12) areas. The six task categories are further divided into three passive (asking or question categories, 7, 8 and 9) and three active (giving or answer categories, 4, 5 and 6). That set of six categories is also paired in relation to the three problem-solving phases mentioned previously: orientation (asking and giving information, categories 6 and 7); evaluation (asking and giving opinion, categories 5 and 8); and control (asking and giving suggestions, categories 4 and 9). The six expressive categories are also divided into two sets, three positive (1, 2 and 3) and three negative (10, 11 and 12). Within these, categories are again paired, in terms of a set of expressive "phases": statements of agreement and disagreement (3 and 10); indication of tension build-up and tension release (2 and 11); and expressions of group solidarity and antagonism (1 and 12).

These categories provide a systematic framework for making observations pertinent to Bales's theoretical ideas regarding instrumental and expressive acts, and phases in group interaction. Indeed, the theory and the observation system were developed together, so to some degree the categories of

EXRT 25: BALES'S INTERACTION PROCESS ANALYSIS (IPA) PARADIGM

Main Study Procedures: Subjects (usually male college students) are assigned to relatively small groups to discuss and decide upon an issue (often a human relations problem). No leader is designated; each member has some but not all the information needed to deal with the problem. Groups are expected to complete the problem within the session (usually 40 to 120 minutes). One or more observers divide ongoing (verbal) interaction into unit acts and categorizes each into one of 12 mutually exclusive, exhaustive, highly interrelated categories: three active task or instrumental categories (gives orientation, opinion, suggestion); three passive or reactive task or instrumental categories (asks for orientation, opinion, suggestion); three positive social-emotional or expressive categories (agrees, shows tension release, shows solidarity); and three negative social-emotional or expressive categories (disagrees, shows tension, shows antagonism).

Main Dependent Variables of Interest: Distribution of acts over time, categories and participants; shifts in distribution over categories-by-time (process phases); shifts in distribution over categories-by-persons (roles); post-session judgments of members about influence, participation.

Main Variations: Types of problems and groups (e.g., therapy groups, labor/management negotiations); size of groups; prior group experience; characteristics of members (gender, status, assertiveness, etc.).

References: Bales (1950a, 1950b, 1953); Bales & Slater (1955); Bales & Strodtbeck (1951); Borgatta (1963); Borgatta & Bales (1953); Carter, Haythorn, & Howell (1950); Landsberger (1955); Morris (1966).

the system determined the terms of the theory and vice versa. Bales's interaction observation system requires that every action fit one and only one of the 12 categories. Hence, each act has to be *either* task instrumental or social-emotional; and each task instrumental act has to be either active or passive, and has to be about orientation, evaluation or control. So the categories themselves, and the application rules for their use, guarantee that the observations will fit the terms of the theory pretty well, and therefore permit tests of its propositions.

By the same token, although Bales's IPA is widely regarded as a *generic* process observation system, one that could be used for a variety of groups doing a variety of tasks (limited mainly to task involving talking), and although IPA can indeed be used for groups engaged in a variety of kinds of verbal behavior, nevertheless the category system is so closely linked to Bales's underlying theoretical structure that data derived from its use can seldom be used to test propositions from any other theory of interaction. While it has been used to test many parts of Bales's theory, the IPA turns out to be theoretically barren as a system for testing any other theory.

Bales's IPA can be used to illustrate two other problems faced by all observation systems: choosing a perspective from which to make observations, and deciding on the unit act. Every observation system requires that the observer take some stance or perspective from which to make the observations.

Some ask observers to judge the meaning of the act from the point of view of the actor, a very difficult thing to judge in ongoing interaction. Bales avoids this problem. Instead, IPA asks the observer to consider what impact the act would have on "the group." Bales's system defines a unit act as the smallest segment of behavior that is meaningful in terms of the category system. An act always ends as soon as it would require a category change to code it. Consequently, unit acts in IPA vary a lot among themselves in size (e.g., number of words, number of seconds) but tend to be at a micro-level, often a single sentence or less.

These features are related to two other aspects of the Bales IPA. The twelve categories are regarded as mutually exclusive and collectively exhaustive. That is, any act fits one and only one category. Hence, there is no multiple coding, and there is not an "other" category for actions difficult to place in one of the categories. Although such characteristics are very useful features of a classification system from a practical and methodological point of view (e.g., McGrath, 1968) they imply certain theoretical premises. For example, they imply that every action serves either a task instrumental or a social-emotional function; no behavior serves any other function; and no behavior serves both of those functions. Not all theoretical views and observation systems make those assumptions.

Problems and Limitations

The Bales IPA system both stimulated and dominated the study of group interaction process for some time. Many studies using Bales's category system (e.g., Bales & Slater, 1955; Bales & Strodtbeck, 1951; Landsberger, 1955) and using variations of it (e.g., Borgatta, 1962; Borgatta, Couch & Bales, 1954; Morris, 1966), were carried out in the 1950s and early 1960s. They constituted the lion's share of work on interaction. The set of features that characterized the system (generic, contentless categories, a group perspective, a micro-level unit act, single categorization, etc.) were both its strengths and the seeds of its limitations. Its very generality, purchased by being "content free" in the sense that it wasn't tied to the content of any group task or group activity, made it very difficult to apply IPA to test any content based hypotheses (for example, about the effectiveness of various task strategies). Furthermore, IPA's tight ties to Bales's theoretical view were both a boon and a bane. On one hand, these ties made IPA automatically useful to provide support for that position (e.g., every act *had* to be either task instrumental or social-emotional). On the other hand, these same theoretical ties made it difficult to use IPA in relation to any other theoretical view.

Moreover, the complex and abstract (i.e., contentless) character of the categories, the difficulties of making observations from a "group" perspective, the requirement for singular categorization, and the problems arising from using a small unit of action, all increased the difficulty of the observation task. While Bales's own work reflected high levels of observer reliability, that reliability was obtained by extensive observer training. Other users of the IPA schema were not always willing to make such a training investment. Sometimes, too, investigators recorded the audio portion of the interaction, both to avoid

putting an observer into the group's meeting room and to make it easier to assess and improve coder reliability. In many uses, the audio record was then transformed into a written transcript, with coding done from that typescript. It is very difficult for the observer to take the group's perspective when working from a written transcript or even from an audio record, both of which lose all of the richness of the nonverbal activity that helps us "interpret" the meaning of communications in an actual group.

Decline and Resurgence

These problems raised both theoretical and practical difficulties for the use of IPA. As studies using IPA accumulated, so did the burden of those difficulties, so that by the early 1960s use of IPA began to decline. This decline had two consequences. On the one hand, a number of investigators tried to develop alternative systems. Many of these were very specialized for specific classes of groups or of group activity. For example, observation systems were developed to code in-classroom behavior of students and teachers (e.g., Medley & Mitzel, 1958). Others were less comprehensive than IPA, less general, less systematic. Each had its own set of solutions to the problems of unit definition, observer perspective, multiple coding, observer reliability, and so forth, and each set of such solutions had its own advantages and limitations. But no one system proved sufficiently broadly attractive to be used beyond the research of the program within which it was developed.

Along with the search for alternative systems for group interaction process observation, especially as those efforts met only limited success, there came a major decline in research involving the direct observation of group interaction. That decline had a number of consequences. First, it encouraged researchers to do studies designed to test input-output links directly, hence to ignore the mediating effects of (group) process. At the same time, it encouraged a shift in interest and emphasis from process to structure (hence, from the dynamic to the static), and probably also a shift in emphasis from behavior to its outcome or consequences. But in many studies, it became clear that input-output relations needed to be *interpreted* in terms of intervening processes. So group interaction process, instead of being center stage and the focus of behavior observation (as it had been in Bales's work), was shifted to the status of *unobserved* intervening process, amenable to speculation in the absence of empirical data, but not subjected to systematic observation. The *study* of group interaction, in that empirical sense, waned, but the conceptual use of hypotheses about such processes did not.

That decline in study of group interaction process extended for over a decade. There is evidence, I believe, that a resurgence has begun (e.g., Dabbs, 1980; Gottman, 1979a. See also McGrath & Kravitz, 1982). The decline was triggered because the research had reached the limits of the technology available at the time. It also had "used up" or reached the limits of the theory available at the time. The resurgence, in turn, was triggered by the availability of some new technology, both for data collection (e.g., sophisticated videotaping systems) and for data analysis (e.g., some applications of Fourier analyses and other complex mathematical techniques for studying cycles). It re-

mains to be seen whether advances in theory will also come about, or whether the resurgence in study of interaction can be sustained long without them. The resurgence stemming from this new technology is discussed in the last section of this chapter.

One basis of optimism that such theoretical advances will be forthcoming is in some work by Bales and colleagues (Bales & Cohen, 1979). That work offers an entirely new interaction process observation system, called SYMLOG. Among other changes, SYMLOG codes each unit in terms of three bipolar dimensions: up-down (dominance-submissiveness); right-left (positive-negative); and forward-backward (task-conforming versus deviating). It also can be used either for act by act recording or for rating larger segments of interaction. The SYMLOG system is far more flexible, but also far more complex theoretically, than the earlier IPA. It has had little use, as yet, beyond the Bales group; so it is hard to assess its impact or its effectiveness at this time.

This brief history of the study of group interaction process sets the stage for an examination of patterns of interaction that have been hypothesized and observed using such interaction observation systems.

THE MORPHOLOGY OF INTERACTION: REGULARITIES IN THE PATTERN OF INTERACTION OVER MEMBERS AND TIME

To refer to group interaction is to imply that two or more people are communicating to one another about something. In the early days of use of Bales's Interaction Process Analysis (IPA), a number of researchers gave considerable attention to seeking regularities in the pattern of such communications, for groups doing "typical" problems. They were seeking clues as to how such patterns varied over types of tasks, types of groups, and time; and they were trying to establish how such interaction was distributed among members of the group. (See, e.g., Bales, 1950a, 1950b, 1953; Bales & Slater, 1955; Bales & Strodtbeck, 1951; Borgatta & Bales, 1953.) Many of these regularities can be stated in rather direct forms, and some of them are among the most consistent and robust findings in the field.

Distribution of Participation Among Members

Some people talk more than others, and do so consistently. This is an extremely general and robust finding, for amount of participation in a wide array of groups under a wide array of conditions (e.g., Bales, 1953; Borgatta & Bales, 1953). Furthermore, *persons who talk more get talked to more*. There is substantial correlation between the rank order of interaction initiated and the rank order of interaction received. This, too, is robust and general (e.g., Bales, 1953; Stephan & Mishler, 1952).

The person who talks most (the top initiator) *addresses most of his or her communications to the group as a whole*, and is the only member of the group to do so. All other members of the group address most of their communications

to specific individual group members, with the top initiator receiving more than anyone else. If members of a group of any given size are ranked in order of the total communications each initiates, the proportion each initiates can be represented very accurately by a downward-tending diminishing returns type curve. A decreasing exponential function provides an imperfect but rather good fit. (See Horvath, 1965; Nowakowska, 1978; Stephan, 1952; Stephan & Mishler, 1952; Tsai, 1977.) The top initiator may initiate about 40 to 45 percent of the communications, the next highest about 23 percent, the next about 17 percent, and so on. *As the size of the group increases, the proportion of communications initiated by the top initiator increases while differences in amount of communication among the other members tend to decrease.* The downward curve falls much more sharply from top to next highest initiator, then tends to flatten out (to become asymptotic) to near-equality among the other members.

Individuals seem to have relatively consistent rates at which they would interact *if they were under hypothetical "free running conditions."* Bales (1953) calls this a "basic initiation rate" for the person. But the actual amount of a given individual's interaction, and its contents, will vary as a function of the time available, the task, the situation and the interaction tendencies of other group members. *It is as if any given time-task-situation set an upper limit on the total communication for the group as a whole during that time period.* That total is "allocated" among the group members, as a function of the group size and the appropriate exponential curve for that size, and as a function of the individuals' basic interaction rates. An individual's amount of interaction relative to other group members in a given group interaction situation is highly predictable. It is (a) a direct or positive function of that individual's "basic initiation rate" (estimated, for example, from previous sessions in other groups); and (b) an inverse or negative function of the "basic interaction rates" of the other group members (Borgatta & Bales, 1953).

But there seems to be an upper bound for each individual's interaction rate, even if not constrained by competition with other group members for "floor time." Individuals tend toward that *limit*, but do not exceed it even if the situation permits them higher rates. So, while the absolute initiation rates of high initiators will be much reduced if they are placed in a group with other high initiators (given that the situation poses a fixed task and time limit), the interaction rates of low initiators will increase far less if they are placed in groups with other low initiators. Even so, you can raise a low initiator's rate somewhat by removing high initiators from the group. It can also be raised if the group's leader (or its norms) urges participation by all.

Any given individual's rate of interaction will also be affected by the individual's "position" in the group. The term position is used here very broadly, to refer to several different aspects of the individual's situation vis-à-vis other members. The individual's interaction rate, initiated and received, will be higher or lower, respectively, (a) if he or she is in a central as compared to a more peripheral position in the group's communication network (see chapter 13); (b) if he or she is seated in a prominent position (e.g., head of the table, or front of the class) as compared to a less prominent one (e.g., corner of a rectangular table, or back of classroom); (c) if he or she is high or low in terms of status in the group (that status being based on any of a number of ways in which groups in general, or any particular group, reckon status); (d) if he or she is

highly motivated to perform the group's task (as compared to less motivated) or highly attracted to the group (as compared to less attracted); and/or (e) if he or she is in some way especially valuable to the group (e.g., a content expert on the task) or negatively valued by it (e.g., a deviate from group consensus on some matter important to the group).

Distribution of Interaction Among Categories (of IPA)

In the typical group interaction, the distribution of actions over types of acts, as defined by sets of categories of the Bales system, is an extremely orderly pattern. Typically, about half of the interactions of a group are "proactive" attempts to deal with the group's task. The other half are "reactive." In terms of Bales's IPA system, categories 4, 5, and 6, giving orientation, opinion, and suggestions, are the proactive categories. (Actually those three categories typically include about 56 or 57 percent of the acts. Of this total, some 6 or 7 percent are considered reactions. See below.) About half of the reactive half of the acts, or about 25 percent of the total, are positive reactions (Bales's categories 1, 2, and 3). Bales (1953) and Hare (1976) regard these as completing the cycle of activity (or the "disturbance of equilibrium") begun by the proactive event. About half of the remainder, or about 12.5 percent of the total, are negative reactions, Bales's categories 10, 11, and 12. These can be regarded as rejections of the proposed solution; hence, they recycle the interaction back to a "new" attempted solution. About half of the remainder, or about 6 or 7 percent of the total, are questions (Bales's categories 7, 8, and 9). Direct answers in reaction to these questions (the "reactive" 6 or 7 percent of attempted answers, over and above the proactive 50 percent) make up the rest.

Alterations in that pattern occur as a function of type of group and type of task. Therapy groups, for example, may show higher proportions of positive and negative reactions and fewer attempted answers. Jurors show high proportions of agreement (their task requires it). Groups drinking beer and brandy show high rates of disagreement and antagonism, whereas groups under the influence of LSD show high rates of tension release and solidarity.

The distribution over categories can also be altered by reinforcing, positively or negatively, one or another of the categories (see Hare, 1976, p. 81, for a list of many studies showing this). The general reluctance to transmit bad news is a specific case of this (see e.g., Rosen & Tesser, 1970). Presumably, giving bad news has been negatively reinforced in the past. So, that "category" becomes less frequent in future interactions. But the positive and negative categories are themselves "reinforcements," as well as positive and negative reactions. Such reinforcement effects, and feedback and other effects, can be examined by considering the way in which group interaction varies over time.

Distribution of Interaction over Time

Bales (1953) postulates several kinds of changes in interaction pattern over time. Some of these deal with "equilibrium" on an act-to-act basis; some deal with phase movement within sessions; and some deal with development of

the group over sessions. Before examining those postulations, it is worth noting that most data used by Bales (and others using the Bales system) to test these distribution questions, and to establish baseline data or "norms" for interaction rates, were done with ad hoc laboratory problem-solving groups. (Regrettably, moreover, almost all of these were groups of *male* college students.) These groups were dealing with what Bales considered "full-fledged" problem-solving tasks, requiring the group to carry out a complete task (usually discussion of a human relations case) within one relatively short session of forty minutes to two hours. Many other kinds of groups might have tasks that really extended over many meetings (e.g., therapy groups). Still others might deal with tasks for which early problem-solving stages (e.g., gathering information) had already been completed by others (as is the case with many management meetings). One would not expect the same pattern over time to occur in groups with such truncated tasks.

The Basic Equilibrium Problem. Bales (1953) argues that two types of patterns take place within a session of groups dealing with "full-fledged" problems. The first is a series of continual shifts, to reestablish equilibrium, between task efforts and social-emotional efforts. Such shifts occur at a micro level, perhaps at an act-to-act level and certainly between "strings" of successive acts within the ongoing group interaction session. (The second pattern is a phase-to-phase pattern, through the course of the session. That pattern will be discussed in the next part of this chapter.) According to the equilibrium idea, task activity itself produces strains in the social-emotional relations among group members. Even successful task activity produces strains, from the results of inattention to social-emotional matters; but task failure or task difficulties amplify these strains. These tensions build up until a point is reached at which the group must put the task aside, so to speak, and turn its attention to these social-emotional strains. But while these strains are being dealt with, there is no further progress on the task. So, when the high level of tension is "bled off" sufficiently by social-emotional activity, the group can set aside its social-emotional efforts and return its attention to task activity. This process continues until the task is completed, or interrupted by time running out (or, one would suppose, until the group "breaks up" due to unresolved social-emotional strains—although that is not permitted to happen in the ad hoc laboratory groups upon which most interaction research has been done).

Act-by-act patterns. Such an equilibrium-seeking pattern ought to be visible in the sequence of actions within the interaction of problem-solving groups. Bales (1953) examined two sets of "act to act" matrices. One, a "reactive" matrix, plots how acts are distributed over categories when one person's act is followed by an act by another person, that is, when there is a change of speaker. The other, a "proactive" matrix, plots the act to act distribution when a speaker keeps the floor for more than one act. The patterns in these two matrices bear on the equilibrium problem.

Keep in mind that, overall, interaction rates are highest for attempted answers (56 percent), then positive responses (25 percent), negative reactions (12 or 13 percent) and questions (7 percent). Within these, *relative* rates differ

as a function of the preceding act. (Acts can, of course, be influenced by acts earlier in the sequence than the one just preceding; but such analyses have been too complex for detailed treatments. See later discussion of some sequential analyses employing more complex mathematical forms by Gottman, 1979a).

The reactive pattern (one speaker followed by another) shows that attempted answers are typically followed by positive reactions, especially agreements. There are weaker tendencies to reply to a suggestion with a suggestion, and to reply to attempted answers with negative reactions (disagreements especially), and with questions, in that order of frequency.

Positive actions by one member of an interacting pair, A, generate both positive reactions (especially of the same kind—agree for agree, solidarity for solidarity, tension release for tension release), and also attempted answers (especially orientation and opinion) by the other member of the pair, B. Questions follow in relative frequency, with negative reactions very unlikely. Negative actions by A show an opposite pattern. They generate both negative reactions (especially "in kind") and attempted answers (especially orientation and opinion) by B. Questions by B follow in frequency, with positive reactions very unlikely. Questions by A generate attempted answers (again, in kind) by B, and there is some tendency for questions by A to generate questions (ask for orientation, especially) by B. Both positive and negative reactions to questions are infrequent.

Looked at from the other side of the matrix, reacting with an attempted answer is most often "induced" by the prior speaker asking for such answers, and/or giving either positive or negative responses. Giving positive responses is most often induced by the prior speaker being positive, or attempting an answer. Giving negative reactions is most often induced by the prior speaker being negative; and disagreement is also induced by the prior speaker offering an attempted answer. While questions are low rate in all cases, B's asking for orientation is induced by A's asking for suggestion; B's asking for opinion is induced by A's positive or negative responses, and B's asking for suggestion is induced by A's giving suggestion.

When person A initiates two acts in a row (the proactive matrix), attempted answers are most often continued (in kind) with further attempted answers. Questions, also, are usually continued (in kind) with further questions, but questions also generate attempted answers (orientation and opinion), indicating that they may have been more or less rhetorical. Asking for suggestion is often followed by disagreement.

A's positive reactions are most often followed by attempted answers (opinion and suggestion). Solidarity is often followed by agreements; but agreements are often followed by disagreements, and tension release is often followed by antagonism and tension (first the good news, then the bad news). These varying forms of continuation after a positive response (presumably to a prior speaker) suggest that the positive response may have any of several meanings or functions. This idea will be discussed later.

A negative reaction by A is followed most often by tension reduction and next most frequently by further antagonism, then by giving opinion or showing solidarity. Both tension and disagreement are followed by giving suggestion or opinion.

Looked at from the other side of the matrix: A's acts of attempted answers can be induced by virtually any type of A's own prior act. A's positive acts are likely to have followed a prior positive or negative act by A. This is especially so for tension release, which tends to follow expressed antagonism, expressed solidarity, or other tension release. A's negative acts are likely to have followed positive or negative prior acts by A. (This is especially so for antagonism following antagonism and for prior tension release.) A's questions tend to have been preceded by other questions of the same kind.

A brief summary of all this may point up some patterns. If A initiates an act, the most likely category is an attempted answer. If A keeps the floor, the next act is likely to be another attempted answer, of the same kind. If another speaker, B, assumes the floor, B's most likely first act will be a positive response. Less likely would be a negative response (disagreement), or an attempted answer of his or her own. But whichever of these was B's first act, B's next act, if he or she keeps the floor, is very likely to be an attempted answer, with one exception. Acts of antagonism and tension release "provoke" themselves and each other, as well as provoking "gives opinion". So some sub-cycles of this sort are quite possible. (Bales suggests that such cycles also occur for solidarity and tension release.)

The only other sequence that is very likely to occur would be A's single (or multiple) attempted answer, followed by B's positive (or negative) single act response, which is then in turn followed by A as a speaker. If B gave a positive response, then A is likely either to give another positive response (followed by more attempted answers), or to respond to B's positive response immediately with an additional attempted answer. If B gives a negative response, then A is most likely to give another attempted answer (at least orientation or opinion), or to give back a negative response (disagreement or antagonism). The first of these, disagreement, is likely to be followed by more attempted answers. The second, antagonism, is likely to lead to an antagonism-tension release subcycle, that eventually "breaks out" into the "gives opinion" category, which in turn leads to further attempted answers.

Equilibrium versus punctuated sequences. Such examination of the act to act sequences does not give a picture of simple two- or three-step action/reaction sequences, with each "proaction" creating a disturbance in equilibrium and each "reaction" resolving or rejecting or reducing it. Rather, the pattern suggests that there is a focal thrust to solve the task; that so-called attempted answers are efforts toward that goal; and that responses to those task attempts are not so much distinctive reactions as they are one or another (or several) of the following:

1. reinforcements, encouraging or discouraging further development of the same "line" of task effort;
2. devices to help "seize" the floor, so as to offer one's own task effort;
3. the offering of nonevaluative feedback ("uh huh"; "go on") to facilitate the flow of interaction (a regulatory function);
4. the fulfilling of social rituals of courtesy (agreement even if that is to be followed by disagreement).

This process generates mostly *strings of attempted answers*, some of which are proactive but some of which are really reactive to one's own or another's immediately prior (or almost immediately prior) task actions. Bales (1953) cites Murray's term, "serial programs," for those strings. *Such strings or serial programs of task events are punctuated with positive and negative reactions (agreements and disagreements) by others.* These reactions serve as feedback, reinforcement, courtesy, flow regulators, tactics to get the floor, and the like. These strings of task events are also punctuated, though infrequently, with questions. Questions also may serve feedback functions, and perhaps floor-taking or other functions.

Occasionally, a strong form (or a more interpersonal form) of negative reaction (antagonism) will move the string into a temporary negative "reverberation": antagonism generates further antagonism, tension, or tension release; tension release generates antagonism or further tension release. That reverberation persists until the tension is reduced (according to Bales, 1953) or until it shifts over into the task area (since "gives opinion" is also a relatively probable response to tension release). A similar positive reverberation, of solidarity and tension release, can also occur, though this is more likely to "exit" quickly back into the task area. These results suggest that task activity, once started, tends to persist for an extended time (Bales, 1953). They also suggest that cycles of social-emotional activity occasionally get started and, once started, tend to reverberate for a time; but that they get "spent" through tension release relatively soon. In summary, then, one can regard this whole process not so much as a continuous see-sawing, task/social-emotional equilibrium process, but rather as a *straightforward problem-solving* (i.e., task) *process punctuated by social-emotional activities that reinforce, guide, and regulate the flow of essentially task-oriented behavior.*

Bales (1953) also regards positive and negative reactions as involving reinforcement. He argues that such positive reinforcements must exceed negative ones by a substantial amount (as they characteristically do) for a group to be successful or even viable over an extended period. He argues that if there were *no* reinforcements the behavior rates would reduce or cease as motivation waned. Positive and negative reactions serve two purposes: to reinforce (positively or negatively), and to guide toward or away from the behavior just exhibited. But a negative reaction is, in itself, a reducer of motivation and satisfaction. So you need at least one positive act to counteract each negative one. But that would only overcome the friction of operation of the group's own controlling system (Bales, 1953). If positive equals negative, then task motivation would run down, the task would not get completed, and task satisfaction would be less. A group needs positive reactions in excess of negative ones in order to get its tasks successfully completed, hence, to get satisfaction from task performance itself. (This holds even without considering the pleasure and satisfaction that come from the interpersonal domain when more positive than negative interactions occur.)

It follows that groups with higher positive to negative ratios should have higher satisfaction (and they do, with correlations from .6 to .8, says Bales, 1953). Furthermore, individuals who receive higher positive to negative ratios of feedback from fellow group members should have higher satisfaction. There is no direct evidence of this, but several sets of indirect evidence bear on it:

1. Higher status members get higher positive/negative ratios and also have higher satisfaction. (This is evidence based on covariation, and not direct evidence of a relation between positive/negative ratio and satisfaction.)
2. Members who are rejected reduce communication (Dittes & Kelley, 1956) and communication to them is also reduced (Schachter, 1951).
3. Members who get support from others communicate more (Pepinsky, Hemphill, & Shevitz, 1958).
4. Members in more active places in the communication net of the group also are more active and have more satisfaction (Leavitt, 1951; Shaw, 1959).

Even more indirect evidence lies in results showing that members communicate more with those whom they like and dislike (and far more with the former than the latter) than with those toward whom they are neutral, and receive communications from those whom they perceive as liking them or disliking them more than from those they perceive as being neutral toward them (Festinger & Hutte, 1954). Similarly indirect evidence is the finding that members of highly motivated groups communicate more; that highly motivated members of groups increase communication rates over successive sessions whereas members of low-motivation groups decline in their interaction rates over time (Bass, Pryer, Gaier, & Flint, 1958).

All of these findings represent indirect evidence that positive and negative reactions within group interaction serve as reinforcements; and that these reinforcements facilitate and regulate the flow of interaction, affect and are affected by the motivation of members for task performance, and (along with task success) affect the satisfaction members get from the group interaction. This evidence does not directly discredit the idea of a continual task/social-emotional equilibrium process, but it does not support it either. It is at least as plausible to view the process as an extended, task oriented "serial program," punctuated, reinforced and guided by positive and negative reactions, partly of an interpersonal nature (solidarity, antagonism), partly task-related (agreement and disagreement), and partly a mixture of personal, interpersonal, task and situational aspects (tension and tension release). The matter of groups as equilibrium-seeking systems will arise again in several other chapters of this book, and will be discussed in terms of the perspectives of those chapters.

Phase Movement in Groups

Bales (1953) also postulated a series of shifts in the relative rates of different categories of interaction as the group moves through its session (hence, as it executes a "full-fledged" problem). He concentrated on three problem-solving steps: orientation (gathering information and clarifying what the task is); evaluation (assessing that information); and control (deciding what to do). These three stages, incidentally, deal only with Quadrants I and II of the Task Circumplex: Generate and Choose. These phases might or might not include activities pertinent to Quadrant III, Negotiate. They do not include Quadrant IV, Execute (see Part II, especially chapter 5).

These three phases correspond to the three pairs of categories at the center of IPA: 6 and 7 (ask for and give orientation); 5 and 8 (ask for and give opinion); and 4 and 9 (ask for and give suggestions). As the group moves

through its task efforts, Bales hypothesizes, the relative rates of acts in these three pairs of categories shift as follows: (a) orientation is highest at the outset and declines as the session progresses; (b) evaluation rises from the beginning to the middle of the session, then declines; and (c) control is low at first and rises to its highest at the end. (Note that these are *relative* rates within categories.)

At the same time—to reintroduce the idea that there is a continuing task/social-emotional equilibrium process—as the group progresses on the task from the relatively unemotional orientation to the more controversial evaluation, and especially control, there is a corresponding increase in tension. This increased strain is reflected in an increase in negative reactions; efforts to deal with this strain bring an increase in positive reactions through the course of the session. As a consequence, both positive and negative reactions increase from beginning to end, although they still remain a small proportion of all acts, and although positive reactions have much higher rates than negative ones. Both positive and negative reactions reach their highest level in the last phase; but positive reactions, in the form of tension release and expressions of solidarity, predominate at the very end.

These descriptions of phase movement are fairly good representations of several sets of group data that have been examined in this regard (e.g., Bales, 1953; Bales & Strodtbeck, 1951). They did *not* hold up for a large set of sessions of therapy groups studied by Talland (1955). But such groups are definitely not carrying out a "full-fledged" problem in each single session, and they differ in many other ways from the kinds of groups studied by Bales and others for baseline IPA data. Therapy groups are to some extent searching for "the problem" and, if anything, solve the full-fledged problem only over many sessions, perhaps extending for years. Furthermore, Psathas (1960) analyzed data from a set of groups in therapy by comparing early versus middle versus late *sessions* (over a nine-month course of therapy), rather than comparing beginning versus middle versus end periods within a single session. Those therapy groups apparently went through the problem-solving phase sequence once over the entire course of the therapy. Talland's groups were all taken from early sessions, when they were still concentrating on the problem of orientation. Landsberger (1955) also found the phase sequence in a series of labor negotiation groups. He suggests that the phase sequence holds for all groups, but is sharper for the more successful groups. So, within the limitations involved in the IPA categories and data, most of it from ad hoc laboratory groups with full-fledged tasks, there seems to be a reasonable body of evidence supporting the proposed phase sequence.

BASIC FUNCTIONS OF THE GROUP INTERACTION PROCESS

What is going on when a group is interacting? To borrow an example from the physical sciences, when chemicals are interacting (i.e., when a chemical reaction is taking place) at least two things may be occurring: Some particles may be uncoupling and recoupling in new combinations; and some matter-to-energy

conversions may be occurring, often evidenced by accompanying heat exchange. The outward forms of the substances involved may undergo dramatic changes, including shifts to either far more stable or quite unstable substances. What comparable kinds of occurrences take place when a group of people is in interaction? In other words, what are the group interaction equivalents of bonding and energy exchange in chemistry?

Bales's Two-Process Schema

Many past studies using systems for observation of group interaction process, as well as studies not observing group interaction but making inferences about intervening processes from input-output relations, have tried to hypothesize about such underlying processes or have tried to discern them from results of observation. Bales posited two fundamental processes: task oriented or instrumental, and social-emotional oriented or expressive. Except for some highly unusual limiting cases, both these processes are always in operation when group interaction is taking place. For Bales, though, they are mutually exclusive at the action level. Any unit act serves one or the other function but not both. The two processes are interrelated, and to some extent in opposition, within a general group equilibrium. For example: Attention to task creates social-emotional friction. Attention to social-emotional concerns detracts from task efforts. Too much attention to either process leads to system breakdown because of failure of the other process (i.e., either social-emotional disruption of the group or group failure to do the tasks necessary to its goals).

Many other theoretical efforts have posited two underlying processes similar, in many respects, to Bales's instrumental and expressive processes. The distinction between task concerns and interpersonal (social-emotional) concerns also underlies several historically important distinctions between types of groups: Simmel's (1950) *gemeinschaft* and *gesellschaft* (often translated as community and society); Cooley's (1902) primary versus secondary groups. In the leadership area, this same distinction underlies Hemphill's (1949) initiating structure-in-interaction versus consideration; and Fiedler's (1967) task oriented versus interpersonal oriented leadership styles. It is also one of the key distinctions made in the interaction framework presented in chapter 1.

The Bion-Thelen Interaction Theory

Contemporaneously with Bales's pioneering work, Bion was formulating a theory of group process (Bion, 1961) in the context of group therapy. Thelen subsequently used the concepts of that theory to develop a group observation system. (Stock & Thelen, 1958; Thelen, 1956; Thelen, Stock & others, 1954). It, too, posits a "work" versus "emotion" distinction, but unlike IPA it assumes that every act is *both*. Work is coded at four levels (effort concerned with personal goals; routine group work; active problem-solving; and creative, integrative work). The emotional categories are: fight/flight; pairing among group members; and dependence on the leader. Thelen separated fight and flight into categories, scored degrees of the emotions, and added an "other" category for

coding acts clearly emotional but not clearly fitting one category or the other. Thelen also used a larger "natural unit" of group interaction, by trying to identify points when a shift occurred in the particular subgroup involved in the discussion. That tended to divide "sessions" into four to twenty "natural" units, ranging from three to eighteen minutes. (Bales's IPA would divide a session of the same length into hundreds of acts, each lasting, on the average, only a few seconds.)

Stock and Thelen (1958) applied this system to a series of training groups at the National Training Laboratory at Bethel, Maine. They did not find a dominant phase movement of the type Bales posits. Bion was more interested in the swings between various emotion/work states than any specific developmental pattern. But Dunphy (1964) inferred a developmental scheme implicit in Bion's concepts: (1) dependence on leaders; (2) attack on leader (fight) followed by scapegoating others (flight); (3) pairing; (4) effective work with little emotionality. That is a sequence similar to several that will be discussed later under group development.

The Thelen observation system shared with Bales the basic task/social-emotional distinction, but it contrasted sharply with Bales in several other respects. First, rather than being mutually exclusive alternatives, task and emotion are treated in the Bion-Thelen system as *independent, crossed* dimensions; every act is scored on both. The observer takes the perspective of the actor (what he or she is *really* doing). Thelen uses a more macro-level unit, with boundaries based on participation patterns rather than on categories of the system. While their theory and observation scheme gained some following, it never was very broadly used in the study of groups.

Steiner's Analysis of Process

An earlier chapter provided a description of Steiner's (1972) task typology and model of group productivity. A central idea of that model is that a group's actual productivity is often below its potential productivity because of *process losses*. Steiner talks about two general types of process losses: those due to shifts in member *motivation* (usually losses, but sometimes increases for groups of very small size); and those due to the need for *coordination* of actions of different members (always losses). One could regard these as results of shifts in force (motivation) and in integration (coordination), not unlike the energy exchange and bonding of chemistry. But these really label the results of the process losses, rather than the nature of the processes themselves. Furthermore, they are at least somewhat related to Bales's task (coordination) and social-emotional (motivation) processes.

The Hackman-Morris Summary Variables

An earlier chapter also described, though briefly, a three-factor approach to analysis of the relation of group interaction to task performance, by Hackman and Morris (1975). In that analysis, the authors propose that all of the ways that group interaction process can affect group task performance can be

reflected in three summary variables: task strategy, member effort, and member knowledge and skills. Note that this analysis is explicitly concerned with summarizing and labelling the *effects* of group interaction process, rather than specifying the fundamental *processes* themselves. So, as with Steiner's analysis, the terms label outcomes of group interaction, but do not specify processes. Note also that this analysis, as well as Steiner's analysis, is concerned primarily with groups as task performance systems. So, quite naturally, the "task" aspect of group interaction process is heavily reflected here. Both the first (task strategy) and the third of the summary variables (member knowledge and skills) refer directly to aspects related to the group's task. Member effort, on the other hand, like Steiner's motivation, refers to what might be regarded as the social-emotional aspect—though the concern is also with how such individual effort affects group task performance.

Hare's Four-Dimensional System

Hare (1973, 1976) has drawn upon some theoretical ideas of Parsons and his colleagues (e.g., Parsons, 1961; Parsons & Shils, 1951) to identify four basic needs or functions of groups. He argues that all groups, to survive, must meet four basic needs:

1. The members must share a common identity and have a commitment to the values of the group. (This is termed L, for latent pattern maintenance and tension reduction.)
2. They must have or be able to generate the skills and resources needed to reach their goal(s). (A for adaptation.)
3. They must have rules (norms) to coordinate their activities and enough solidarity (cohesiveness) to stay together to complete their goals. (I for integration.)
4. They must be able to exercise enough control over members to be effective in reaching their common goal(s). (G for goal attainment.)

Hare (1976, p. 15) argues that these can be viewed as categories of a 2×2 matrix. Two of the needs have a referent *external* to the group (A and G) while two have an *internal* referent (L and I). Two refer to *instrumental* processes (L and A), and two to *consummatory* processes (I and G). These four distinctions are drawn from Parsons' structural-functional theory of social systems. Hare (1976) has related them to major social subsystems (A-economic; L-familial and religious; G-political; and I-legal), and to different system levels (A-organismic; G-personality; I-social system; L-culture).

Hare (1976) ties these four functional needs to sets of dimensions used by other researchers to characterize interpersonal relations in groups. Chapple (1942) used a single observation category (action/silence), hence had a single behavior dimension (dominance/submissiveness). Bales's IPA had two, as did the Bion-Thelen scheme, Leary (1957), and several others. These two-dimensional systems essentially added a positive/negative dimension to the dominance/submission one. Couch and Carter (1952) postulated a three-dimensional system, adding "individual prominence" to group sociability and group facilitation dimensions. Borgatta (1963) had three similar dimensions.

Schutz (1958) also had three: inclusion, control and affection. Bales, too, in his later work, added a third dimension (up/down or dominance/submission; positive/negative; and a task oriented and conforming versus deviant dimension).

Hare (1976) maintains that the set of three dimensions obscures a fourth. He postulates four dimensions of interpersonal relations in groups, and relates them to Parsons' four functional needs of groups, as in Table 12-2.

It is not clear in all cases why these functional needs map to the interpersonal dimensions in the fashion proposed by Hare. For example, why doesn't G fit the third dimension just as well as A? But Hare's efforts to align all of the systems proposed by Parsons, Bales, Couch, Carter, Borgatta, Leary, Schutz, Bion, Thelen, and others, is heroic. And his integration of them is by far the most comprehensive yet developed, even though some portions of the rationale for it are not entirely clear.

Hare (1976, p. 15) also orders the four Parsons functions in terms of what he calls the "cybernetic hierarchy of control" (that order is L/I/G/A). Moreover, he uses those four needs as the basis for a theory of group development (for which the order is L/A/I/G/L). That latter use is discussed in a later section, in the context of changes in the pattern of interaction over time.

While the labels used by Hare for the four group functions derive from and are sensible within Parsonian theory, they seem to add jargon unnecessary for the purposes and focus of this book. I want to substitute for them some terms drawn from the concepts used elsewhere in this book. For Adaptation, substitute Abilities and Resources. For Goal attainment, substitute Group Task Performance. For Latent pattern maintenance, substitute Values and Goals. For Integration, substitute Norms and Cohesiveness. In these terms, the four basic problems can be stated as:

- (V) Developing or adopting fundamental values and goals for the group.
- (A) Developing or having abilities and resources needed to do the tasks necessary to achieve those goals.
- (N) Developing or having norms to guide behavior toward the goals, and cohesiveness to support and enforce conformity to those norms.
- (P) Performing effectively the group's tasks in pursuit of the common goals.

When the four are presented in this form, it is clear that Bales's IPA system (and most of the other two-dimensional systems) focused more or less on task execution (P here, G for Hare) and on interpersonal relations (N, or I). Those two functions are the two that Hare calls consummatory. They are the

TABLE 12-2 Functional Needs and Interpersonal Dimensions

HARE'S INTERPERSONAL RELATIONS DIMENSIONS	PARSON'S FUNCTIONAL NEEDS
I Dominance versus Submissiveness	G Goal attainment
II Positive versus Negative	I Integration
III Task-serious versus Expressive	A Adaptation
IV Conforming versus Nonconforming	L Latent pattern maintenance

TABLE 12-3 Four Fundamental Group Problems. A Reformulation

REFERENT OF ACTION	LEVEL OF EXPRESSION	
	MANIFEST	LATENT
EXTERNAL TO GROUP	P Group Task Performance (Hare's G, Goal attainment)	A Abilities and Resources (Hare's Adaptation)
INTERNAL TO GROUP	N Norms and Cohesiveness (Hare's I, Integration)	V Values and Goals (Hare's L, Latent pattern maintenance)

explicit aims of action in groups. The other two, that Hare calls instrumental, are more or less implicit or latent. They *underlie* the two consummatory ones. Abilities (A) underlie and are essential to task performance. Values and goals (V or L) underlie and are essential to interpersonal relations. So it may be worth considering that the four functional needs are really *two needs* (task-external and interpersonal-internal), *at two different levels of expression*. That would cross Hare's internal-external distinction with manifest-latent, rather than with instrumental-consummatory (see Table 12-3).

Still another way to view these is to regard them as functionally linked in terms of what underlies or logically precedes what. In that view, consensus on values and goals (V) is fundamental to all else. Then come both insuring abilities and resources to carry out those goals (A), and developing norms to guide behavior and cohesiveness to support those norms (N). Both A and N, then, serve as preconditions for effective group task performance (P) (see Figure 12-1). This formulation has the advantage of displaying basic group needs in a functional order that relates to, but doesn't presuppose any specific order of, group development. At the same time, it separates out what is latent (hence, not directly observable) from what is manifest though instrumental. In a sense, values and goals set the purposes for group action; abilities and norms provide the means; and group task performance is the action (consummatory).

GROUP DEVELOPMENT: PATTERNS OF INTERACTION OVER SESSIONS

Considerable attention has been given to the question of how the distribution of activity shifts over periods of time longer than the single session. Much of this has been provided under the rubric of "group development" (e.g., Bales, 1950a; Bion, 1961; Hare, 1976; Schutz, 1958; Bennis & Shepherd, 1956; Dunphy, 1964; Tuckman, 1965; Mills, 1964; Mann, Gibbard, & Hartman, 1967; Slater, 1966). There are two striking features of IPA profiles taken for the same group over several sessions, when the group is solving a "full-fledged" problem at *each* session. First, there is a reduction in relative proportion of group inter-

action that is devoted to task activity as the group progresses through a series of problem-solving sessions. This reduction is paralleled by a rise in positive social-emotional activity. But that rise in social-emotional activity includes a slight drop in agreements along with a large increase in tension release and solidarity, especially in the final meetings. The second striking feature of those session to session IPA profiles is a sharp rise in negative reactions during the *second meeting*. Negative reactions are typically low (around 12 percent) in the first session, and return to that level in the third, fourth and later sessions. But they rise to over 18 percent in the second session. This feature has occurred in data from other studies, not using IPA, and it is made much of in several theories of group development that are described later in this chapter.

It has already been pointed out that Bion's theory does not postulate a series of phases within a session nor a fixed sequence of developmental stages for the therapy groups about which he theorized. Thelen's empirical use of Bion's concepts (Stock & Thelen, 1958) also did not find any dominant developmental sequence for training groups. (Training groups, or T-groups, refer to one of the earliest forms of experiential groups discussed in Chapter 2. Later forms are called sensitivity groups, encounter groups, and the like). But Dunphy (1964) derived a developmental sequence from Bion's categories (first dependence, then fight, then flight, then pairing, then task efforts low in emotion). Bennis and Shepherd (1956) offered a theory of development for training groups. It postulated two major phases: dependence, or concern about relations to authority; and interdependence, or concern about intimacy and personal relations. Each phase had three subphases that reflect a dialectic sequence of thesis, antithesis and synthesis. In phase I, the subphases are dependence on the leader, then counterdependence and attack (the rise in negative reactions!), then resolution. In phase II, the subphases are enchantment, disenchantment and consensual validation.

Schutz (1958), too, posed a theory of group development, working mainly from laboratory problem-solving groups. He posited three interpersonal needs: inclusion, control, and affection. He asserted a universal sequence of group development: interaction dealing with inclusion, then with control, then with affection. That cycle recurs until the final three time-intervals before the group expects to terminate. In the last three time-intervals, the sequence is reversed: group members break their ties of affection, then stop controlling one another, then stop interacting and feeling identity with the group.

Tuckman (1965) developed his theory of group development on the basis of an extensive review of work done with therapy groups, and later applied it to development in training groups, laboratory groups, and groups observed in natural settings. He posits four major stages, each with two aspects: group structure and task behavior. Stage I involves testing and dependence for the group structure aspect, and orientation and testing for the task behavior aspect. Stage II involves intra-group conflict and emotional response to the task demands (the rise in negative reactions at the second stage again!). Stage III involves the development of group cohesion, and open discussion of self and other group members (the latter being work on "the task" for therapy groups). Stage IV involves development of functional role relatedness and the emergence

of insights (i.e., successfully "solving" the therapy group's task). The essence of Tuckman's four stages has been paraphrased as: I, *forming*; II, *storming*; III, *norming*; and IV, *performing*.

Several other theories of group development, based on training groups, use four or sometimes five stages similar to Tuckman's (e.g., Dunphy, 1964; Mann, Gibbard, & Hartman, 1967; Mills, 1964; Slater, 1966). Hare (1976) argues that these can, in large part, be described in terms of Parsons's (1961) functional theory of groups. Hare postulates that the following sequence of the four functional problems posited by that theory (see the previous section) constitutes a developmental sequence for groups: latent pattern maintenance (L), adaptation (A), integration (I), and goal attainment (G). The sequence ends with a return to L, a reorientation of the group after completion of the cycle of development.

When those four functional needs were discussed earlier, I offered substitute terms more closely fitted to the concepts of this book, namely: values and goals (V); abilities and resources (A); norms and cohesiveness (N); and group task performance (P). Tuckman's and Hare's stages are laid out along with those terms in Table 12-4. It is clear that there is a good fit for stages I, III and IV, but a misfit for stage II. Tuckman's storming stage is simply not comparable to the Hare-Parsons adaptation (which we have termed abilities).

The three-level representation of the four fundamental problems, offered in Figure 12-1, may provide a clue about the misfit. Tuckman's stage I is clearly related to the most fundamental latent function: developing consensus on values and goals (my V, Hare's L). Tuckman's stage III, norming, is clearly related to the middle level—the manifest-instrumental needs for task abilities and resources (A) and for group norms and cohesiveness (N). Tuckman's stage IV, performing, is clearly related to the final consummatory phase of group task performance (P). But the three-level functional chain formulation simply does not include an equivalent to Tuckman's phase II, storming. One possibility is that the storming stage is spurious. But it reflects the much-touted rise in intra-group conflict and negative reactions in the second developmental stage. Such a

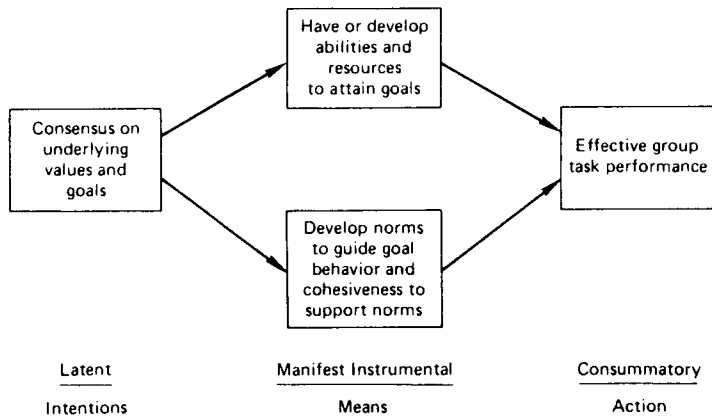


FIGURE 12-1 A Functional Chain of Fundamental Group Problems

conflict stage is found in IPA profiles, in Tuckman's review of therapy groups, in Schutz's laboratory groups, and by Bennis and Shepherd, Mills, Dunphy, Slater, and Mann and colleagues, with training groups.

It was noted in chapter 10 that the full-fledged problems used in Bales's ad hoc laboratory groups dealt only with two of the four quadrants of the Task Circumplex, namely: Generate and Choose. Not only did they not deal with Quadrant IV, Execute (a natural consequence of using verbal group tasks), they also did not deal with Quadrant III, Negotiate. That quadrant deals with the resolution of conflict within the group. Suppose, then, that we imagine that the full-fledged or *total* task of a group, over its development, subsumes all four quadrants of the Task Circumplex: Generate, Choose, Negotiate, and Execute (see chapter 5). Let us further imagine that those four quadrants or segments of the generic group task are in some way related to the stages in the development of the group. Retaining Tuckman's labels to identify the four stages, and recognizing that each stage involves *both task and interpersonal activity*, perhaps the developmental sequence can be represented in a manner similar to Figure 12-2.

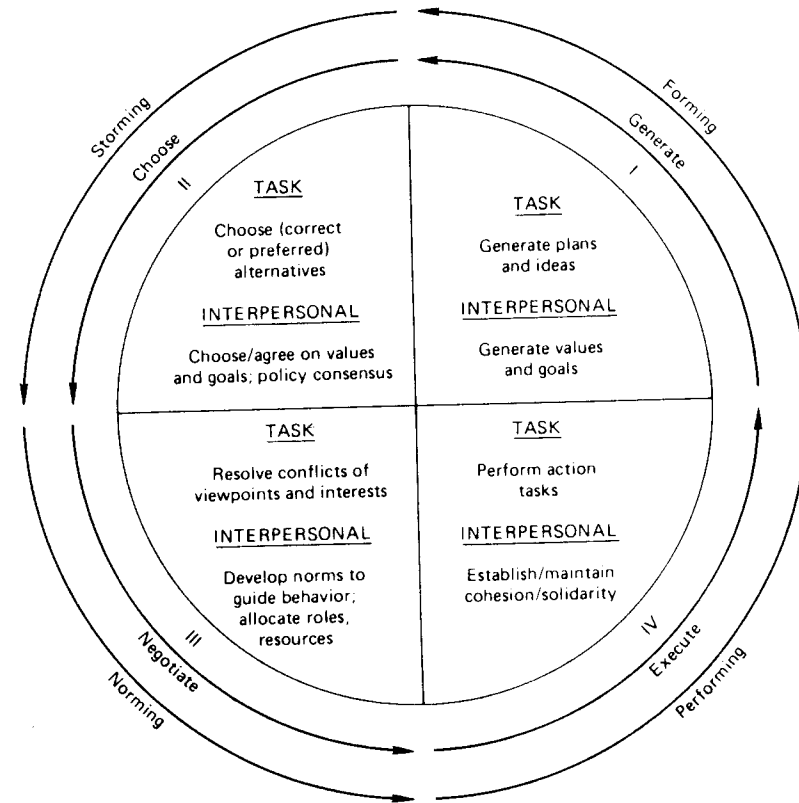


Figure 12-2 An Integrated Circumplex: Task Performance Processes, Interpersonal Processes, and Stages of Group Development.

TABLE 12-4 Developmental Stages Compared

HARE/PARSONS	TUCKMAN	THIS BOOK
L Latent pattern maintenance	I Forming	V Values and Goals
A Adaptation	II Storming	A Abilities and Resources
I Integration	III Norming	N Norms and Cohesiveness
G Goal attainment	IV Performing	P Group Task Performance

The possibility of fusing the extensive theoretic integration of Tuckman regarding stages of group development, the Hare-Parsons functional theory of group interaction and group development, and the Task Circumplex presented in the earlier chapters of this book, makes the exploration of this set of relations worthwhile.

SOME NEW TECHNOLOGY FOR STUDYING INTERACTION PROCESS

As indicated in the first section of this chapter, research involving the direct observation of group interaction process waned for over a decade, beginning in the 1960s, except for work with specialized systems tailored to specialized group situations such as classroom behavior. But there has been a resurgence in such work, triggered largely by the availability of some new technology for collection of observation records, for analysis of data, and for modelling interaction processes. A few examples of each of these are discussed here.

Data Collection Technology

Gottman (1979a, 1979b) has pioneered the use of split-screen presentations of video recordings of dyadic interaction. He displays, side by side on the same screen, the face and even upper bodies of the members of a dyad. In Gottman's work this is often a husband and wife dyad. In that way, there can be direct observation of both the visual and verbal responses of A and B to each other's inputs, and it can be done either with A and B's simultaneous behavior being examined or with either partner's behavior "lagged" by any given amount of time. With this technique and some complex analysis methods to be noted below, Gottman is able to study the cyclicity of behavior of the couple and of both of its members, the lead-lag relations (i.e., temporal intervals) involved in their interdependence, and especially the *dominance* relations between them. Gottman defines dominance of A over B as the degree to which B's behavior is predictable from A's simultaneous or prior behavior. If the probability that B does X is higher when A has just done behavior Y (compared to B's doing behavior X in general, or when A has not just done Y), to that extent and in regard to those behaviors and that situation, A can be said to dominate B.

Obviously, such a definition of dominance will, in many cases, lead to the conclusion that A dominates B *and* B dominates A. More specifically, it could

lead to the conclusion that A's behavior X dominates B's behavior Y, while B's behavior P dominates A's behavior Q. Dominance, in this sense, is what we will later call influence. Such *mutual influence* or *complementary influence* between interacting partners is the rule rather than the exception in group interaction. Gottman uses these techniques, among others, to help identify and clarify bases of marital conflict.

Data Analysis Techniques

On the data analysis side, both Gottman (1979a, 1979b) and Dabbs (1980) have made use of Fourier analyses and spectral analysis to treat interaction data. These techniques have long been used in the physical sciences and in some areas of psychology (e.g., audition) but seldom in social psychology or in the study of groups. They help to find cycles and subcycles within continuous data, and to identify the periodicity of those cycles. Gottman has used them to identify cycles of behavior in husband-wife and other dyadic interactions, and to study lead-lag relations of dominance in those cycles. Dabbs (1980) has used Fourier and spectral analyses to try to identify the "cognitive load" of different kinds of dyadic interactions, and to examine patterns of talking, silence and gaze. Specifically, he has compared temporal patterns of talking, pauses, interruptions, and floor shift pauses for dyads engaged in intellectual discussions as against social conversation. He also examined those patterns of verbal behavior in relation to the temporal patterns of gaze.

Dabbs (1980) argues that pauses *during* a floor turn (but *not* the silence just before a floor shift) are evidence of cognitive load (thinking, searching for the right word or for an elusive fact). He hypothesizes that there will be a reduction of visual input (gaze by the speaker) during such cognitive work. Dabbs defines a "turn" as a period of time during which one participant has the floor. It includes pauses in that person's speech, and it includes the silence after he or she stops speaking until the next speaker starts. Such turns last longer in intellectual conversations than in social conversations. Dabbs suggests that such turns may be organized into "megaturns" in such high-cognitive-load conversations. A megaturn is a period of time during which *one* of the interactants has the floor a very large proportion of the time, usually having a number of relatively long turns punctuated by a partner's very short responses (perhaps the reactive acts suggested from Bales's profiles, discussed earlier in this chapter). Dabbs finds that such megaturns are characteristic of dyadic conversations involving intellectual discussions, and that the "cycle length"—from the predominant talking of one to the predominant talking of the other and back again—generally took 32 to 128 seconds in dyads having such conversations. In contrast, dyads engaged in social conversation typically had cycles of a length of two to four seconds, indicating that the cycles were single turns rather than megaturns. (Dabbs also found interesting relations between the vocalization cycles and patterns of gaze. Both Dabbs's and Gottman's work offer techniques for studying patterns of nonverbal behavior as well as, and in conjunction with, studies of verbal behavior. Some of these are discussed in chapter 13, dealing with nonverbal behaviors.

Modelling Group Interaction Patterns

Tsai (1977) applied an exponential model, similar to the one by Stephan and Mischler (1952) discussed earlier, to examine the pattern of participation of a rather large, natural group (the eighteen-member Economic and Social Council of the United Nations). Incidentally, he found very high correlation of participation rates using three quite different definitions of a unit act: (a) Bales's IPA unit, rather micro and based on category of the act; (b) number of sentences, a unit based on semantic rather than interaction content categorization; and (c) number of floor turns, regardless of length of speech. So the rate phenomena discussed in this section are not artifacts of the way the unit act is defined.

Tsai found a very good fit of the exponential model to actual participation rates, but he also found some significant deviations. Specifically, the model underestimated rates for the highest participators while overestimating them for the middle-participators. Nowakowska (1978) offered a stochastic (probabilistic) model to try to account for such deviations. It supposes that the total group is composed of two "factions" (but it could be extended to more than two such subgroups); that participation *within* each faction is distributed in a manner similar to the downward exponential curve of the other models; but that the two curves may differ in starting level (reflecting between-faction differences in the rate of the faction's highest participator) and in slope (reflecting such factors as faction size, leadership structure, basic initiation rates of individuals).

It is worth noting that each of these models is built upon certain hypothesized psychological processes. Descriptions of those processes, by researchers developing the models (e.g., Horvath, 1965; Nowakowska, 1978; Tsai, 1977) sound pretty unrealistic. For example, Horvath's model (and subsequently both Tsai's and Nowakowska's) was built on the assumption that each member of the group has the same constant probability of trying to initiate the next act if given the opportunity, but that group members are arranged in a hierarchical order in terms of each person's reaction time in responding to a pause in the conversation. So, the probability of each person's actually getting the floor varies inversely with that response speed. It is as if each person waited to see whether each person higher in the hierarchy was going to speak, and if and only if none did, to then themselves initiate speech (or not to do so, and thus to pass the opportunity on to the next member in the group's hierarchy) as a function of that uniform probability of a member talking if given the chance.

It is important to make the point that *the value of the mathematical model*, as a basis for *describing and predicting the phenomenon* (in this case, the distribution of participation in a group), *does not rest entirely on the validity of the psychological processes hypothesized as underlying the phenomenon*. The model can provide a very accurate description, and be very effective in predicting the pattern for some groups not yet observed, even if what the model builder hypothesized about underlying processes is incorrect, even unrealistic. The model maker may have described an unrealistic process that happens to correlate highly with the (as yet unappreciated) real underlying process. Such

seems to be the case for the topic at hand. The models accurately describe and predict the pattern of interaction in groups, but we are yet a long way from appreciating just how that pattern comes about, and why it varies as it does over group size, task and situation differences, and the like.

Thomas and Malone (1979) have examined and compared a series of formal mathematical models for analyzing the time course of two-person interaction. They concentrated on what are termed discrete-state, discrete-time, two-person models. Each person's behavior at any instant of time can be classified as in one or the other of two states (i.e., a given behavior is or is not being exhibited). Therefore, the two-person system is in one of four states at time t (A is or is not doing the key behavior, and B is or is not doing it at time t). Those models also assume (a) that A's behavior at time t is independent of B's behavior at time t , but may be dependent on B's behavior at the prior time interval ($t-1$); (b) that the state of the system at time t depends on its state at time $t-1$, but not at any earlier times; and (c) that the set of probabilities of the system going from each given state to each other given state (i.e., transition probabilities) remains constant throughout the interaction. (Readers with appropriate backgrounds will recognize that this describes a set of stochastic models that are Markov chains with stationary transition probabilities.)

The main parameters of each of the models divide into three sets; (a) bias, or the individual's tendency to do the key behavior; (b) sensitivity to own prior behavior; and (c) sensitivity to other's prior behavior. The models differ in terms of whether they focus on the behavior itself or transitions in behavior, and in terms of whether they allow for asymmetry between the interacting persons (as we would expect, for example, in mother-infant pairs). Applications of these models to several sets of interaction data, from vastly different kinds of groups (e.g., mother-infant pairs, college student strangers on the telephone, subjects in a face to face laboratory group), lead Thomas and Malone to offer several *general* results. For example, there is evidence of interdependency between members of a pair, but in all cases that tendency is much weaker than the dependence between successive acts of the same person. As another example, in mother-infant dyads, the mother's smiling and gazing behavior depends on the infant's prior behavior, but the converse does not hold. It may well be useful to try to connect these mathematical models of the interaction process with the data analysis models used by Dabbs and Gottman, and to connect both of these with some substantive theories about interaction.

There are some other models of group interaction process, more or less recent and more or less mathematical, that also promise to serve as bench marks for future work. Most of these deal with what we are here regarding as the content of interaction, rather than its pattern. Some (e.g., Altman, 1975; Altman & Taylor, 1973; Altman, Vinsel, & Brown, 1981; Huessman & Levinger, 1976; Levinger, 1980) deal with the acquaintance process and are treated in chapter 16; others (e.g., Adams, 1965; Kelley & Thibaut, 1978; Thibaut & Kelley, 1959) deal mainly with interdependence and allocation of resources and are treated in chapter 15. Still others, dealing with the task performance process, have been discussed in the chapters of Part II. There are some further comments about the functions of models and theories at appropriate places later in the book.