

International Encyclopedia of the Social & Behavioral Sciences

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Volume 9



2001

ELSEVIER

AMSTERDAM—PARIS—NEW YORK—OXFORD—SHANNON—SINGAPORE—TOKYO

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P. Suedfeld

Groups, Sociology of

A group is a bounded collection of interacting individuals or a consensual social categorization. It is difficult to distinguish sociological and psychological studies of groups and, in the past, there has been a

considerable overlap. Still, one feature may help to make a reasonably accurate distinction. The sociological study of groups always involves attention to collective phenomena in addition to the concept of the group itself. The psychological study of groups sometimes does, but often does not, involve attention to these phenomena. In the work of sociologists, processes of interaction and of individual behavior in social contexts are seen as giving rise to durable or semidurable collective phenomena (such as cohesion, relational structures pertaining to status, communication, friendship, power, control; structural similarity; distribution of information; collective good-provision; social norms; collective representations; styles of conflict resolution; patterns of group decision making).

These small-scale collective phenomena, in turn influence the behavior of individuals and their interactions (see Fig. 1). Some sociological work concentrates on relation 1, some on relation 2, and some on 1 and 2, and other combinations. Relation 3b allows explicit feedback mechanisms involving both levels (as in expectation states theory, see below). Psychological studies often focus on the direct influence of interaction (or the presence of others) on attitude change, productivity, satisfaction, self-esteem, depression, etc., occasionally allowing for feedback mechanisms (3a and 3b). The extra arrows in Fig. 1(i) indicate exogeneous factors (such as genetic dispositions, rules, established categories, status differences).

1. Historical Background of Small Group Research

The scientifically serious investigation of groups in the sociological tradition started with anthropological studies of tribes, clans, and families in the nineteenth and early twentieth centuries. Sumner, Simmel, and Cooley were early codifiers of that kind of research. The most important turn in this development occurred

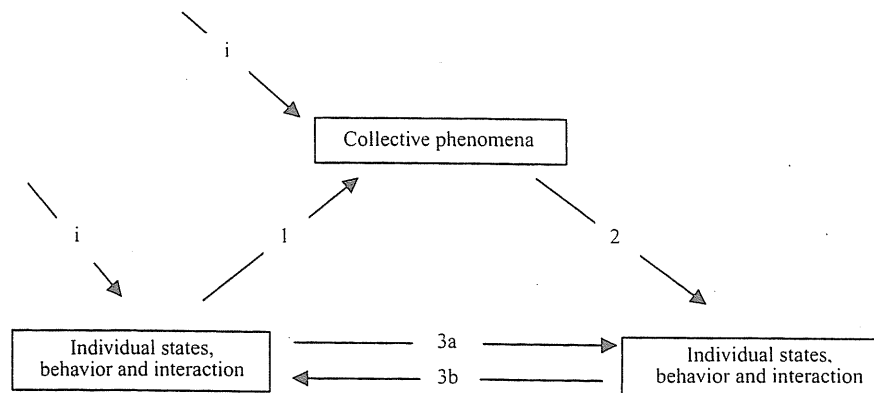


Figure 1
Schematic depiction of the explanation of groups

in the 1930s. Within the span of a few years, four great books appeared which had two very important messages in common: that groups are constituted by a cognitively mediated functional interdependence between individuals, i.e., people who are dependent on each other for achieving a goal interact, and something important happens to their minds and the way their minds operate when they interact. In addition, the actual situation in which their action is placed matters most for behavior (as opposed to traits or other cross-situational constants). In 1934 Mead's (then already posthumous) *Mind, Self and Society* appeared. Two years later, Lewin's *Principles of Topological Psychology* and Sherif's *The Psychology of Social Norms* came out. A year later, Parsons' *The Structure of Social Action* made its appearance. Merton's early work on reference groups was also quite influential.

From this time, group studies continued in two traditions—experimental and field studies—and both traditions bore the mark of this convergent conception of groups. Under the leadership of Lewin and Sherif, 'group dynamics' as the experimental study of groups was then called, achieved great heights. Field studies had Mayo's Hawthorne studies and Whyte's famous *Street Corner Society* as models. Both traditions owe their success to the simultaneous consideration of the three fundamental interdependencies in groups: *functional* (related to goal achievement), *cognitive* (related to common categorizations, beliefs, and knowledge) and *structural* (related to the configurations of social relations) (see Lindenberg 1997 for more detail on this and other aspects of this article).

However, the precise nature of the interdependencies was not yet well investigated and in the late 1950s and early 1960s, specialized groups of studies on each of these interdependencies became dominant, with interesting crossovers between psychology and sociology. Homans (1950, 1958), a sociologist, combined the field and the experimental traditions in the study of functional interdependencies in exchange relations. Inspired by Homans, two psychologists, Thibaut and Kelley (1959), worked out the study of small groups as the study of functional interdependencies. Their book is to this day one of the best on the subject. It influenced Homans' further work on the subject (Homans 1961). Cognitive interdependencies were elaborated by Sherif and turned into a major strand of group research called 'social identity theory' by Tajfel (1982) and Turner (1982), both psychologists but very influential among sociologists and in turn influenced by sociological symbolic interactionism. In a related development, Moscovici, a psychologist, elaborated Durkheim's theory of collective representations (see Flick 1998). Structural interdependencies were more formally elaborated by the psychologist Cartwright and the mathematician Harary and turned into a full-blown network approach by sociologist White and his followers (see White et al. 1976).

2. *Bringing Different Kinds of Interdependencies Back Together Again*

This section deals briefly with the field study approach and in some more detail with experimental studies. No attempt is made to be complete. Rather, the overview is selective. The selection criteria are first, that the studies should be substantively important. Second, they must mainly focus on group processes comprising small groups (i.e. face-to-face interaction with at least one common goal), small networks, and face-to-face encounters. Third, the studies must be seriously concerned with the integration of at least two of the three fundamental interdependencies. Fourth, they must cluster around a program of investigation with some continuity.

With regard to field studies, work inspired by Goffman was chosen. Goffman's studies provided a new integration for field studies in sociology (excluding Mayo-type studies). With regard to experimental (and simulation) studies, expectation states theories, various groupings of social exchange theories, and studies of friendship and cognitive networks were selected. Studies of social dilemmas are covered elsewhere (see *Cooperation: Sociological Aspects*). Helpful discussions of a broader scope can be found in Cook et al. (1995) and Foschi and Lawler (1994). Due to space restrictions, the reader will at times be referred to bibliographies and collections rather than individual works.

2.1 *Fieldwork Studies*

From the beginning of the 1960s, fieldwork studies on face-to-face groups have received their main theoretical guidance from Goffman (1961). He also put short-lived groups, or 'encounters', on the map. There is a relatively small but very productive circle of contributors to this kind of research (a few important examples are Anderson 1978, Cahill and Lofland 1994, Fine 1987, MacLeod 1995). These studies are concerned with conformity, status, group divisions, identities, and their combination in impression management. They are rich in descriptive detail. Aspects of functional and cognitive interdependencies are clearly present in Goffman's work.

2.2 *Experimental Studies*

2.2.1 *Expectation states theories.* Generic expectation states theory is concerned with the formation and maintenance of power and prestige structures in face-to-face task groups (see literature in Berger and Zelditch 1993). Following the tradition of Bales in the 1950s, power and prestige are conflated and their structure is conceived in terms of behavioral aspects

(opportunities and influence) rather than the distribution of scarce resources. People are higher on the power and prestige structure, the more opportunities to act they receive, the more often they take advantage of these opportunities, and the more often they win disagreements if and when they occur.

The basic mechanism that creates this structure is pairwise interaction (between, say, Ego and Alter) that is governed by performance expectations. It is the (unobservable) structure of these performance expectations which keeps generating the observable power and prestige structure. When Ego has positive performance expectations towards Alter, he or she will give more action opportunities to Alter and Alter will more likely take up each opportunity offered. Alter has influence over Ego. It is assumed that there is an evaluation bias. Ego is more likely to judge Alter's performance to be positive if the performance expectation was positive and vice versa. And if Ego nonetheless voices disagreement, he or she is more likely to eventually yield to Alter if the performance expectation was positive to begin with. Such evaluation biases greatly enhance the stability of the power and prestige structure (provided the task endures).

The theory is meant to apply to task groups. For this reason, functional interdependence is by definition the starting point. Here, a joint task and face-to-face interaction is what makes a collection of individuals into a group. Each group member's contribution influences a group score (mostly outcome interdependence, say, linking bonus to agreement in answers). There are also cognitive aspects. For the theory to apply, group task achievement must be a salient goal in the interaction with other members ('collective orientation'). The central cognitive element in the theory is a performance expectation. It presupposes other cognitive elements, such as goal criteria and causal beliefs about how likely a particular characteristic or behavior is to lead to success or to failure. Cognitive interdependence comes about when the performance expectations (and, prior to that, the goal criteria and causal beliefs) are being shared. Given the evaluation bias, the interdependence means that performance expectations of different group members interlock (see Moore 1985).

Functional and cognitive interdependencies are closely interlinked in this theory. This link is made even stronger through extensions of the theory to include external status characteristics (see Berger and Zelditch 1993) and the generation of status characteristics from nominal distinctions (see Webster and Hysom 1998). Task groups are embedded in a wider culture in which such status and competence beliefs exist (such as 'men are better at mathematics'). People seem to follow the maxim 'when in doubt, assume that a salient characteristic is task-relevant' (the so-called 'burden of proof principle'). With regard to gender, this favors men in general tasks as well as in 'masculine' tasks, and it favors women only in stereotypically

'feminine' tasks. Through the link of performance expectations with worthiness, there is also a link of expectation structures to conceptions of just rewards, which is worked out in the 'status value theory' of distributive justice (see Berger and Zelditch 1993).

Ridgeway has shown that, in turn, such cultural beliefs can be explained by the diffusion of *status belief-generating mechanisms* in small groups. When interaction partners in task groups are doubly dissimilar in that they differ in valuable resources (say high pay level) and in a salient nominal distinction (such as race or gender), then a process of misattribution will causally link having the valuable resource with the nominal distinction and eventually with assumptions of competence, worthiness, and esteem. The group consensus on this attribution generalizes to the idea that 'most people' believe it to be so (Ridgeway et al. 1998). Group members are likely to transfer such beliefs to other group contexts, thereby spreading and reinforcing them across groups and turning them into cultural status beliefs. Similar mechanisms are now invoked to explain legitimation and delegitimation of power and prestige structures in groups (see Berger et al. 1998).

2.2.2 Theories of exchange in networks. Theories of social exchange by Blau (1964), Homans (1950), and Thibaut and Kelley (1959) have given rise to a number of theories on the influence of social structure on the distribution of exchange ratios or benefits within groups. The results of these theories are also relevant to the explanation of network effects on power advantages on a macro level (see, e.g., Burt 1992). Paradigmatic for these theories is Emerson's (1976) concept of 'network connection,' which points to externalities between exchange relations. Two exchange relations are connected if and only if the exchange in one relation affects the exchange in the other (in terms of frequency and value). Thus, in an exchange network, the specific distribution of ties can have a strong impact on the distribution of benefits, but this influence depends on the nature of the network connections. For example, if there is a rule that one may exchange only with one other partner then the network is negatively connected. Division of labor creates positively connected networks in which exchange with one stimulates exchange with the other(s). Negative connections are easiest to trace both theoretically and empirically, and thus the bulk of research in this area is on negatively connected networks (an important exception is Burke (1997), who has developed an interesting link between network exchange and identities).

One prominent version of such a theory is *exchange network theory* (Cook and Yamagishi 1992). The distribution of benefits (or rates of exchange) within a network is explained on the basis of power ('power/dependence'). In positively connected networks, the power process is determined by brokerage, i.e., by the

ability to connect resources of various actors, and by the value of the focal resource to the actors. In a negatively connected network, power is based on the value and degree of availability of a focal resource from alternative sources. The more value Ego gets from an exchange with Alter compared to the best available exchange alternative, the more dependent Ego is on Alter and the more power Alter has over Ego. With repeated exchange in such negatively connected networks, the exchange ratio is predicted to shift toward the point at which neither of them could improve his or her outcome by exchange with another partner. Power advantages are thus structurally induced, given the 'connectedness' of the network.

A variant of this theory for coercive power has been elaborated by Molm (1997). Interestingly, Molm predicts and finds that power based on the ability to inflict damage on others is not structurally but strategically induced in order to extract rewards from the other. This opens exchange theory to a more explicit consideration of rational strategies, especially with regard to the balance between incentive to coerce and fear of retaliation. Lawler's work is also relevant to this topic (see, e.g., Lawler 1992a).

Elementary theory (ET, sometimes also called 'network exchange theory') is also rooted in the Homans/Emerson tradition and it also explains exchange ratios on the basis of structurally induced power (see Berger and Zelditch 1993, pp. 323). The major difference with exchange network theory is twofold. First, in reference to Weber, ET considers resistance to the exercise of power more explicitly than exchange network theory. Second, ET uses experiments in which the degree of 'exclusion' (i.e., the degree of negative connectiveness) varies. This second possibility gives it more flexibility to approximate various real life phenomena. However, the way resistance and the representation of exchange are worked out imposes strong restrictions, which reduces real life application to some degree (see Van Assen 2001). More recently, interesting links of ET with expectation states theory (Willer et al. 1997) and with game theory (see Willer and Skvoretz 1997) have been developed.

An additional grouping of theories on exchange should be mentioned. It is also related to the Homans/Emerson tradition but uses different elaborations. There have been long-standing efforts to explain structural network effects on power and exchange rates by means of game theory (especially using the concept of the 'core') by Bonacich and co-workers (see, e.g., Bonacich 1998). See Friedkin (1995) for yet a different model and Fararo and Skvoretz (see Berger and Zelditch 1993, pp. 416) for a comparison of various models. There is also a productive development of models that use exchange in networks for the explanation of power processes in collective decision making, mostly in small groups (see Stokman et al. 2000). Because these models are not tied to a particular experimental paradigm, they are more open

to the consideration of other exchange models and strategies (such as Coleman's model; see Coleman 1990) and to an explicit consideration of strategies of persuasion and challenges that accompany exchange strategies.

2.2.3 Friendship and cognitive networks. In recent years, dynamic friendship networks have received an increasing amount of attention. A new line of research has opened up by taking relatively simple behavioral assumptions and tracing their structure-generating consequences through simulation and, at times, also empirical research. What is new is that the interdependence of simultaneous friendship choices is modeled. If choices go on simultaneously in a group of strangers, what structure will emerge from the interdependence of choices under various choice preferences and constraints? How does 'group' size affect the resulting structure(s)? How does heterogeneity of the choosing individuals affect the resulting structure(s)? Preferences have been made more complex by stepwise adding status preferences to similarity preferences, and by explicitly introducing friendship dissolution to friendship formation. As to influence, friends do not just have a preference for similarity, they also become more similar. Paradigmatic for this kind of work is Stokman and Zeggelink (1996) and work presented in Doreian and Stokman (1997). See Van der Bunt (1999) for empirical research. Work linking this kind of dynamic approach to issues of cooperation is exemplified by Flache and Macy (1996) and Flache and Hegselmann (1999).

Networks are also cognitively represented which, in turn, contributes to the generation of joint cognitive and social structures. Research dealing with these aspects of networks link explicitly cognitive and structural interdependencies (see Carley 1986, Freeman 1994, Krackhardt 1987, Pattison 1994). Related research deals with the effects of cognitive interdependencies on learning, search, and general problem-solving strategies in groups and organizations (see Carley 1995, Edmonds and Dautenhahn 1999). Here functional interdependencies in terms of joint production are added explicitly (see also Troyer and Silver 1999). In the future, one can expect innovative impulses from these lines of research for sociological group research in general.

3. Evaluation

Sociological research on groups is lively, productive and, in the experimental fields, also cumulative. There is also a slow tendency to open up across the narrow borders of the research paradigms. However, there are a number of important shortcomings (see Lindenberg 1997 for more detail and for suggestions for new directions). First, field and experimental studies generally ignore each other. This is not a

desirable state. Crossovers in the past have been very productive and should be encouraged. Second, the experimental paradigms carry such a strong weight that they hamper new theory formation. For example, in expectation states theories, the functional interdependence is experimentally restricted to outcome interdependence with regard to agreement. There is little or no task interdependence. In the exchange theories, exchanges are often limited to divisions of resource pools. Such exchanges lack many of the properties of the exchange of goods, information, and emotions. On the whole, there is little attention to the effects of joint production on expectations and exchange.

Third, functional interdependencies should have analytical primacy. This primacy derives from the fact that cognitive processes are strongly influenced by goals (see Gollwitzer and Moskowitz 1996) and structural effects only occur in interaction with goals (externalities) as has been seen in exchange network theory. Yet, in most exchange theories this primacy is lacking. Fourth, present research rarely includes 'groupishness' (i.e., categorization and framing effects) in its consideration of cognitive interdependencies (see Lawler 1992b as an exception). For example, in expectation states theory, 'collective orientation' is introduced as a scope condition, not as a variable. Related to this point is, fifth, that the distinction between small groups and small networks is non-existent or ad hoc. There is little or no theory on the influence of groups on networks or vice versa, or on networks nested in groups. Sixth, the study of inter-group relations for the explanation of what goes on inside the group needs much more attention. A positive example of what is needed is Coleman's classic study of the influence of interscholastic athletic competition on the local status structure in schools (see Coleman 1961).

See also: Collective Behavior, Sociology of; Exchange: Social; Networks: Social; Status and Role, Social Psychology of; Status and Role: Structural Aspects

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S. Lindenberg

Growth Curve Analysis

The phrase 'growth curve analysis' denotes the processes of describing, testing hypotheses and making scientific inferences about the growth and change patterns in a wide range of time-related phenomena. The term 'growth curve' was used originally to describe a graphic display of physical stature (e.g., the height or weight) of an individual over consecutive ages. In contrast to some longitudinal data, growth curves have unique features: (a) the same entities are repeatedly observed, (b) the same procedures of measurement and scaling of observations are used,

and (c) the timing of the observations is known. Formal models for the analysis of growth curves were developed in many different substantive domains with a common goal—to examine and uncover a fundamental set of regularity conditions or 'basic functions' responsible for the manifest growth and change. Techniques for the analysis of growth curves were initiated in the physical sciences, more fully developed in the biological sciences, and then used in studies of the size and health of plants, animals, and humans. In the behavioral sciences, growth curve analyses have been applied routinely to a wide range of phenomena—from experimental learning curves, to the growth and decline of intellectual abilities and academic achievements, and to changes in other psychological traits over the life span.

Growth curve analyses are among the most widely studied and well-developed mathematical and statistical techniques in all scientific research. These analyses have roots in the seventeenth- and eighteenth-century calculus of Newton and probability of Pascal, but this article is limited to more recent historical developments and other related techniques, such as time-series and dynamical systems analyses are not covered.

1. Growth Curve Data Collections

The first reported growth curve data were collected by the French Count de Montbeillard between 1759 and 1777. These data consist of semi-annual measurements on the growth of the height of his son over nearly 18

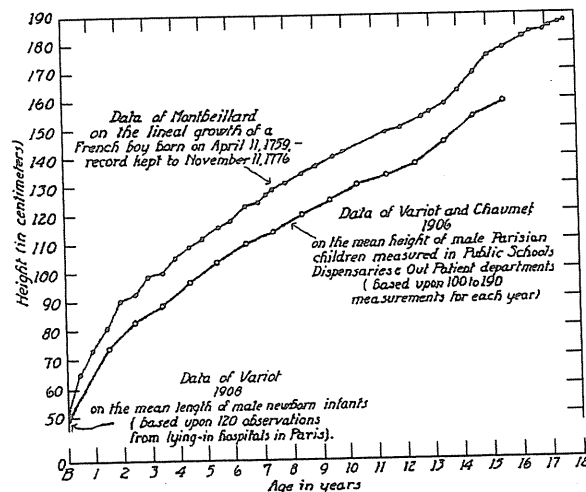


Figure 1

The initial 'growth curves' of human height data from Scammon (1927, p. 334). Note: The vertical (y) axis represents the height in centimeters and the horizontal (x) axis represents the age in years from birth