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978-1-107-00246-3 - Social Influence Network Theory: A Sociological Examination of Small Group Dynamics

Noah E. Friedkin and Eugene C. Johnsen

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## Social Influence Network Theory

Social influence network theory presents a mathematical formalization of the social process of attitude change as it unfolds in a social network of interpersonal influences. This book brings the theory to bear on lines of research in the domain of small group dynamics concerned with changes of group members' positions on an issue, including the formation of a consensus and of settled disagreement, via endogenous interpersonal influences, in which group members are responding to the displayed positions of the members of the group. Social influence network theory advances a dynamic social cognition mechanism, in which individuals are weighing and combining their own and others' positions on an issue in revising their own positions. The influence network construct of the theory is the social structure of the endogenous interpersonal influences that are involved in this mechanism. With this theory, the authors seek to lay the foundation for a better formal integration of classical and current lines of work on small groups in psychological and sociological social psychology.

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# Social Influence Network Theory

## *A Sociological Examination of Small Group Dynamics*

NOAH E. FRIEDKIN

*University of California, Santa Barbara*

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## *Preface*

Social influence network theory presents a formalization of the social process of attitude changes that unfold in a network of interpersonal influence (Friedkin 1986, 1991, 1998, 1999, 2001; Friedkin and Cook 1990; Friedkin and Johnsen 1990, 1997, 1999, 2002, 2003). In this book, we bring the theory to bear on lines of research in the domain of small group dynamics that are concerned with changes of group members' positions on an issue, including the formation of a consensus and of settled disagreement, via endogenous interpersonal influences, in which group members are responding to the displayed positions of the members of the group. Newcomb (1951) has suggested, and we agree, that the occurrence of endogenous interpersonal influence is among the basic postulates of social psychological theory:

Any observable behavior [e.g., a displayed position on an issue] is not only a response (on the part of a subject) which is to be treated as a dependent variable; it is also a stimulus to be perceived by others with whom the subject interacts, and thus to be treated as an independent variable. (Newcomb 1951: 34)

Social influence network theory advances a dynamic social cognition mechanism, in which individuals are weighing and combining their own and others' positions on an issue in the revision of their own positions. The influence network construct of the theory is the social structure of the endogenous interpersonal influences that are involved in this mechanism.

With this theory, we seek to lay the foundation for a better formal integration of classical and current lines of work on small groups in psychological and sociological social psychology. We explore a terrain that lies between two traditions – the analysis of social cognitions, and the analysis of social structures. Our book is addressed to our colleagues in the social sciences, and to the increasing number of scholars in the physical sciences, who are engaged with the mathematical formalization

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of endogenous interpersonal influences that unfold in social networks. The theoretical scope of our approach is not limited to small groups. Small groups are simply the setting in which we are currently studying the mechanism upon which the theory is based. We investigate the merits of our postulated mechanism in small groups, assembled under experimental conditions, because such groups allow (a) measures of group members' initial positions on an issue, (b) control over the moment at which discussion on the issue is opened, (c) measures of the influence network in which group members are responding to the positions of other group members, and (d) measures of the revised positions that arise from such responses. However, the work in this book is also motivated by an agenda of theoretical integration in the field of research on small groups.

With the cognitive revolution in social psychology, which began in the late 1950s as a reaction to behaviorism, a misleading theoretical disjunction has emerged between the investigation of social cognition mechanisms and the investigation of small group social structures. The former is focused on the problem of how individuals process social information. The latter is focused on the implications of the structures of social relations. We want to reduce this disjunction. We intend to do so by revisiting lines of work on group dynamics with formal and empirical analyses that are based on a postulated social cognition mechanism unfolding in an influence network. Our analyses attend to (a) the classic work on group dynamics by Sherif, Asch, Newcomb, Cartwright, French, Festinger, and other investigators, whose empirical and theoretical work dramatically advanced the field of social psychology; (b) the more recent work of psychologists who have investigated majority–minority influences, social decision schemes, and choice shifts in small groups; and (c) the current work of sociologists on social structures of interpersonal sentiments and interpersonal influences in small groups. The bearing of a simple social cognition mechanism on these disconnected lines of inquiry suggests that their formal integration need not be a chimera, that is, a grotesque combination of mismatched parts. Hence, although our most fundamental focus is on whether the mechanism presents empirically supported predictions in small group settings, we also aim to foster the mathematical foundations of an approach to interpersonal influence that is widely applicable to various lines of research in social psychology. We hope that our colleagues in both psychological and sociological social psychology will appreciate this agenda, even though they may disagree with certain features of the approach that we have developed.

The bulk of the work on small group dynamics is in psychology. We bring a sociological perspective to bear on parts of this literature via the construct of an influence network. The social networks of interpersonal contacts that fascinated Cartwright, Festinger, French, Moreno, and

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Newcomb now rarely appear as an important theoretical construct in the work of cognitively oriented social psychologists. This neglect is understandable given the promising frontiers opened by the cognitive revolution and the failure of the group dynamics tradition to incorporate social cognition into studies of the implications of social networks. Cartwright and Harary's (1956) formal theory of structural balance was a seminal effort to link social cognitions and social networks, and French's (1956) formal theory of social power was a seminal effort to link social networks and group members' positions on issues. Neither of these advances led to the incorporation of social networks as an important theoretical construct in the cognitive revolution. The connection of social networks to the core concern of social cognition – how people process social information – was not developed.

The theoretical status of social networks is secure within sociology. However, in the three core journals of sociology (*American Sociological Review*, *American Journal of Sociology*, and *Social Forces*), where social networks frequently appear as an important theoretical construct, a surprisingly small fraction of publications deal with empirical data on entire social networks, specifically the intact  $n \times n$  matrix of social relations that exists among the members of a group of size  $n$ . Among studies that do deal with entire networks, a small fraction of them employ a clear specification of a social process that unfolds in the network; sociological work has been mainly focused on the structural features of social networks, such as the structural centrality of individual members and the differentiation of the network into subgroups. Our analysis of influence networks is based on the specification of a dynamic social cognition mechanism that describes how persons' attitudes on an issue are affected by their own and others' attitudes on the issue. The network construct that we deal with emerges from the specification of this cognitive mechanism.

Our work is situated at the interface of two disciplines with different emphases, and we present an approach in which neither emphasis alone is viewed as theoretically sufficient to explain individuals' positions on issues when individuals are embedded in groups. This work is addressed to scholars with an interest in the employment of mathematical formalizations of social phenomena. A serious reader, without the requisite mathematical background, may also find our empirical results of interest; in each chapter, we try to separate our formal and empirical analyses. Although we draw only on linear algebra and a discrete-time social process, our analysis sometimes becomes detailed as we elaborate the steps that move us from the postulated individual-level mechanism to its implications for group dynamics and outcomes. Our work presents an intimate dance between formal analysis and empirical findings in which we privilege both partners. This dance occurs in various different substantive venues that require separate introductions to substantive problems,

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depending on the particular line of work we are analyzing. We organize the book as follows.

Beyond the Part I introductory Chapters 1–4, we focus each of the remaining Chapters 5–12 on prominent topics of substantive inquiry. Chapters 5–12 in Parts II and III may be read independently and in any order. We have placed some of our mathematical analyses in appendices and refer to them where appropriate.

Chapters 5–9 in Part II deal with five classic lines of work: (a) the formation of consensus in group discussions of issues; (b) the special properties of the smallest group, the dyad; (c) the social comparison hypothesis that interpersonal influences are importantly affected by group members' initial positions on issues; (d) the majority influence hypothesis that individual and group outcomes are importantly affected by the group's initial faction structure; and (e) the group polarization hypothesis that small group discussions reinforce the average initial inclination of the group's members on an issue. These five lines of work, mainly developed by psychologists, intersect in important ways, with their focus on the account of an emergent consensus, in their emphasis on the initial positions of group members, and in their treatment of group discussion as a condition that has a main effect on individual outcomes. We show how our formalization bears on each of these lines of work.

Chapter 5 presents an analysis of the emergence of consensus via attitude changes that unfold in influence networks and related empirical findings on dyads, triads, and tetrads. A consensus may or may not be formed in a group. When it is formed, the consensus may be located at one of the two initial boundary positions of the initial range of positions in a group, or at an initial position between these boundary positions, or at a compromise position that is not one of the initial positions. All of these outcomes arise in our experiments, and we show how our formalization accommodates them. Disagreeing individual positions and collective consensual positions rarely fall outside the range of a group's initial positions; the exceptions are concentrated in dyads.

Chapter 6 focuses on dyadic influence systems. The smallest group presents certain unusual formal properties and our empirical evidence on dyads suggests that they have, in some respects, potentially more complex influence systems than those in larger groups. An influence process that involves superaccommodative group members necessarily exhibits particular unusual formal properties in a dyad, which only arise in very special cases in larger networks. In addition, our empirical evidence indicates that dyads are more likely than larger groups to generate settled positions on issues that are more extreme than any of the initial positions of group members. We present a viewpoint that relates the unusual formal properties of superaccommodative dyads and these observed breaches of initial ranges of positions.

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Chapter 7 is addressed to Festinger's social comparison theory and to the broader literature dealing with the effects of group members' initial positions on an issue on their influence networks. Our findings indicate that, except in special cases, the distribution of initial positions on an issue is not informative of the influence network that is formed in a group and, in turn, is not generally informative of the final position(s) of group members on an issue. In the absence of a *direct measure* of the influence network of a group, models that seek to predict group members' final positions from a measure of group members' initial positions do not appear to substantially advance our understanding of group dynamics. We find that two prominent models that have attempted this – the consensus model of Davis (1996) and the meta-contrast-ratio model of McGarty, Turner, Hogg, and Wetherell (1992) – fail to advance the prediction of small group discussion outcomes beyond the baseline prediction that group outcomes converge to the mean of initial positions.

Chapter 8 is related to the focus of Chapter 7 and concentrates on the implications of initial attitudinal factions (e.g., majorities and minorities) in groups. We develop a formal perspective on the literature concerned with such factions. We show that initial factions do not fix the positions of their members, but do constrain their attitude changes. Factions are rarely broken and their members are usually “fellow travelers” during the course of the influence process.

Chapter 9 presents an analysis of choice shifts and group polarization. The literature on group polarization has taken group discussion as a condition that may shift the average initial position of group members in a particular direction. The network of interpersonal influences in which discussion on an issue unfolds is not directly dealt with as a basis of choice shifts and group polarization, although Cartwright (1971) pointed to the influence network as an important construct in his review of the developing literature on these phenomena. We show that choice shifts and group polarization are not main effects of group discussion but phenomena that may be generated by an influence process (one process) unfolding in an influence network. Some networks will generate choice shifts and group polarization; others will not.

Based on these analyses and empirical findings, it is difficult to escape the conclusion that the extant literatures in the group dynamics tradition have been limited by their lack of attention to the influence network construct and that the neglect of influence networks has impeded an integrative perspective. We advance a perspective wherein particular conditions and experimental paradigms may be formalized as special cases of social structures in which one fundamental social cognition process unfolds that can have different implications for different structures.

Part III concludes the book with Chapters 10–12, in which social influence network theory is linked with three prominent formal theories.

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Chapter 10 brings our approach to bear on the social decision scheme theory hypothesis that group outcomes may be understood in terms of heuristic formal rules that directly transform group members' initial positions on an issue into a consensus position. Chapter 11 dovetails our theory with expectation states theory and affect control theory. Chapter 12 extends Blau's (1977) analysis of the implications of macro-level sociodemographic heterogeneity by introducing small group dynamics as a source of social integration in large-scale differentiated communities.

Chapter 10 concentrates on social decision scheme theory, arguably the most prominent approach among psychologists to group decisions, and this theory's application to jury outcomes. The extant literature on social decision scheme theory indicates that groups behave as if different decision schemes are invoked to reach a collective decision, depending on the type of issue with which the groups are dealing. We show that a social influence network perspective provides a unifying formal framework. A single social process is consistent with different decision schemes and suffices to account for the issue-contingent results that have been noted in the literature.

Chapter 11 shows how influence networks may form and change based on group members' attitudes about each other, and presents an integrative viewpoint on two prominent lines of research in sociological social psychology – expectation states theory and affect control theory. Expectation states theory emphasizes the effects of sociodemographic or personal characteristics of group members on their interpersonal influences. These effects are mediated by consensual perceptions of the relative competence of group members. Affect control theory emphasizes the effects of individuals' sentiments in interpersonal interactions. These sentiments are assumed to be consensual for persons in identical situations. Both theories invoke assumptions of prior consensus, and neither presents a framework that grapples with the implications of influence networks. We dovetail these two theories by relaxing the assumption of prior consensus that is involved in both theories and generalize expectation states theory under the assumption that broader interpersonal sentiments (attitudes about particular others) govern the formation of influence networks in small groups. We show how a group's influence network and matrix of interpersonal sentiments may coevolve over time, each affecting the other.

In Chapter 12, our final chapter, we develop a perspective on the implications of small group dynamics for macro-level sociological theory. We elaborate Blau's (1977) analysis of large-scale social structures, in which he hypothesizes that homophilous contacts contribute to macro-level social integration. Blau's insight is that an in-group relation on one sociodemographic dimension is frequently also an out-group relation on other sociodemographic dimensions. His theory is structural in that he does not delve into what occurs in interpersonal contacts. For Blau,

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contact presents integrative opportunities. We dovetail Blau's macro-level structural analysis with the meso-level of subgroups and with the micro-level interactionist tradition in social psychology that attends to small group dynamics. We show how gender-homophilous contacts in disjoint small groups may contribute to a macro-level reduction of the variance on issue positions in the population, due to the effects of the influence networks in the small groups of which the population is composed.

The book is a collaborative effort of a sociologist and a mathematician, but the substantive and mathematical work is not divided along these lines. Our collaboration has been successful and satisfying in part because we each contribute to both the substantive and the mathematical aspects of our research. To be sure, there is some natural asymmetry in this interaction – Friedkin more often bringing Johnsen to ground on substantive issues, and Johnsen more often bringing Friedkin to ground on mathematical issues. The experience of these corrections has underscored for us the value of this collaboration. Friedkin's (1986) initial foray into the development of the theory was followed by Friedkin and Johnsen's (1990) more general formalization. Since 1990, we have spent many enjoyable hours pursuing further generalizations, implications, and applications of one deceptively simple formal model. The result has been a series of publications on various topics (Friedkin 1991, 1998, 1999, 2001; Friedkin and Johnsen 1997, 1999, 2002, 2003). This work has been motivated by the realization that scholars in different disciplines have converged, sometimes independently, on an approach with strikingly similar formal features. We fold revised and extended versions of some of these publications into the present book, and present numerous new developments on the general formal properties and implications of the model, and on the model's application to small group dynamics.

The present book may be viewed as a companion to Friedkin's (1998) application of the model to the Durkheimian problem of social integration in large, complexly differentiated social structures. In that work, the constructs of the model were operationalized with structural measures, based on features of the communication network among group members. Here we apply the model to the micro settings of small groups engaged in a discussion of an issue, and the operationalization of the theory stays close to the *cognitive foundation of the formalization*. The influence process is the same in both applications – the study of large differentiated populations and the study of small groups; we have *one process* that unfolds in networks of different sizes and structural complexity. The bearing of our model on topics related to small group dynamics, we believe, is straightforward and informative.