



Article

When Does Information Affect Power? Evidence from Strong and Semi-Strong Exchange Networks

Pamela Emanuelson

College of Arts and Sciences, Department of Sociology and Anthropology, North Dakota State University
Fargo, Fargo, ND 58108, USA; pamela.emmanuelson@ndsu.edu

Abstract

Does the completeness of actors' knowledge affect the exercise of power in social structures? Exchange theories and the experiments used to test them vary in the level of information availability—ranging from fully transparent to sharply restricted. These paradigms implicitly assume that actors' knowledge corresponds directly to the information provided. While previous experiments have compared exchange payoffs under complete and restricted information, no theory explains why differences in power outcomes should or should not emerge across exchange structures under differing informational conditions. This paper investigates how knowledge shapes the exercise of power in exchange networks, where power is operationalized as payoff differences between actors. Knowledge is defined as what an actor can infer from experimental information and within-structure interactions, rather than as information alone. The study first examines whether restricting information effectively limits actors' knowledge and finds that it does. It then uses new and previously published experimental data to analyze how information conditions (complete versus restricted) and structure type (strong versus semi-strong) jointly affect actors' ability to secure advantageous payoffs in exchange relations. The results resolve previously contradictory findings on the relationship between information availability and power exercise in exchange networks by demonstrating that the effects of knowledge depend on both network structure and the form of rationality actors can plausibly employ under given informational constraints.

Keywords: strategic rationality; parametric rationality; exchange networks; power; experimental methods; structure types

1. Introduction

Not ideas, but material and ideal interests, directly govern men's conduct. Yet very frequently the world images that have been created by ideas, like a switchman, have determined the tracks along which action has been pushed by the dynamic of interest.—Weber

How are knowledge and power related? Does completeness of knowledge affect whether power can be exercised? It would seem that the answer is yes. Certainly, anyone who has worked in an administrative hierarchy has learned that the flow of information downward can be highly restricted. When information is in short supply, so too is inferable knowledge about events distal in the structure.¹ For example, when an official is told that her new project is impossible because the organization cannot afford to fund it, if the

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official has limited knowledge, she will find it difficult to respond. Was power exercised over the official? Or was she influenced?

Organizational theorists have long used the terms ‘power’ and ‘influence’ interchangeably (Pfiffner and Sherwood 1960, p. 310; Pfeffer 1981, p. 4) as have some political theorists (Lasswell 1936, p. 3). In social psychology, French and Raven “defined power in terms of influence and influence in terms of psychological change” (French and Raven 1959, p. 260), while, in sociology, Wrong asserted that “[p]ower is identical with intended influence” (Wrong 1979, p. 4).

In this paper, however, we join those who believe that power and influence may be usefully distinguished and treated as a distinct phenomenon (Keltner et al. 2003; Magee and Galinsky 2008). For Mokken and Stokman, “The exercise of influence takes place mainly by means of persuasion, information and advice” (Mokken and Stokman 1976, p. 37). For power, “force, coercion and sanctions are sufficient.” (Mokken and Stokman 1976, p. 35). Zelditch agrees. “What distinguishes power is that it involves external sanctions. Influence, on the other hand, persuades B that X is right according to B’s own interests” (Zelditch 1992, p. 995). See also Willer et al. (1997, p. 571).

Clearly, knowledge and influence are related. To exercise influence requires at least some measure of uncertainty on the part of the person being influenced (Joseph Berger: p.c.). In experiments testing Status Characteristics Theory, uncertainty is assured and opportunities for influence are optimized by presenting the subject with an ambiguous stimulus (e.g., Moore 1968; Berger et al. 1992). As a result of the long history of status characteristics experiments, the relation between incomplete knowledge and influence is now covered by well tested theory (Gould 2003).²

By contrast, the relation between knowledge and the exercise of power in structures has yet to be successfully covered by theory. Consider a hierarchy in which officials seek higher pay and perquisites associated with advancement. When all actors know that promotion is competitive and contingent on their ability to contribute meaningfully to their superiors’ success, officials seek to outperform their peers, and power concentrates at the top. If, however, promotion becomes discretionary on grounds outside officials’ control, such as nepotism, racism, or sexism—or becomes opaque—actors cannot determine whether their efforts to obey and support immediate superiors will yield benefits. Under these conditions, behavior within the same hierarchical structure may generate different power dynamics and outcomes.

One stream of early exchange research (Stolte and Emerson 1977; Cook and Emerson 1978; Cook et al. 1983) attempted to predict power under conditions of restricted information, but it was grounded in Emerson’s (1972a, 1972b) operant exchange theory.³ Consistent with the capabilities of the operant actor, in their experiments, little information about the structure in which they were acting was supplied to subjects, thereby limiting what knowledge could be inferred about distal relations. However, Brennan (1981) showed that the satiation of the operant actor cannot predict power outcomes. Instead, power was produced by structural conditions. Unfortunately, unlike Emerson’s operant actor, alternative exchange theories were not equipped to predict power when actors’ knowledge is not complete⁴.

Whereas structural power has been most extensively investigated in the lab by exchange theories, those theories are subject to an important scope restriction (Walker and Cohen 1985). Throughout, ‘actors’ refers to experimental subjects occupying network positions. Distinctions among actor types refer to alternative models of decision-making rather than different kinds of individuals. Strategically rational actors are a necessary part of their explanations (Walker et al. 2000; Willer et al. 2014).⁵ According to Schelling (1960, p. 86) actors’ decisions are strategic in that each subject’s best choice depends on the choices of one or more persons. That is to say, strategically rational actors select an action

only after inferring the actions of others. Effectiveness in inferring other's action is certainly related to completeness of information.

Prior theoretic explanations take the following form. Strategic actors are placed in the positions of a given power structure. Under the conditions of that structure the decisions and actions of strategic actors produce predictions for power as evidenced by exchange ratios that favor some at the expense of others.⁶ Consistent with Simon's criteria for rationality (Simon 1955, p. 102, See Appendix A), since the theories employ strategically rational actors and actors need complete knowledge to accurately infer the actions of others, these explanations require that information not be restricted. Therefore, exchange theory has been able to predict power exercise from structures but only when actors' knowledge is complete (Gigerenzer and Selten 2002). Is power exercise different when knowledge is incomplete? Previous research leads us to suspect that it is.

In the absence of theory, several experimental investigations have made initial forays exploring the link between experimentally restricted information, inferred knowledge, and power exercise. Skvoretz and Burkett (1994) found essentially no differences for the same network, after comparing power outcomes when actors' information was complete to power outcomes when actors' information was restricted. Lovaglia et al.'s (1995) comparison of information levels in a distinct network also found effectively no difference. By contrast, Simpson et al. (2011), testing a network studied by neither Skvoretz and Burkett (1994) nor Lovaglia et al. (1995), did find power differences due to subjects' information. Looking across the three studies, there is no clear result: two studies found no difference and one study found that more information resulted in more power. However, since these studies did not offer theory explaining why information should or should not impact power, it is impossible to interpret the significance of these results toward a more general understanding.

When knowledge is incomplete another kind of actor is needed to predict power in structures.⁷ Following Elster, parametrically rational actors select between fixed, ranked alternatives (Elster 1986). Because they do not infer others' actions before choosing their own, parametrically rational actors use less information. Thus, they can be employed to predict outcomes when information is restricted (Willer 1999, p. 30; Willer et al. 2014).

We propose to substitute the parametric actor to predict in the restricted information conditions employed by early operant theories. In fact, the decision-making of the parametrically rational actor is similar to the simulated actor proposed by Yamagishi (Cook et al. 1983) (see below) and used by Markovsky (1995).

Applying the parametric actor in limited information conditions and the strategic actor when information is complete gives predictions for how knowledge affects the exercise of structural power. Because power and influence are frequently conflated in the field, the laboratory is the best setting to test those predictions. Laboratory experiments testing exchange theories control interactions so that power is exercised without subjects being able to directly influence one another.⁸ Of the experiments we report, some were previously run and some are new to this paper.

The paper is organized in the following way. First, we look at previous work noting the forms that exchange structures have taken. The results from previous empirical investigations that compared complete and restricted information are reviewed. In what follows, information refers to what the experimental system makes observable to actors, while knowledge refers to what actors can infer about the structure and strategic environment from that information. Whereas researchers have restricted information made available to subjects, there is no proof that restricting information necessarily restricts knowledge. Can subjects accurately infer knowledge beyond the information given to them? The first step of this research is to find to what degree restricting information restricts subjects' knowledge.

Then we turn to strategic and parametric actors. For structures with complete information, we show that the information available satisfies Simon's (1955) rationality conditions. Then, predictions for complete information power structures are given. The parametric actor is formed and predictions are generated for restricted information power structures. With predictions in hand, the results from complete and restricted information experiments are reported. Some results are from previously published research and some from experiments run for this paper. As will be seen, restricting information has very different effects in different structures. In the conclusion we take up the broader significance of those different effects.

Importantly, although originally developed in the context of laboratory exchange experiments, the argument advanced here speaks directly to ongoing debates about power, information, and rationality in contemporary group and organizational research (Brass 2022).

2. Exchange Structures

In this section resource pools and the 1-exchange rule are explained as are the strong, equal and weak power types. A fourth type, semi-strong power is defined. Then, the focus moves to demonstrating how strategic actors and parametric actors decide between alternative behaviors in strong and semi-strong networks. Experimental results of the three empirical investigations that studied the effect of information on power are reported. Unlike this research, none of those three: (1) developed theory to predict contrasting knowledge effects or (2) studied more than a single structure.

2.1. Types of Power Structures

Below, we will demonstrate how strategically rational actors decide between alternative actions in exchange networks with known properties. To provide a framework for that discussion, we first present three network types; each type having previously been theorized and tested within the 'Exchange Network Paradigm.' One of each network type—one strong, one equal and one weak—are shown in Figure 1. In these networks lines represent pools of 24 valued resources that are divided at the agreement of connected actors. Resource divisions imitate exchanges and each position (occupied by an experimental subject) is limited to maximally one division. For example, in Figure 1a, when A divides a pool of 24 resources with any one B, A cannot divide another pool with another B.

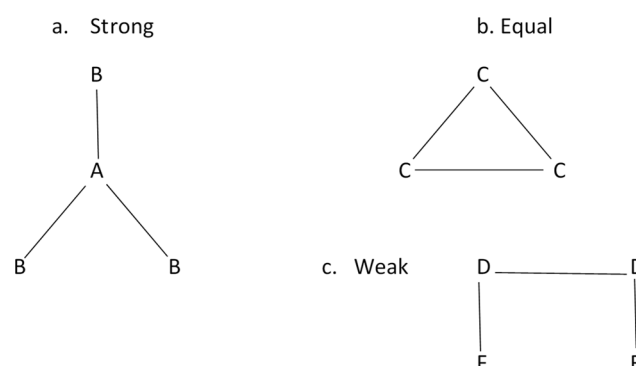


Figure 1. A Strong, Equal and Weak Exchange Network.

Figure 1a is a strong power exchange network. "Strong power structures contain two and only two kinds of positions: one or more high power positions which are never excluded and two or more low power positions at least one of which must be excluded; low

power positions are connected only to high power positions” (Simpson and Willer 1999, p. 271).⁹ All exchange theories recognize that, in strong power networks, disadvantaged positions make better offers moving payoffs to advantaged positions toward the extreme of the negotiation set (Willer and Emanuelson 2008; Willer et al. 2014).¹⁰ For example, in the Figure 1a network, the equilibrium outcome would be 23–1 favoring the A. Power in strong structures is a function of a structurally defined distribution of the ability to exclude one or more others from exchange, and thereby benefit, not by any particular action. In many previous exchange experiments, structurally advantaged positions have secured favorable outcomes without initiating exchange, as less advantaged actors seek to avoid exclusion (Willer 1999; Willer and Emanuelson 2008).

When all network positions are distinguishable only by assigned labels, the network can only have one type of position: equal. Equal power positions can be excluded but, since all positions are automorphically equivalent, no one position faces a higher likelihood of exclusion than any other (Wasserman and Faust 1994). For example, the Cs in the Figure 1b network each have a one out of three chance of being excluded. As such, no position has leverage over any other, and resource divisions are equal.

The Figure 1c network is neither strong nor equal: it is weak power (Simpson and Willer 1999). The Ds, each having two connections, can be distinguished from the Fs that have only one. As such, the network is not equal power. Furthermore, the network does not meet the conditions necessary for strong power. Although both Fs *can* be excluded if the Ds exchange, they are not *necessarily* excluded. For example, when one D divides resources with its respective F, the other D does likewise. If a network is not strong, not equal, and contains at least the potential for exclusion, that network is weak. Payoff differences in weak power networks fall between and are not inclusive of those of strong and equal power (Skvoretz and Willer 1993).

Strategic Actors in Strong Networks: In this model, strategic actors must have complete and accurate knowledge so that alternatives available to themselves and others can be fully weighed. When, in strong power structures, given complete knowledge, each low power actor will recognize that others low in power are competitors. For example, in the Figure 1a network, each B will know that other Bs are competing to exchange with the A. And in the Figure 2b network each A will know that the other A and the C are competing to exchange with the Bs—and similarly for C. Knowing that high power actors, like themselves, are interested in gaining points to avoid exclusion, each low power actor makes better offers to those high in power than made by the other(s). *Because each low power actor sees the offers of others low in power, payoffs to low and high-power actors rapidly differentiate.* Payoffs find equilibrium only at the extreme of the negotiation set favoring the high-power actor. Were this power process to slow at any point, the actor in the high-power position can speed it by playing low power actors off against each other.¹¹

Strategic Actors in Semi-strong Structures: Strategic actors will act very differently in the 5-Line of Figure 2a, however. In a semi-strong structure, given complete knowledge, power will not develop as it does in a strong power structure for two related reasons. First, each time the first B to exchange does so with the C, power conditions disappear for the second B and its A. Power disappears because the second B is then in an equal power dyad. Being in a dyad and having complete knowledge, *both A and B recognize that B is no longer power advantaged.* Thus, instead of B gaining more than A, there is no structural power and the two exchange equally.

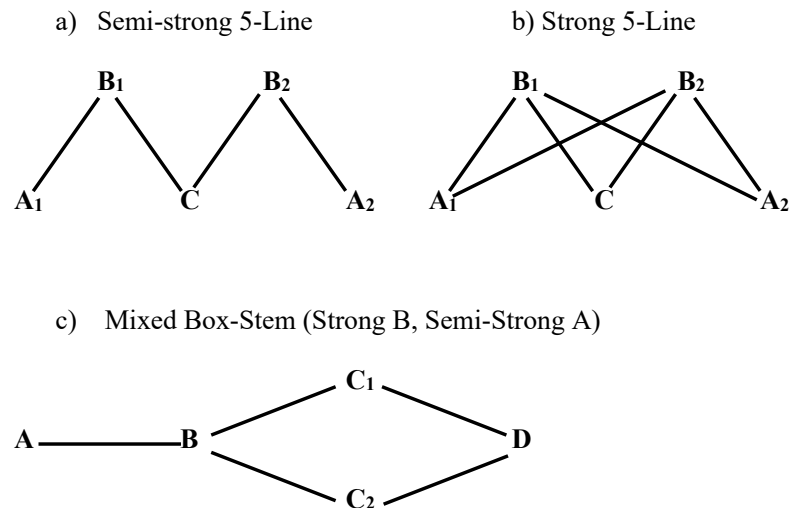


Figure 2. Strong and Semi-strong Structures.

The second reason follows from the first. The 5-Line, like all exchange networks, is studied as a repeated game. Because it is, actors in all positions will soon observe one or more power reversals. Any A, knowing that power can disappear, will prefer to exchange second, hoping to trap its B in a dyad. *But now both As, preferring to exchange second, are unwilling to make greater and greater concessions to their B.* Therefore, the power process does not develop far due to (1) power reversals and (2) the As' reluctance to bid. It follows that payoffs to the Bs will be well below those of the high-power positions in strong power structures. The predictions generated by these structures depend on assumptions about how actors make decisions, which in turn depend on the information available to them.

2.2. Complete Information

The effect of knowledge on power is best examined in experimental studies of exchange networks that manipulate information conditions. It is to exchange structures under those information conditions that theory is applied and tested. In this section we detail complete information conditions as they are encountered by experimental subjects. In the section to follow, conditions of restricted information are presented. Complete information refers here to the availability of sufficient structural and interactional information to support strategic inference, not to exhaustive knowledge of all possible contingencies. Under these conditions, actors are modeled as strategically rational, meaning that subjects are assumed to infer others' likely actions before selecting their own.

To our knowledge, there is only one complete information experimental system, ExNet 2.0 which was developed at The University of South Carolina by Willer, Girard and associates. It was available online at weblab.ship.edu until the 2010s. It is currently being rebuilt at North Dakota State University. In that system, subject information could also be restricted (see below). In its complete information experiments, each subject's screen displays the network being investigated. That display initially looks much like one of the networks in Figure 1 or Figure 2—but, on the screen, the subject's own position is highlighted. Furthermore, the network on the screen is a live display showing all offers and counteroffers along the edges connecting positions. The edges change color turning from black to red after an exchange indicating that that relation is no longer available.

In fact, each subject's PC displays offers, counteroffers and exchanges throughout the structure including ones between positions not connected to that of the subject. Using mouse control, subjects click icons to make offers, counteroffers and complete exchanges. Subjects know how many points they have earned upon the division of a pool and know

the number gained by their exchange partner as well. In addition, each subject is reminded of the number of points they have earned overall at the conclusion of each round. While the screen display is quite intuitive, to aid subject accuracy, each session begins with a tutorial, moves to a practice network distinct from the one to be investigated and, only then, does the experiment begin. As in all exchange research there is no misdirection.

2.3. Restricted Information

Restricted information refers to experimental conditions in which actors lack sufficient information to support strategic inference, even across repeated interactions. Beyond information restrictions that can be imposed in ExNet 2.0, there are two restricted information experimental paradigms, one developed at the University of Washington by Cook, Yamagishi and associates (Cook et al. 1983) and the other developed at the University of Iowa by Lovaglia, Markovsky and associates (Lucas et al. 2001). Power structures are never displayed in their entirety. Instead, both paradigms restrict subjects' knowledge to the relation or relations in which she can exchange. As a result, no subject can know the overall configuration of the structure nor can any know of events unfolding in others' relations. For example, looking back to the 5-Line of Figure 2a, each A knows only that (1) it is connected to one other position, its B and (2) it and B make offers and seek to exchange with each other. Each B knows somewhat more. It knows that it is connected to two other positions A and C, can make offers to both, and can exchange with one—and similarly for the C. ExNet 2.0 can also produce these same information conditions.

Furthermore, in Washington and Iowa systems, the number of points that can be gained in each relation is masked such that subjects cannot infer their own or others' earnings. While that masking also makes it impossible for subjects to know the negotiation set within which agreements are reached, by remembering previous outcomes, subjects can know that any given offer is either larger, smaller or the same size as the offer previous to it. Thus, with even a shallow memory, the subject can know whether its current exchange is better or worse than, or the same as, the one previous to it. In addition to these limits, the Iowa system adds one further restriction. Between rounds, when subjects adjust their offers, that adjustment can be for, at most, one point more or less than their offer in the previous round.

Simon's conditions are not satisfied by the restricted information experiments. Restricting subjects to information only to events in their own relation(s) violates Simon's first condition and, by default, his second and third. Masking payoffs violates Simon's fourth condition and by default his fifth and sixth conditions. It follows that strategically rational action is not possible in the limited information paradigm. Nevertheless, parametrically rational action is still possible. As defined above, the parametric actor need know of only two alternatives and have a preference for one over the other.

2.4. Knowledge and Power in Previous Studies

Only three previous studies considered the impact of knowledge on power and each considered but one network. Skvoretz and Burkett (1994) compared results from Cook and Emerson (1978) for the Figure 3 network to ExNet 2.0 results under complete and restricted information. While they suggested that power developed more rapidly when information was less restricted, the mean payoff to the central high power position was 19.04 and 18.84 for ExNet complete and restricted information, respectively. The payoff to the central high power position was 19.08 for Cook and Emerson.¹² With complete information results lying between two restricted information outcomes, available information appeared to have no effect in the strong power structures.

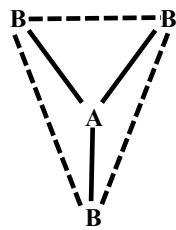


Figure 3. A Previously Studied Exchange Structure.

Also finding effectively no difference was Lovaglia et al.'s (1995) comparison of knowledge levels for the weak power Stem network of Figure 4b. Payoffs to B in the A–B exchange were 15.86 in the complete information ExNet experiment and 16.10 in the restricted information Iowa system experiment. A t-test found the difference not significant.

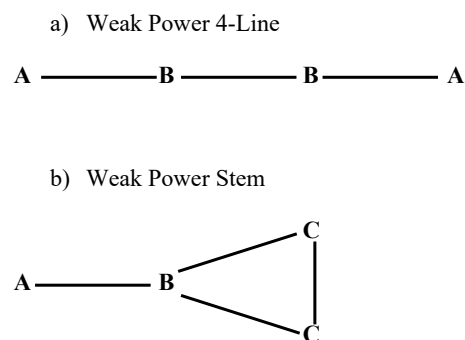


Figure 4. Two Weak Power Structures.

By contrast, Simpson et al. (2011) found power differences due to available information in the Figure 2b “strong 5-Line”. The strong 5-Line displayed in Figure 2b differs from the semi-strong, 5-Line of 2a in the following way. Beginning with the semi-strong 5-Line, connect A₁ to B₂ and A₂ to B₁. Now, because no B ever exchanges in a dyad, the network is strong. The ExNet 2.0 system was used and the structure was run both under complete information and when information of one or all of the low power positions was restricted. As they reported,

Thus, regardless of how we parse the data, low-power positions fared significantly worse when they had greater knowledge about others’ ties and exchanges. (Simpson et al. 2011)

Said somewhat differently, the fact that low power positions fared worse meant that more power was exercised when they had greater knowledge. Interestingly, greater knowledge via greater information availability to the high power positions only also resulted in more power exercised.

Looking across the three studies, there is no clear result: two studies found no difference and one study found that greater information availability resulted in more power. Nor did these studies offer theory explaining why knowledge should or should not impact power. Were these disjoint results a consequence of the particular types of networks investigated? Were they a consequence of the particular way that information was restricted? Perhaps a theory explaining the link between knowledge and power in exchange networks can answer these questions.

2.5. Limiting Information and Restricting Knowledge

None of the forgoing works asked whether limiting information to subjects actually restricted their knowledge of the structures in which they were acting. Is there any reason to suppose that subjects could infer to the larger structure when they were given only information on their adjacencies? Perhaps. Consider the 5-Line of Figure 2a when information is limited to adjacencies. While subjects cannot initially know that they are in a 5-Line, they do know that all subjects may exchange only once per round. After B and C exchange, A may well notice that B is no longer responding to her offers. From that lack of response, A might infer that there is a C with whom B has already exchanged. By extension, in another round when B continues to negotiate, A might infer that there is a more distant D with whom C has already exchanged. If A can infer three steps away, B, C and D should be able to infer through the whole of the 5-Line. But can they?

To test whether they can infer the configuration of the network in which they are acting, 70 subjects negotiated over 10 rounds. One half were placed in the 5-Line of Figure 2a and half in the Box-stem of Figure 2c. While each knew that all in the network exchanged maximally once, they only saw their own negotiations, the offers they sent and received, and the exchanges they completed.

At the conclusion of the tenth round all were asked to draw the network in which they believed they were acting. Not one of the subjects in the 5-Line accurately drew that structure while one subject in a Box-stem accurately drew it. With the completion of their first drawing, subjects were told that their network contained a total of five positions. Given that information, they were asked to again draw the network. Again one subject accurately drew the Box-stem but now 5 of 35 accurately drew the 5-Line.¹³ These results show that limiting subject information does restrict subject knowledge. Similar dynamics have been observed in organizational settings, where restricted transparency can shape actors' learning and behavior without eliminating purposive action altogether (Bernstein 2012).¹⁴

3. Theory and the Impact of Knowledge on Power

A rational actor, strategic or parametric, optimizes on a well-formed preference system that is devoid of transitive triads. A preference system has no transitive triads if there are no three payoffs P_1 , P_2 and P_3 for which $P_1 > P_2$, $P_2 > P_3$ and $P_3 > P_1$ (Schelling 1960, p. 4; Luce and Raiffa 1957, p. 50). In the experiments subjects are asked to gain as many points as they can. Subjects following that instruction have no transitive triads. Now the strategic and the parametric actors are constructed and their respective behaviors in strong and semi-strong structures are traced. This section concludes with four hypotheses that follow from these formulations. The four hypotheses are tested in the experiments of the next section.

3.1. The Strategic Actor

Strategic actors must have complete and accurate knowledge so that the alternatives available to themselves and others can be fully weighed. The content of their knowledge system is, in effect, Simon's six conditions plus the seventh we have added. It follows immediately that actors can choose and act strategically only when knowledge is complete as it is in the complete information experimental system. This is an important scope condition for the strategic actor, but it is moot insofar as predictions for limited information experiments are concerned.

In strong power structures, given complete knowledge, each low power actor will recognize that others low in power are competitors. For example, in the Figure 1a network, each B will know that other Bs are competing to exchange with the A. And, in the Figure

2b network, each A will know that the other A and the C are competing to exchange with the Bs—and similarly for C. Knowing that high power actors, like themselves, are interested in gaining points to avoid exclusion, each low power actor makes better offers to those high in power than those made by other(s). *Because each low power actor sees the offers of others low in power, payoffs to low and high-power actors rapidly differentiate.* Payoffs find equilibrium only at the extreme of the negotiation set favoring the high-power actor. Were this power process to slow at any point, the actor in the high-power position can speed it by playing low power actors off against each other.¹⁵

Strategic actors will act very differently in the 5-Line semi-strong power structure of Figure 2a, however. In a semi-strong structure, given complete knowledge, power will not develop as it does in a strong power structure for two related reasons. First, each time the first B to exchange does so with the C, power conditions disappear for the second B and its A. Power disappears because the second B is then in an equal power dyad. Being in a dyad and having complete knowledge, *both A and B recognize that B is no longer power advantaged.* Thus, instead of B gaining more than A, there is no structural power and the two exchange equally.

The second reason follows from the first. The 5-Line, like all exchange networks, is studied as a repeated game. Because it is, actors in all positions will soon observe one or more power reversals. Any A, knowing that power can disappear, will prefer to exchange second, hoping to trap its B in a dyad. *But now both As, preferring to exchange second, are unwilling to make greater and greater concessions to their B.* Therefore, the power process does not develop far due to (1) power dissolutions and (2) the As' reluctance to bid. It follows that payoffs to the Bs will be well below those of the high-power positions in strong power structures.

3.2. The Parametric Actor

Parametric actors employ only highly restricted knowledge: they do not consider the decisions others might make. Therefore, they need know only what alternatives are available and their own preferences for those alternatives. They select among fixed alternatives without inferring others' actions, not because they are less capable, but because available information does not support strategic inference. Now we will see whether the action of parametric actors can be predicted for restricted knowledge structures.

In strong power structures, given restricted knowledge, low power actors react to being excluded by raising offers to high power positions. In the Strong 5-Line of Figure 2b, when a B exchanges with C, its A is excluded. In the next iteration, the A, preferring a lower payoff to being excluded from exchanging, makes a better offer to B. Then, B accepts A's offer excluding C whose subsequent behavior mirrors A's. Across rounds of exchange, exclusion reverberates through the network causing lower power positions to make offers worse to themselves and better to the Bs. *Because each low power actor cannot see (nor understand) the acts of others low in power, the bidding process is not produced by actors anticipating the acts of others. Instead, it is produced only by the immediate effect of exclusion.* While payoffs of low and high power actors differentiate, come to favor those high in power actors, and will approach the extreme of the negotiation set, these changes unfold slowly.

In strong power networks, power develops quickly when knowledge is complete, but slowly when knowledge is restricted. As a consequence, payoffs to high power positions when information is incomplete should never be higher than payoffs to high power positions in complete information networks. Furthermore, unless experiments run long enough for restricted knowledge networks to reach equilibrium, power exercise will be less and payoffs to high power actors lower than when knowledge is complete.

Parametric and strategic actors act differently in semi-strong power structures. In Figure 2a, when knowledge is complete and A and B are strategic, both recognize that B

is not always advantaged. Thus, power reversals and unwillingness on the part of As to bid both depress the Bs' payoffs. In contrast, when information is restricted, a B may guess that it is sometimes in a dyad, but the As cannot.¹⁶ Furthermore, each A can only react to exclusion by bettering offers to its B. It follows that, in semi-strong structures with restricted knowledge, power will develop as it does in strong power structures. It will do so because low power actors cannot discern when power reversals occur. Therefore, for restricted knowledge, payoffs in the semi-strong 5-Line should be the same as payoffs in the strong 3-Branch.

Unlike strategic actors which can function only in complete information exchange networks, parametric actors can function in both complete and restricted knowledge networks. Parametric actors can function in both types because they use only the kind of knowledge available in the restricted knowledge networks and that knowledge is also available in the complete information network. That parametric actors have this broader scope may not be helpful insofar as the prediction of human activity is concerned. Given complete knowledge, we expect that humans, who act like parametric actors when knowledge is restricted, will act strategically.¹⁷ The contribution of this paper is to show that power outcomes depend not only on exchange structure, but on the form of rationality that actors can plausibly employ under given knowledge conditions.

4. Hypotheses

The formulations for structures and actors presented above allow the following hypotheses to be put forward:

H1. *Restricting information reduces power exercise in strong power structures.*¹⁸

H2. *Restricting information increases power exercise in semi-strong power structures.*

H3. *When information is complete, power exercise is greater in strong than in semi-strong structures.*

H4. *When information is restricted, power exercise is similar in strong and semi-strong structures.*

These hypotheses are tested in the experiments reported below where power exercise is indicated by the payoffs received by the high power actor. It will be remembered that resource division is a fixed sum game. Thus higher payoffs to high power actors always implies lower payoffs to low power actors and, of necessity, a larger difference between their payoffs. That difference is the measure of amount of exercised power.

5. Method

To test the hypotheses, results are drawn from three experimental settings that vary systematically in information availability: a complete- and restricted-information system developed at the University of South Carolina (ExNet), and two restricted-information paradigms developed at the University of Washington and the University of Iowa. The Washington and Iowa data are drawn from previously published experiments (Cook and Emerson 1978; Cook et al. 1983; Lucas et al. 2001), while the ExNet data include both previously reported results and new experiments conducted for the present study.

This design allows direct comparison of power outcomes across information conditions and structure types while holding constant the core features of exchanges. All three experimental protocols employ computer-mediated network exchanges, fixed resource pools, and repeated rounds of negotiation in which actors may exchange at most once per round. These shared design features are paradigmatic across exchange research, which is

a strength that permits theoretically unified analyses and the generation of new knowledge from existing experimental data. Although the experimental interfaces differ in the amount of information made observable to participants, the underlying exchange structures, payoff incentives, and behavioral constraints are directly comparable across settings, permitting theoretically grounded comparisons of power exercise under complete versus restricted information conditions.

On arrival at the laboratory, subjects are assigned to network positions and conducted to individual rooms each containing a PC. Each PC is connected to a master control and thence to the PCs of all other subjects. Communications are possible only between positions that can exchange. The content of communications is limited to offers, counter-offers and agreements to exchange. Each experimental session begins with a tutorial showing subjects how to interface with computer software and thus interact with other subjects. Subjects may have an opportunity to interact in a practice network distinct from the one to be investigated. Then, the experiment begins with subjects interacting in the experimental network. Each session investigates a single network structure. Though the amount of information available to subjects varies, deception is not used in any of the settings.

Across all settings, subjects were recruited from undergraduate courses and randomly assigned to network positions. Each experimental session (period) investigated a single network structure and produced one independent data point. Unless otherwise noted, reported means are calculated by averaging payoffs across the final rounds of each session (period), and then averaging across sessions. In the ExNet experiments, subjects participated in multiple periods and were reassigned to new network positions between periods. Each period constituted a distinct realization of the exchange structure, with a new positional configuration and interaction history. Because assignment to a position changed across periods and each period constituted a distinct realization of structure, each period was treated as an independent session for analytic purposes.

For previously published studies, reported means reflect late-session behavior (final block or final rounds) as defined in the original experimental protocols. In all analyses, late-session agreements are used because exchange outcomes have stabilized and reflect developed power. Sample sizes therefore reflect the number of experimental sessions (periods) conducted under each condition rather than the number of individual participants.

For cross-study comparisons involving previously published restricted-information means, differences between conditions were evaluated using one-tailed t-tests of session-level means. When variance estimates were available for both conditions within a given comparison, pooled variances were used. When session-level variance information was not reported for a published condition, the closest comparable session-level variance from a structurally similar condition was used as the reference for inference. Variance estimates used for restricted-information conditions are reported in the relevant table notes (see Table 4). All statistical results are reported in the tables and correspond to directional hypotheses derived from the strategic and parametric actor models.

In all three settings, exchange consists of agreements to divide a pool of resources. The South Carolina setting uses 24-point resource pools. The Washington setting also uses 24-point pools, but as displayed in Figure 5, it also connects some positions by 8-point pools. The effect of the 8-point pools is to limit the maximum A–B difference to slightly less than a difference of 20–4. The Iowa limited information setting uses 30-point pools only. Those parts of the analyses that compare between settings were standardized to a common scale. For Table 2, restricted-information means were rescaled to a common 24-point metric to permit direct comparison with ExNet results; Table 4 reports original published values because comparisons are made within studies.

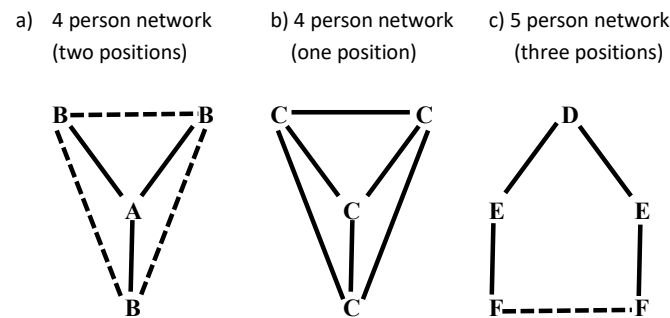


Figure 5. Three Exchange Structures Published in Cook et al. (1983).

The analyses focus on theory predicted contrasts between structure types and information conditions rather than on model fitting. Mean differences in payoffs are therefore evaluated in light of explicit hypotheses derived from the strategic and parametric actor models. This approach is appropriate given the procedural control of interaction, such as the one exchange rule, moderated communication, controlled information availability and the fixed nature of exchange outcomes, where differences in payoffs directly indicate differences in exercised power. Sample sizes for each comparison are reported in the corresponding table notes.

6. Results

Hypothesis 1 predicts that power exercise in strong power structures will be lower when information is restricted than when it is complete. Table 1 reports exchange payoffs for high-power positions in strong 3-Branch networks under complete and restricted information conditions. As shown in the table, the mean payoff under restricted information is significantly lower than under complete information for the same number of exchange rounds. The pattern supports the prediction that restricting access to information about interactions and structure diminishes the extent of power exercised. This pattern is consistent with findings reported by Simpson et al. (2011) for strong structures.

Table 1. Mean Payoffs to high-power positions in the strong 3-branch under complete and restricted information conditions (SDs in parentheses).

Network	Complete Information	Restricted Information	<i>t</i>	<i>p</i>
3-Branch	22.74 (0.70)	17.51 (3.40)	3.99	<0.001

Notes: Values are mean payoffs to the high-power position, averaged across the final rounds of each session and then averaged across sessions. One experimental period (session) constitutes one independent observation. $N = 7$ sessions per condition. Differences between conditions were evaluated using one-tailed *t*-tests of session-level means, consistent with directional hypotheses derived from the strategic and parametric actor models. Resource pools contained 24 points.

Examination of payoffs across rounds suggests that power in complete information sessions reached equilibrium, as no significant changes occurred in the final rounds. In contrast, payoffs across the later rounds of restricted information sessions continue to show incremental, but slow, increases, indicating that power develops more slowly when information is restricted. Even if both conditions were to converge on the same equilibrium payoff eventually, the slower development of power where information is restricted implies lower *overall* power exercised. Therefore, restricting information reduced power exercise, and Hypothesis 1 is supported.

Hypothesis 2 predicts that, in semi-strong structures, power exercise will be higher when information is restricted than when it is complete. Table 2 compares mean payoffs

to the high-power B position in the semi-strong 5-Line under complete and restricted information conditions. Under restricted information, mean payoffs are drawn from two previously published datasets (Cook et al. 1983; Lucas et al. 2001), whereas the complete-information results come from new ExNet experiments. As shown in the table, mean payoffs to B under restricted information exceed those observed under complete information across both datasets, indicating greater power exercise when information is restricted.

Table 2. Mean payoffs to high-power position (B) in the semi-strong 5-line under complete and restricted information conditions.

Source (Restricted)	Relation	Restricted Mean	Complete Information Mean (SD) (ExNET)	<i>t</i> (vs. ExNet)	<i>p</i> (One-Tailed)
Cook et al. (1983)	B–C	18.31	14.75 (2.83)	4.03	<0.0001
Cook et al. (1983)	A–B	19.42	14.75 (2.83)	5.28	<0.0001
Lucas et al. (2001)	B–C	19.95	14.75 (2.83)	5.21	<0.0001
Lucas et al. (2001)	A–B	21.09	14.75 (2.83)	6.35	<0.0001

Notes: Values are mean payoffs to the high-power B position. Restricted-information means are drawn from Cook et al. (1983) and Lucas et al. (2001) and are reported separately for central (B–C) and peripheral (A–B) exchanges; these relations are structurally equivalent. Complete-information values are from ExNet (this study; *N* = 21 sessions) and are repeated for each comparison. Restricted-information means were rescaled to a common 24-point resource pool. Means reflect late-session behavior (final rounds or final block) as defined in the original protocols. One experimental period (session) constitutes one independent observation. Reported *t* and *p* values are one-tailed tests comparing each restricted-information mean to the ExNet complete-information distribution. Because restricted-condition variances are reported on their original resource-pool scales, tests use the ExNet session-level variance as a common reference. Original restricted-condition standard deviations, where available, are reported in Table 4.

In the published studies, B's payoffs were reported separately for exchanges with A and with C. Because A and C are structurally equivalent low-power positions, these values represent alternative observations of the same theoretical relation. For the complete-information condition, B's payoffs were averaged across exchange partners. Despite these differences in reporting, the pattern is consistent: power in the semi-strong structure is greater under restricted information than under complete information. Hypothesis 2 is therefore supported.

Hypothesis 3 predicts that, under complete information, power exercise will be greater in strong structures than in semi-strong structures. Table 3 compares mean payoffs to high-power positions occupying strong and semi-strong structural locations. As shown in the table, mean payoffs to high-power positions are consistently higher in strong structures than in semi-strong structures, indicating greater power exercise in strong networks.

Table 3. Mean payoffs to high-power positions in strong and semi-strong structures under complete information.

Comparison Context	Strong Structure (Position)	Mean (SD)	Semi-Strong Structure (Position)	Mean (SD)	<i>t</i>	<i>p</i>
Between Structure:	Strong 5-Line (B)	18.31 (3.66)	5-Line (B)	14.75 (2.83)	3.61	<0.001
Within Structure:	Box-Stem (B)	19.28 (2.97)	Box-Stem (D)	15.39 (2.44)	4.53	<0.001
Between Structure:	Box-Stem (B)	19.28 (2.97)	5-Line (B)	14.75 (2.83)	4.98	<0.001

Between Structure:	Strong 5-Line (B)	18.31 (3.66)	Box-Stem (D)	15.39 (2.44)	3.05	<0.002
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Notes: Values are mean payoffs to positions occupying strong and semi-strong structural positions under complete-information conditions. In the Box-Stem network, position B occupies a strong position (multiple exchange partners with at least one necessarily excluded), whereas position D occupies a semi-strong position (it can reach an agreement in every round but without guaranteed exclusion of exchange partners). Means reflect late-session behavior. One experimental period made up of a number of rounds constitutes one independent observation. In ExNet, subjects were reassigned to new network positions across periods; each period constituted a distinct structural realization and was treated as an independent session. Differences were evaluated using one-tailed *t*-tests of session-level means. Sample sizes differ by structure: strong 5-Line ($n = 24$), Box-Stem ($n = 20$), and 5-Line ($n = 21$) period (session) observations.

The Box-Stem network provides an additional comparison because it contains both strong and semi-strong structural positions. This classification is theoretical rather than empirical. As shown in Figure 2c, position B occupies a strong-power location, having multiple exchange partners such that at least one low-power position must be excluded. In contrast, position D is included in every round but its exchange partners are not necessarily excluded, making it semi-strong. Mean payoffs to B exceed those to D, and all comparisons of strong and semi-strong positions support Hypothesis 3.

Whereas Hypothesis 3 predicts differences in payoffs to high-power positions (accessed 10 January 2008) under complete information, Hypothesis 4 predicts no difference under restricted information. Table 4 presents published results for restricted-information networks drawn from Cook and Emerson (1978), Cook et al. (1983), and Lucas et al. (2001). As shown in the table, mean payoffs to high-power positions in the semi-strong 5-Line are similar to those observed for high-power positions in strong 2- and 3-Branch structures, and in some cases are lower. These results indicate that, under restricted information, power exercise does not differ systematically between strong and semi-strong structures. Hypothesis 4 is therefore supported.

Table 4. Mean payoffs to high-power positions in strong and semi-strong structures under restricted information.

Semi-Strong Source	Semi-Strong Structure	Relation	Mean	Strong Source	Strong Structure	Relation	Mean	<i>t</i>	<i>p</i>
Lucas et al. (2001)	5-Line	B–C	24.29 (4.54)	Lucas et al. (2001)	2-Branch	A–B	24.95 (3.23)	0.27	ns
Lucas et al. (2001)	5-Line	A–B	26.36 (4.70)	Lucas et al. (2001)	2-Branch	A–B	24.95 (3.23)	0.55	ns
Cook et al. (1983)	5-Line	B–C	15.26 (5.16)	Cook and Emerson (1978)	3-Branch	A–B	15.33	0.03	ns
Cook et al. (1983)	5-Line	A–B	16.18 (2.82)	Cook and Emerson (1978)	3-Branch	A–B	15.33	0.69	ns

Notes: Values are mean payoffs to high-power positions under restricted-information conditions. Data are drawn from Lucas et al. (2001), Cook and Emerson (1978), and Cook et al. (1983). In the Lucas et al. study, the 2-Branch network is reported as a 3-Line. Means for the semi-strong 5-Line are reported separately for exchanges with the central C position (B–C) and peripheral A positions (A–B); these relations represent alternative observations of the same structural configuration.

For the Lucas et al. comparisons, $n = 13$ sessions for the 5-Line and $n = 4$ sessions for the 2-Branch. For the Cook et al. (1983) comparisons, $n = 20$ sessions for the 5-Line. For the Cook and Emerson (1978) comparisons, $n = 7$ sessions for the 3-Branch. Differences

between means were evaluated using one-tailed tests based on pooled session-level variances when variance estimates were available. In Cook and Emerson (1978), session-level variance estimates were not available; for those comparisons, the variance from the corresponding 5-Line condition was used as the reference. In that study, high-power payoffs for the 3-Branch were reported separately for male and female participants; values reported here were obtained by converting to high-power position means and averaging across gender.

Means and standard deviations are reported on their original resource-pool scales as published. Comparisons are made within studies using common scales and therefore do not require rescaling. One experimental session constitutes one independent observation. Reported *t* values are one-tailed tests of session-level means and are presented as absolute values.

7. Discussion

This research shows that knowledge is power, but only in strong and not in semi-strong power structures. Why is the relation between knowledge and power more complex than the relation between knowledge and influence? In the case of influence, because some degree of doubt is a necessary condition, knowledge sets the limits of influence. No such simple relation holds for knowledge and power.

Knowledge in experiments is shaped by available information, and the results show that the effect of information on power exercise depends on the type of structure. As predicted and consistent with prior research (Simpson et al. 2011), in strong power structures, complete information increases power exercise. But the opposite is true for semi-strong structures: when information is complete, less power is exercised. While these relations appear to be robust, completeness of information and structure type do not themselves account for the two different directions of effect. The relation between the completeness of information and power in structures is mediated by the ways that actors decide. By linking information conditions to formally defined structural types and actor assumptions, the analysis provides a framework for identifying when information should and should not alter power outcomes. The results therefore move beyond demonstrating that information matters to specifying the structural conditions under which it matters.

How, then, do actors' decisions mediate exchange outcomes? How is it that deciding strategically drastically advantages low power actors in semi-strong networks, but handicaps them in strong power networks? In both cases the answer lies in the actor's foresight. Strategically rational actors are forward looking: they anticipate potential events and adjust behavior accordingly. In the semi-strong 5-Line, knowledgeable subjects at the two ends of the line can infer that, if the C in the middle exchanges first, one of them will advance from low to equal power. Anticipating that, peripheral actors seek to exchange after C. By contrast, in the strong 3-Branch, low power Bs, anticipating exclusion, seek to outbid other Bs.

In either structure, parametric actors only react to exclusion. Without foresight, they cannot anticipate an increase in their own power in the semi-strong structure or the effect of others' offers in the strong power structure. Since any payoff is better than none, actors respond to exclusion by accepting less and/or making better offers to others. Since parametric actors' actions are identical in strong and in semi-strong structures, the exchange ratios in the two are similar. These dynamics are not limited to experimental settings, but are characteristic of organizations and institutions in which information is unevenly distributed and actors must act without complete knowledge of the underlying structure.

How do these results bear on structures outside the laboratory? Certainly, organizations are not perfectly transparent, particularly when looking up from below. According to Weber, bureaucrats are notable for "keeping their knowledge and intentions secret."

(Weber [1912] 1946, p. 233; Heald 2006; Flyverbom 2016). Bell et al. (2000) suggest that, within a bureaucracy, the official's access to information is greater the higher the official's position. It would be surprising if a CEO knew less about her organization than managers immediately below and similarly down the hierarchy. In many organizations, access to others above is limited. To talk to the boss's boss, consent of the former is required. But no such restriction governs access instituted from above. Such asymmetries in visibility and access are consistent with contemporary research showing that transparency and information control are key mechanisms through which organizational power is structured and maintained (Flyverbom et al. 2015). Network research likewise continues to emphasize the role of structural position in shaping power and inequality (Brass 2022).

Are bureaucracies purposefully secretive? Perhaps more to the point, are there power advantages in limiting information? According to Weber, "bureaucratic organization is technically the most highly developed means of power in the hands of the man who controls it..." (Weber [1912] 1946, p. 232). Experimental research on hierarchical structures shows that, ones with competitive promotion are strong power structures (Willer 1999; Corra 2005). If ideal bureaucracies are strong power structures, what are organizations where competition for promotion is imperfect, where nepotism, racism and favoritism create power reversals not unlike those that occur in semi-strong structures? For example, in the sexist—racist organization in the absence of secrecy, the white male knows that only he will be promoted while others know they will not be. All know that they need not compete. Such a structure is, at best, semi-strong. When knowledge is incomplete, however, officials come to believe that they are competing for promotion with all its benefits. If so, power will remain centralized. Beyond these power effects, restricting information of those lower in the structure has the added advantage that opportunities for influence are increased (Willer et al. 1997; Thye et al. 2006).

Here the effect of knowledge in structures has been limited to strong and semi-strong structures when all had either complete knowledge or all had restricted knowledge. The only study where knowledge varied by position looked at only a single strong power structure (Simpson et al. 2011). Future experiments should vary knowledge by position in semi-strong structures. Extending that line of work to weak power structures, theory could use the parametric actor model employed here to predict exchange outcomes when subject knowledge is restricted.

Research reported here strongly implies that, unlike either of the two rational actor models, humans are adaptive. Instead of being only strategic or only parametric, people look backward like the parametric actor when their knowledge is restricted and forward like the strategic actor when knowledge is complete (see Kahneman and Frederick 2002; Gigerenzer and Selten 2002). These findings suggest that theoretical models may need to account for actors who shift between forward-looking and reactive decision strategies as the knowledge conditions change.

More generally, these results suggest that researchers should consider the role of theoretically grounded actors rather than purely empirical postulates (for an extended argument on the role of theory in social science, see Willer and Emanuelson 2025). Though criticized by some, there is a strong tradition of rational choice work in sociology and closely related sciences (Coleman and Fararo 1992; Smelser 1992; Udehn 2001; Fehr and Gintis 2007). Working in that tradition we note that it was Popper (1957, p. 128ff) who argued that, contrary to common belief, social situations are not more complex than physical ones. They are simpler because, using a rational actor model, relatively simple explanatory theory can be constructed. To generate predictions for contrasting structures we have constructed relatively simple explanatory theory that included social structural models the dynamics of those which were generated with strategic and parametric actor

models. Experimental results suggest that Popper was right. The models were simple and generated accurate directional predictions.

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Institutional Review Board Statement: Not applicable. The study is a secondary analysis of previously collected, anonymized data obtained from published sources (Cook et al. 1983; Lucas et al. 2001) and a publicly accessible archival database (ExNet 2.0). No new data were collected, and there was no new interaction with human subjects for this study.

Informed Consent Statement: Not applicable. This manuscript reports a secondary analysis of previously published data and anonymized data from a public archive. The original studies from which data were drawn obtained informed consent from all subjects under their respective Institutional Review Board approvals.

Data Availability Statement: The original contributions presented in this study are included in the article. Further inquiries can be directed to the corresponding author.

Conflicts of Interest: The author declares no conflicts of interest.

Appendix A

Do complete information experiments satisfy the conditions necessary for strategic rationality? Quoted here in italics are Simon's (1955, p. 102) six necessary conditions for rationality followed by a brief explanation of information available in the experiment.

1. *"A set of all 'behavior alternatives.'"* Each subject's screen displays all relations in the network, all offers and counteroffers and their payoffs including the subject's own, as well as all exchanges as soon as they are completed.

2. *"The subset of behavior alternatives that the organism 'considers' or 'perceives'."* The subset is the set just given above.

3. *"The possible future states of affairs, or outcomes of choice."* During negotiations, the future states are exchanges. Upon being negotiated all are displayed.

4. *"A payoff function, representing the 'value' or 'utility' placed by the organism upon each of the possible outcomes of choice."* The payoffs are the points earned in exchanges, displayed upon completion of the exchange, and paid in money at the conclusion of the experiment.

5. *"Information as to which outcomes ... will actually occur if a particular alternative ... is chosen"* Subjects' fully public negotiations are the series of possible alternative outcomes. Agreements to exchange produce exchange outcomes.

6. *"Information, as to the probability that a particular outcome will ensue if a particular behavior alternative is chosen."* All agreements between subjects always result in exchange and points earned.

To these six we add a seventh condition: distal events are known. Distal events matter because, as seen above for semi-strong networks, negotiations in some relations can be affected by the prior completion of exchanges in other relations. Regarding distal events, information on all negotiations and exchanges is clearly displayed on the screens of all subjects.

Notes

1. Knowledge is defined as what an actor can infer from experimental information and within-structure interactions, rather than as information alone. For strategies optimizing knowledge, see Burt (1992).
2. The relation between knowledge and influence has been suspected for some time. “The more uncertain the individual is about the correctness of his judgment, the more likely he is to be susceptible to ... social influences in making his judgment” (Deutsch and Gerard 1955, p. 630).
3. In Emerson’s operant exchange theory, actors are modeled as *operant* rather than strategic decision-makers. Power differences are produced through *satiation*: actors occupying advantaged positions are assumed to satiate more quickly on exchange payoffs, such that each additional unit of reward yields diminishing value. As a result, lower-power actors must offer increasingly favorable terms to secure exchange, even without knowledge of the broader structure. Importantly, satiation is assumed to operate independently of actors’ information or inferential capacities; power emerges from physiological response to rewards rather than from strategic reasoning. Brennan (1981) showed, however, that satiation alone cannot account for observed power outcomes, motivating the shift toward structurally grounded explanations.
4. Theory relates knowledge to power exercise, while experiments manipulate information to test the effect of inferred knowledge on power outcomes.
5. The eight exchange theories that use a rational actor, assume that it is strategically rational (Willer and Emanuelson 2008).
6. How power exercise is predicted from structures is shown below.
7. Udehn (2001) for the philosophical grounding of methodological individualism and its implications for individual decision-based explanation.
8. As status characteristics experiments show, the production of influence requires very particular conditions none of which are present in exchange experiments. Compare Berger et al. (1992) and Moore (1968) to Cook et al. (1983), Markovsky et al. (1988) and Willer (1987).
9. Here “exclusion” means excluded from 24-point relations.
10. Whereas observations of interactions show that low power actors are very active, high power actors can be effective even when passive. Willer and Skvoretz (1997) found that simulated actors in high power positions who are able only to accept their best offers, gained payoffs effectively identical to human subjects who, beyond accepting best offers, made offers of their own.
11. Experiments have shown that power development can be stopped by effective collective action, but only when experimental conditions allow coalitions to form which is not the case in experiments reported here. See Simpson and Willer (2005) and Borch and Willer (2006).
12. As mentioned above, the maximum A–B payoff difference in the Cook and Emerson network was limited by the low payoff relations. For the comparison given above, Skvoretz and Burkett adjusted Cook and Emerson to a 24-point scale.
13. For the Box-stem $n = 34$ for the first drawing and $n = 33$ for the second because one and two responses respectively were not intelligible.
14. The activities necessary to limit the development of power in semi-strong networks that are discussed below suggest coordinated action by multiple subjects, actions that do not seem possible when only one subject has accurately inferred distal network shape.
15. Experiments have shown that power developments can be stopped by effective collective action, but only when experimental conditions allow coalitions to form which is not the case in experiments reported here. See Simpson and Willer (2005) and Borch and Willer (2006).
16. The B may guess that it is in a dyad with its A because the C is not sending offers, but I cannot know because it has no information on whether the other B has exchanged with the C.
17. In fact, the behavior of the parametric actor is very like that of the simulated “up-down” actor proposed by Yamagishi (Cook et al. 1983) and used in the X-Net simulation by Markovsky (1995). Since up-down simulated actors never experience power reversals in semi-strong networks, their payoffs in the 5-Line are very like their payoffs in the 3-Branch. Markovsky’s X-Net simulation for 5-Line and 3-Branch was run for this paper. Results are nearly identical.
18. H_1 assumes that restricted information structures do not reach equilibrium.

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