

## **FUNCTIONAL DIMENSIONS OF SOCIAL BEHAVIOR: THEORETICAL CONSIDERATIONS AND SOME PRELIMINARY DATA**

*DIMENSIONES FUNCIONALES DE LA CONDUCTA SOCIAL:  
CONSIDERACIONES TEÓRICAS Y ALGUNOS DATOS PRELIMINARES*

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### **ABSTRACT**

The empirical realm of social behavior is conceptually analyzed, in order to distinguish it from presocial and parasocial behavior. It is argued that social behavior is exclusively human and can be identified only through the division of labor and deferred exchange of goods and services, all of it made possible by conventional communication or language. Three functional dimensions of social medium are proposed: Power (prescription contingencies), wealth (exchange contingencies), and morals and justice (sanction contingencies). A methodological preparation for the experimental analysis of dyadic interactions in these dimensions is proposed and some preliminary data are shown.

Keywords: social contact medium, dyadic interaction, prescription contingencies, exchange contingencies, sanction contingencies.

### **RESUMEN**

El ámbito empírico de la conducta social es analizado conceptualmente, para distinguirlo de la conducta presocial y parasocial. Se arguye que la conducta social es exclusivamente humana y que puede ser identificada sólo mediante la división del trabajo e intercambios diferidos de bienes y servicios, todo ello posibilitado por la comunicación convencional o lenguaje. Tres dimensiones funcionales del medio social son propuestas: Poder (contingencias de prescrip-

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ción), riqueza (contingencias de intercambio), y moral y justicia (contingencias de sanción). Se propone una preparación metodológica para el análisis experimental de interacciones diádicas en estas dimensiones y algunos datos preliminares son mostrados.

Palabras clave: medio de contacto social, interacción diádica, contingencias de prescripción, contingencias de intercambio, contingencias de sanción

### THEORETICAL CONSIDERATIONS AND SOME PRELIMINARY DATA

The nature of social behavior has been elusive in psychology and, at the same time, has caused a great deal of confusion. Since the treatises by Wundt (1910-1920) and Le Bon (1896) on the psychology of people and the psychology of masses respectively, social behavior has become a separate field of psychology, so-called 'social psychology' and, more recently, 'community and ethno-psychology'. Concepts and theories dealing with social behavior have been sometimes inspired by sociological, political, economic, and folk sources (Abelson, Aronson, McGuire, Newcomb, Rosenberg & Tannenbaum, 1968; Thibaut & Kelley, 1959). Other times, formulations about social behavior have originated as extensions of cognitive models, to account for interactions between subjects within groups (Bandura, 1977, 1986; Secord & Backman, 1974). Both approaches to social behavior are prone to reductionistic explanations, stressing social interactions as mental intersubjective relationships, or as the mental mirroring of social and institutional ideas and values.

On the other hand, the search for naturalistic formulations of social behavior has been encouraged by the analysis of animal species-specific behavior (Scott, 1958; Thorpe, 1956; Wilson, 1975), as well as by the extension of the 'principles' of learning and motivation in individual organisms to situations in which at least two organisms interact (Miller & Dollard, 1941; Mowrer, 1960; Skinner, 1962). Both fields of interest share what I consider to be a common limitation: social behavior is conceived in terms of the interaction of two or more individual organisms *regardless* of the functional structure of the environment in which the interaction takes place. The social nature of the interaction is taken for granted as a natural emergent property of the fact of two individuals behaving with respect to one another. Thus, the social nature of behavior is identified as an outcome of such inter-individual interaction and of the common contingencies that necessarily emerge from it.

In ethology and comparative psychology, social behavior has been identified with the behavior of a member of one species serving as a stimulus for the behavior of another member of that species, as in so-called 'insect societies' (ants and bees) and in different vertebrates species ranging from schooling in fishes to group life in higher primates (Etkin, 1964). Maier and Schneirla (1964) defined social organization as "an aggregation of individuals into a fairly well integrated

and self-consistent group in which the unity is based upon the interdependence of the separate organisms and upon their responses one to another" (p. 164). On the other hand, Skinner (1953) defined social behavior as "the behavior of two or more people with respect to one another or in concert with respect to a common environment" (p. 297). Skinner thought that the processes accounting for social behavior were the same that took place when individual organisms behaved under environmental contingencies. Individual and social behaviors differed only in that the later required the behavior of at least two individuals coping with common or shared contingencies. One organism was important to another as part of its environment. Thus, Skinner proposed that the experimental analysis of social behavior could proceed through the synthesis of social episodes in which each individual is controlled by a different contingency involving the behavior of another organism. The analysis should consider one organism at a time, including the variables generated by a second organism, and the episode would be reconstructed by putting the analyses together.

Nevertheless, even if we accept Skinner's definition of social behavior, several authors (Hake, 1982; Hake & Vukelich, 1972; Lindsley, 1966; Weingarten & Mechner, 1966) have considered that social interaction involves emergent processes, not included in, but arising from individual operant behavior. Lindsley (1966) showed that cooperative behavior was learned faster when quasi-social (or socially connoted) stimuli and social stimuli were presented instead of non-social, physically defined stimuli. Hake & Vukelich (1972) and Hake, Donaldson & Hyten (1983) developed explicit criteria to assess when cooperative responding could be interpreted in terms of single-subject behavior parameters, or when it was required to acknowledge that a second subject's behavior introduces emergent variability and complexity to the dyadic episode. On the same token, Weingarten & Mechner (1966) remarked that:

Psychologists may be tempted to suggest that the ultimate analysis of social interaction will be carried out in the psychological laboratory, on the grounds that since all social interactions involve individual organisms responding to "complex and changing" contingencies, we need only investigate how these individual organisms behave under such conditions (This is the reductionistic argument.) The answer to this argument is that we do not know how to generate the relevant "complex and changing" contingencies in the laboratory except by actually introducing the second subject... In the light of our present limited knowledge of individual behavior, the soundest, and most expedient, way to develop a science of social interaction is to treat interaction as a subject of scientific investigation in its own right. (p. 458)

I shall argue that social human behavior is qualitatively different from animal group or con-specific behaviors, and that the foundation of this difference is grounded on the *medium* in which human behavior develops and it is functional. Moreover, I shall stress that human behavior is social in nature, and that the study

of human individual behavior is a restricted case of larger behavioral interactions. In the case of human individual behavior, social dimensions have, most of the time, a tacit or implicit influence. When the analysis of human behavior moves to the interaction between individuals, these dimensions become explicit as social "emergents".

### CONTACT MEDIUM, CONVENTIONS, AND BEHAVIOR

Emerson (1958) and Thompson (1958), in discussing the evolution of social behavior, concluded that social organization can be identified only in insects and man. Nevertheless, human social behavior and that of insects are qualitatively different. The latter is determined by genetic factors and is rigid in form and function, while the former is continuously changing and it is under the explicit influence of culture, symbols and language. Quoting Thompson (1958):

A society is defined as a group that manifests systematic division of labor among adults of the same sex. Most social behavior of insects is genetically determined, while most social behavior of man is culturally determined through symbolic communication (p. 331).

Division of labor seems to be a crucial feature of true social organization as distinct from any other kind of gregarious life. Division of labor reflects specific roles for members of a social group related to the display of the various behaviors that are critical to the survival and reproduction of the group itself. Social roles distribute amongst the members of the group those survival and reproductive behaviors that are *necessarily* performed by every individual in species that do not have a true social organization. In division of labor, each member performs specialized behaviors that are critical for the subsistence and survival of the entire group. Specialized behaviors have to do with feeding, nurturing, defense, and reproduction in insect as well as human societies. However, in the latter, new and qualitatively different forms of labor division emerge, because of language, independently of the biological endowment of the individual.

In this context, we might distinguish social behavior from what could be called 'protosocial', 'presocial', and 'parasocial' behaviors. Protosocial behavior includes those kinds of inter-individual behaviors, such as motor coordinations, eliciting, prompting behaviors, and so on, that are vestigial and fundamental for the emergence of any species-specific behavior. Presocial behavior includes only those inter-individual behaviors that are functional in the development of group hierarchies, either in feeding, mating, territorial dominance, or equivalent circumstances. Parasocial behavior consists of behaviors in parallel, that look like interindividual interactions, but are regulated by simultaneous individual independent variables, as in some analogues of animal leadership, cooperation, and

communication, or in the computer-simulation of social interactions in which a same programmed variables control the interaction of two computers or simulated organisms.

Labor division in human societies is based on a delayed exchange of different goods or services. Somebody does something now and here to exchange afterwards its products (goods) or outcomes (services) for the products and outcomes of the doings of other individuals in a different time or place. Deferred exchange constitutes the defining characteristic of division of labor in human societies. Deferred exchange determines that goods and services are distributed and acquired according to contingencies that emerge from the particular conditions of with whom, what, when, and where the goods and services are exchanged. The *non-immediate* character of the exchange of products and outcomes in human societies has been possible because of the *simultaneous* development of language as conventional behavior mediating time and space events related to the behavior and behavior-products of different individuals (Ribes, 1985). Division of labor in human societies detaches the transformed products or outcomes from their immediate use and gives them their social use to the extent that they are collectively shared. This is possible only through language, as conventional behavior, since language allows the individual to detach its labor acts from the particular circumstances in which these acts take place, relating them with the practice of other individuals in different circumstances (Bennett, 1989; Ribes, 1986).

In insect societies, the physical and biological (organismic) properties of the environment constitute the medium enabling and regulating the occurring of social behavior, which is fixed for every type of species-member according to its predetermined biological endowment. In contrast, in human societies, conventional relations that develop as and through language, become institutions (specialized sets of customs). Institutions, as shared language-mediated practices, become the medium of interindividual relations, to the extent that they set up and regulate the criteria for developing functional behaviors as social roles. The development of social organization is analogous to that of biological organization: the functional differentiation of its parts or elements (tissues versus individuals) is a sign of complexity and evolution. The outgrowth of distinct institutions and the enabling of multiple social roles by individual members allow for the development of different and varied social interactions. In human societies, institutions consist of conventional interindividual practices mediated by language, and constitute the medium for the emergence of social roles based upon a division of labor. Shared and common contingencies affecting the members of a social organization are nothing more than the interindividual actualization of institutions as a complex set of conventional relations.

### INSTITUTIONS, CULTURE, AND SOCIAL INTERACTIONS

Institutions are the continuous outcome of customs, and customs basically are the shared conventional practices of individuals. Institutions, from a psychological point of view, consist of occurrences or events that deploy stimulus functions (Kantor, 1982). When individuals are influenced, regulated, or affected by institutions, we refer to actual interactions between individuals with different social attributions. Institutions are not abstract representations of social structures. Institutions are always individuals interacting with other individuals according to collective criteria. Institutions are always actualized in the form of inter-individual interactions adjusting to functional criteria that are *descriptive* of the social exchanges of a particular group. Institutional functions may be conceived as contingencies that involve the interactions of individuals with differential social attributions in particular situations.

I think that social contingencies, as institutional functions, may be conceived as emerging from three basic dimensions of human society relationships: a) power relations (traditionally studied by political science and sociology), b) exchange relations (traditionally studied by economics), and c) sanction relations (traditionally studied by morals and jurisprudence). Human society, as a conventional medium, is characterized by the delegation, separation, and deferring of these relations among individual members that are involved in particular institutional interactions. This is why some examples of so-called 'political' behavior in apes (de Waal, 1988), which always occur as situational episodes, do not fulfill the criteria for social human behavior, although they are examples of what Byrne and Whiten (1988) have called "Machiavellian" or social intelligence.

Following this line of thought, social contingencies may be identified and empirically analyzed as functional dimensions that characterize conventional contact media, in the context of different institutional interactions. Power relations may be conceived as contingencies involving the prescription, regulation, administration, and monitoring of interactions (López-Valadés, 1987). Exchange relations may be thought of as contingencies involved in the production, distribution, and appropriation of goods or services. Finally, sanction contingencies may be looked at as contingencies that deal with the justification, authorization, or penalization of behavior interactions. The three sets of contingencies do participate in any kind of social interaction, but from a behavioral point of view, each of them can be manipulated separately in order to conduct an experimental analysis of their relative influence and course of action.

A systematic empirical analysis of power, exchange, and sanction contingencies may be extremely useful for the design and experimental exploration of microinstitutional contingencies and the molecular interactions among individuals that comprise dyadic or more complex behavioral units. Through operations that turn explicit power contingencies, we may study the functional dimensions and behavioral structure of interactions that are involved in the various authoritarian

or democratic types of government, or in bureaucratic versus informal administrations. A similar goal can be achieved by exploring the exchange contingencies that are involved in different economic systems that specify diversified relations among production, distribution, and acquisition of goods and services. The influence of moral and laws may also be examined by looking into the relations and orientation of sanction contingencies with power and exchange contingencies. The conceptual and experimental approach here outlined emphasizes three aspects to be accomplished by any attempt to deal with social behavior:

1. The need to distinguish between animal and human societies, stressing the conventional nature of human society as a contact medium enabling institutional individual interactions regulated by power, exchange, and sanction contingencies,

2. The possibility for behavioral psychology to become the experimental discipline of social sciences, by developing an empirical methodology that may map the enormous variety of functional relations involved in institutional behavior interactions, and,

3. The theoretical awareness that just the interaction of two individual organisms under temporally and spatially shared contingencies is not a sufficient empirical condition to study human social behavior. Behavior analysis, as an observational and experimental methodology, has to move towards empirical preparations that actually involve or sample the sort of complex processes and interactions taking place in social human behavior.

#### **DESCRIPTION OF A METHODOLOGICAL PREPARATION FOR THE STUDY OF SOCIAL INTERACTIONS**

I will describe a methodological preparation that allows for the analysis of social interactions in laboratory and quasi-natural settings, and I will contrast it with other preparations previously designed to deal only with the features of antecedent stimuli and the scheduling of consequences (Schmitt, 1998).

This preparation involves, at least, two *explicit* participants in a dyadic interaction, but it may include more than two when it is necessary to introduce separate functional roles that are ascribed to different individuals. In some occasions, the confederate roles of some individuals may be assumed by a computer simulating a non-observable participant. The functional roles in the social interaction are designed according to the three kinds of contingencies previously examined: power, exchange, and sanction contingencies.

The basic set up consists of two interconnected computers, located in separate rooms or in the same room, presenting a visual puzzle through the monitors' screens. Figures 1 and 2 show the typical arrangement of the monitors' screens, and the visual puzzles used in the different experimental conditions. The screens of both monitors display two visual puzzles, one in the left section of the screen and other in the right section. The puzzle in the left section has to be completed

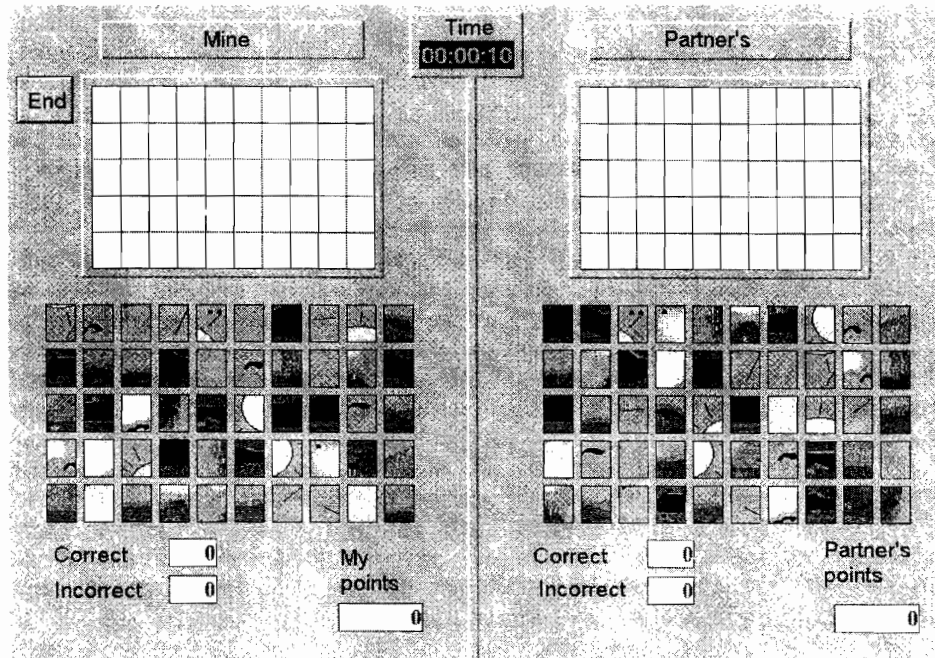


Figure 1. Arrangement of the screen during some of the baseline sessions as well as in the joint contingencies.

by the subject in that computer. The puzzle in the right section corresponds to another subject solving the same or different puzzle in the other computer, either located in the same room or in a separate room.

Computers are programmed synchronically, so that the performance by one participant in his/her computer is also displayed on the monitor of the other participant's computer. Each participant may track the performance of his/her participant peer in the process of completing the visual puzzle. The computers also allow for each participant to place pieces in the visual puzzle of his/her peer. When the piece is correctly placed, it fits automatically and a predetermined amount of points is earned, which may be displayed in each monitor. The monitor of each participant may continuously display how many points have earned each one of the participants. The first participant to complete his/her puzzle may or may not finish the experimental session by pressing a key.

This setting allows for the manipulation of experimental variables dealing with power, exchange, and sanction contingencies. Power contingencies have to do with the prescription of behavioral requirements and attributions, and the rules regulating the specification, administration, and supervision of consequences for



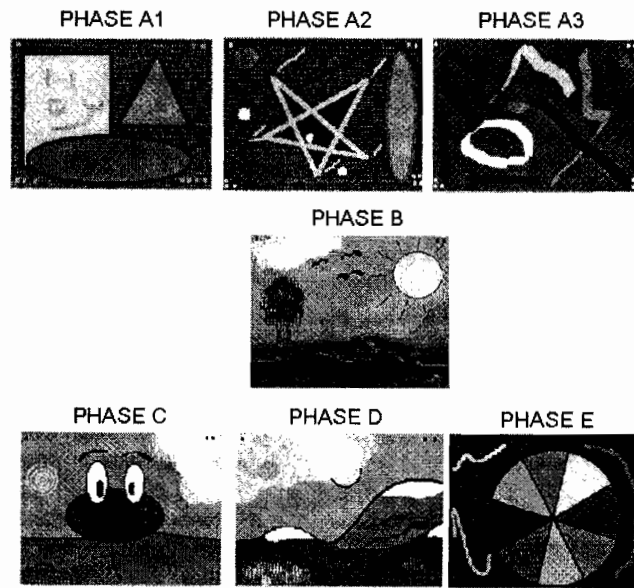


Figure 2. Visual puzzles used in each of the experimental conditions.

different behaviors. The prescription of contingencies may be external to the situation or may emerge from the situation itself, and may be established through several behavioral interactions that exemplify different power structures and levels of explicitness. Exchange contingencies deal directly with production, distribution, and appropriation of consequences for fulfilling behavioral requirements. These contingencies are related to the traditional issues of cooperation, competition, solidarity, altruism and so on. Several combinations of production, distribution, and acquisition contingencies may be experimentally sampled to make contact with issues and variables that are related to economic processes prominent in the history of human societies. Finally, sanction contingencies have to do with the possibility of externally or self-administered consequences, and with the correspondence of behavioral outcomes with implicit or explicitly prescribed rules. Sanctions and justifications of this correspondence or non-correspondence may be manipulated from the outside or inside the situation, with added consequences for appropriate or inappropriate behaviors.

The experimental preparation just outlined may be adapted to natural settings. Everardo Camacho (dissertation in progress) has used a similar, although simpler arrangement, in which two children have to work separately in a puzzle in different

locations of the same room. In this case, each child has part of the puzzle pieces needed to solve the puzzle of his/her peer. These preliminary studies have shown the emergence of social interactions that would very unlikely appear in a laboratory controlled situation. These social interactions involved behaviors such as offering, asking for, insulting, strong physical contacts, threatening, and snatching. The replication and extension of social contingencies analyzed in laboratory conditions should be extremely useful in order to explore the consistency of general patterns and process-like interactions, at the same time that specific, culturally-bound behaviors are assessed as emergent behaviors of particular populations, institutions and exchange settings.

Following accumulated experimental wisdom, we have decided to conform our research program to simplicity. The most convenient strategy is to maintain constant as many (implicit and externally imposed) variables as possible, and to analyze only a limited set of variables that are relevant to one of the three sets of contingencies. As a starting point, we have chosen to study the processes involved in exchange contingencies, while power and sanction contingencies are maintained functionally dim, so to speak, since they are implicitly or explicitly present in any social interaction. The fact that we only manipulate exchange contingencies does not exclude the presence of the other two sets of contingencies in any social interaction. However, we try to maintain non-salient these variables in the experimental situation.

### **SOME PRELIMINARY STUDIES AND RESULTS**

In collaboration with Nora Rangel, we have conducted several exploratory studies, comparing the performance of elementary school children and college students under two sequences of exchange contingencies. In these studies two different sequences of exchange contingencies have been analyzed both with children and adults in separate or the same experimental rooms. Each study comprised seven phases, three of which were conducted as individual conditions and four as social interaction conditions.

Individual conditions were designed as baselines or control conditions to assess the participants' performance in the puzzle solving situation under individual, non-shared contingencies. These individual conditions included the following: 1) the participant responding alone to the visual puzzle presented in his/her monitor's screen, without displaying the peer's puzzle or receiving points as a consequence for completing the puzzle; 2) the display of the peer's puzzle on the monitor, informing to the participant that he/she can follow the performance of a different participant in a separate room, without providing points as consequences; and 3) the presentation of the first condition, in which the participant is presented only one visual puzzle, but receives points for a correct completion of the puzzle.

The conditions with joint contingencies for both participants were the following: 1) both participants could place pieces in any of the two puzzles, and each correct response provided points only for the participant who placed the piece correctly; 2) both participants could respond in both puzzles, and when a piece was placed correctly in the participant's own puzzle, points were awarded only to that participant, and when pieces were placed in the peer's puzzle, points were provided to both participants; 3) both participants could respond in both puzzles, and when a piece was placed correctly in the participant's own puzzle, points were awarded only to that participant, but when pieces were placed in the peer's puzzle, points were awarded to the peer; and 4) both participants could respond in both puzzles and the response of any of them in any of the puzzles provided points to both participants. The condition (1) could be considered as a multiple individual-competition contingency, condition (2) as a multiple individual -partial altruism contingency, condition (3) as a multiple individual-altruism contingency, and condition (4) as a multiple unavoidable-cooperation and sharing contingency. In these four conditions, the participant that first completed his/her puzzle could end the session for both subjects by pressing a key. In each of these conditions, participants were explicitly instructed about the mixed contingencies. A demo exemplifying the contingencies was presented in the screen before the beginning of the session.

The exploratory experiments we have initially conducted have five distinctive features that contrast with those studies that are framed in the operant tradition. First, we measured individual preferences and performances prior to their exposure to the joint contingencies. The measurement of individual performances provided independent baselines in regard to the use of extrinsic consequences (points) and the presentation of an optional performance and stimulus displays (the peer's puzzle). Second, joint contingencies consisted of choice situations in which each subject might respond under individual contingencies or might switch back and forth between individual and shared contingencies. Third, social contingencies involving competition, altruism, or cooperation and sharing criteria were free situations. With some exceptions (e.g., Mithaug, 1969), in the majority of traditional studies, cooperation or competition have consisted in the only available response requirement to obtain consequences. In our studies, participants could choose to respond or not to respond under the joint contingencies. We may expect parallel independent performances, or "intruding" performances by one or both of the experimental participants. We could say that most of the traditional studies have involved involuntary social behavior whereas our studies involve voluntary social behavior. Fourth, our studies included explicit instructions regarding the payoffs in each kind of individual and joint contingency, and responding under one or the other was not confounded, as usually happens with operant responses that are defined in terms of time-limited sequences or position coincidence (e.g., Schmitt & Marwell, 1968). Fifth, each participant was able to track in any moment his/her performance and payoffs and those of his/her peer.

In our initial exploratory studies, we analyzed whether the presentation of the multiple unavoidable-cooperation and sharing contingency at the beginning of the four joint contingencies facilitated exchange interactions in the altruistic and competition contingencies. In the multiple unavoidable-cooperation and sharing contingency, both participants obtained points simultaneously for responding in any of the two puzzles, in such a way that by completing both puzzles they obtained twice the points that were provided for completing a puzzle in the individual situation.

Figures 3, 4, and 5 show the performance of children under two different sequences, one beginning with joint contingencies under the multiple competition condition (Sequence 1) and one beginning with joint contingencies under the multiple unavoidable-cooperation and sharing condition (Sequence 2). When Sequence 1 was the initial condition, the following sequence was multiple partial altruism-multiple altruism-unavoidable cooperation and sharing. When Sequence 2 was the initial condition, the following sequence was multiple competition-multiple partial altruism-multiple altruism.

Figure 3 shows the points obtained for every dyad in both sequences when children worked separately and for Sequence 2 when they worked together in the same room. The dotted line indicates the maximum number of points that could be obtained if the children responded optimally under the joint contingencies. The data show that the children always obtained less points than possible even under the unavoidable cooperation and sharing contingency. Most of the time, the children performed under individual contingencies.

The children showed few correct placements in the peer's puzzle, except for two dyads that worked separately under Sequence 2 (see Figure 4). The asterisks above the bars indicate that the child ended the session after completing the puzzle. With two exceptions in the condition where the children were together, one of the participants consistently ended the session after completing his/her puzzle. Figure 5 shows no systematic effects of placements in the peer's puzzle being done before or after completing the participants own puzzle.

Figure 6 shows the number of points obtained by the adults under experimental conditions analogous to those given to the children. When the adults were together in the same room under Sequence 2, both participants in two of the three dyads obtained almost the maximum number of points under the unavoidable-cooperation contingency and under the multiple-altruism contingency. When adults worked separately, only one of the subjects in one dyad under sequence 1 and under sequence 2 obtained extra points when multiple-partial altruism and multiple-competition contingencies were operating, respectively.

Figure 7 shows the response of each adult subject in the peer's puzzle in those dyads that performed under joint contingencies. Adults never ended the session after completing his/her own puzzle. They waited for the peer to complete the other puzzle. Figure 8 shows that when subjects were together, they tended

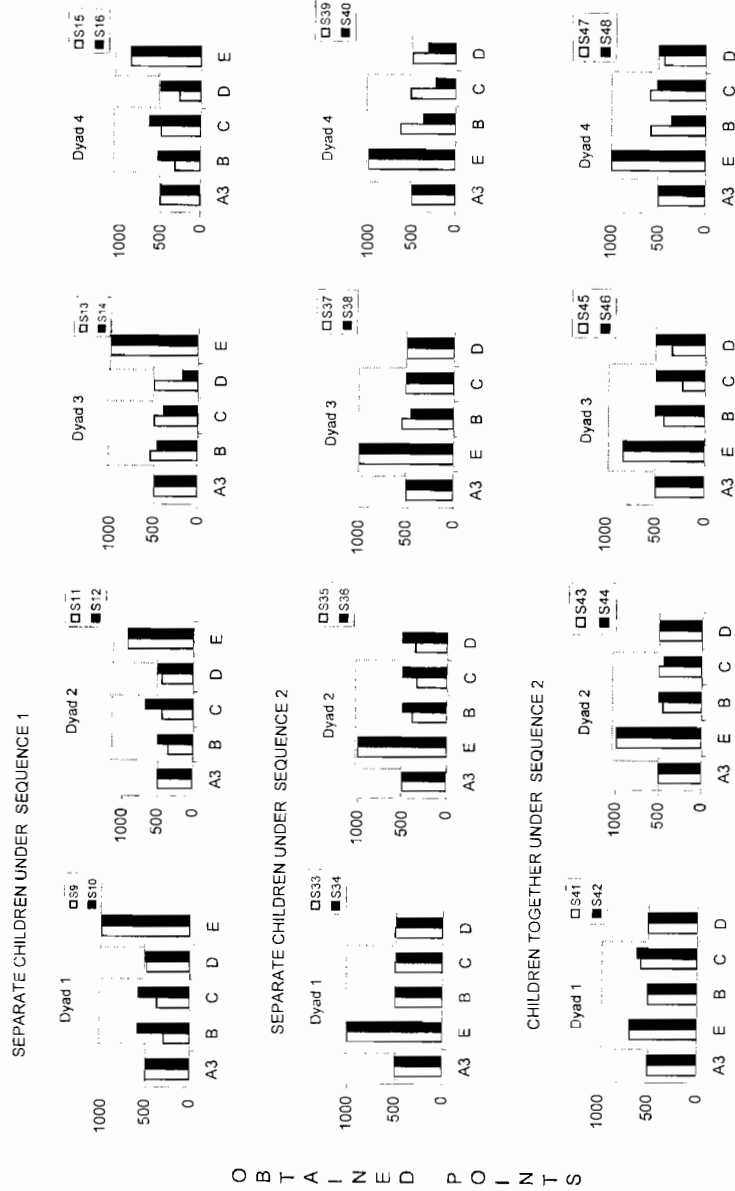


Figure 3. Number of points by obtained the children dyads on the two contingency sequences, separate and together. Sequence 1 began with the multiple individual-competition contingency while Sequence 2 began with the unavoidable cooperation-sharing contingency. The dotted line indicates the maximum of points to be attained individually under each contingency.

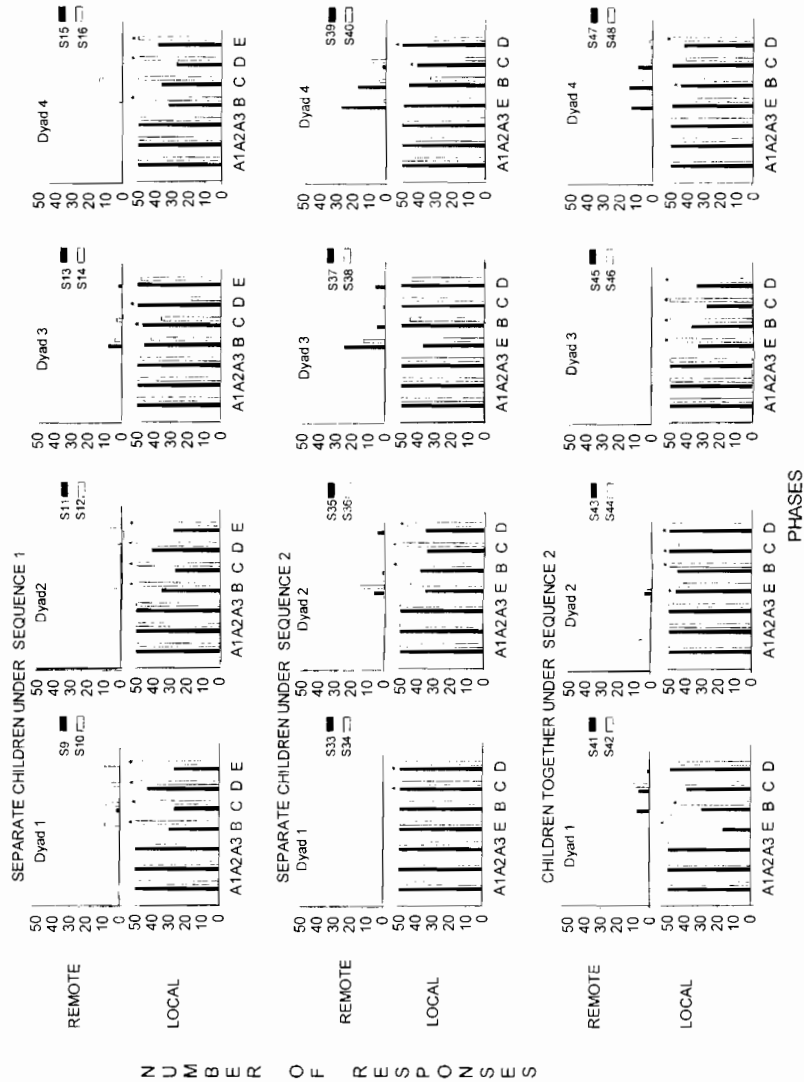


Figure 4. Number of responses for each child in his/her own puzzle (local), or in the peer's puzzle (remote). The asterisk indicates that the child ended the session when he/she completed the puzzle before his/her peer completed the corresponding puzzle.

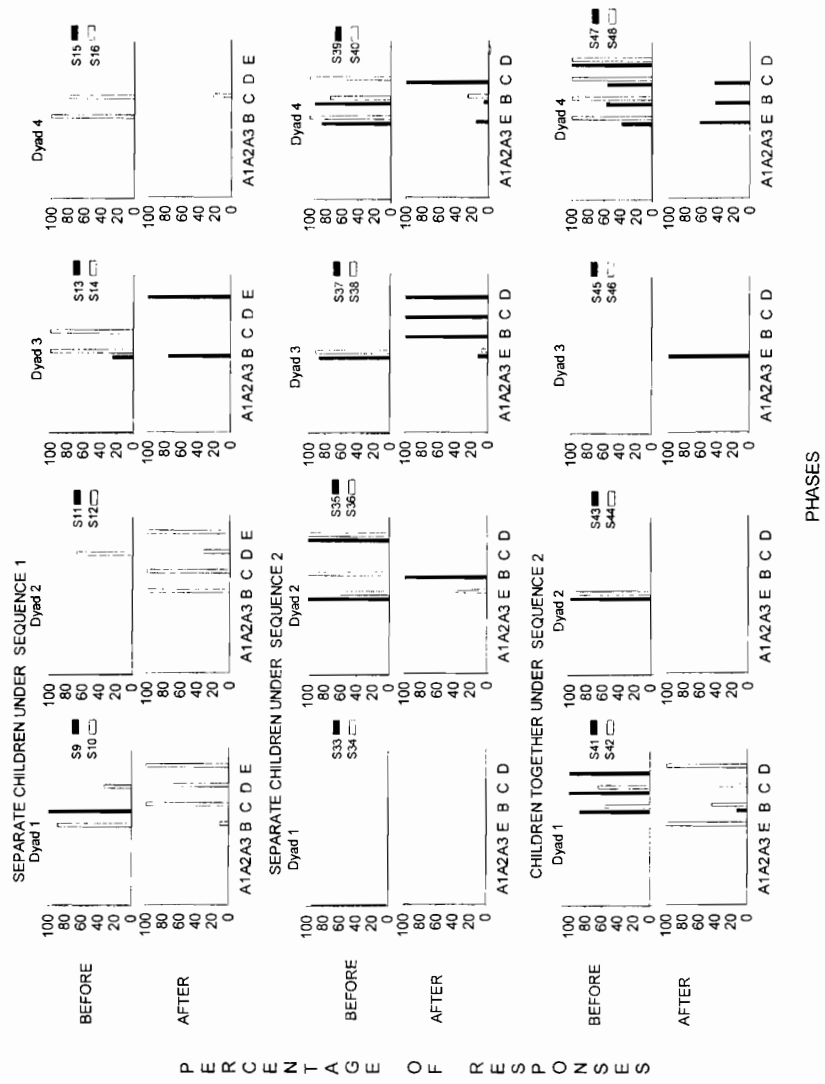


Figure 5. Percentage of responses in the peer's puzzle for each child. The upper panel of each graph shows the responses made before the child completed his/her own puzzle. The lower panel shows the responses made after the child completed his/her own puzzle.

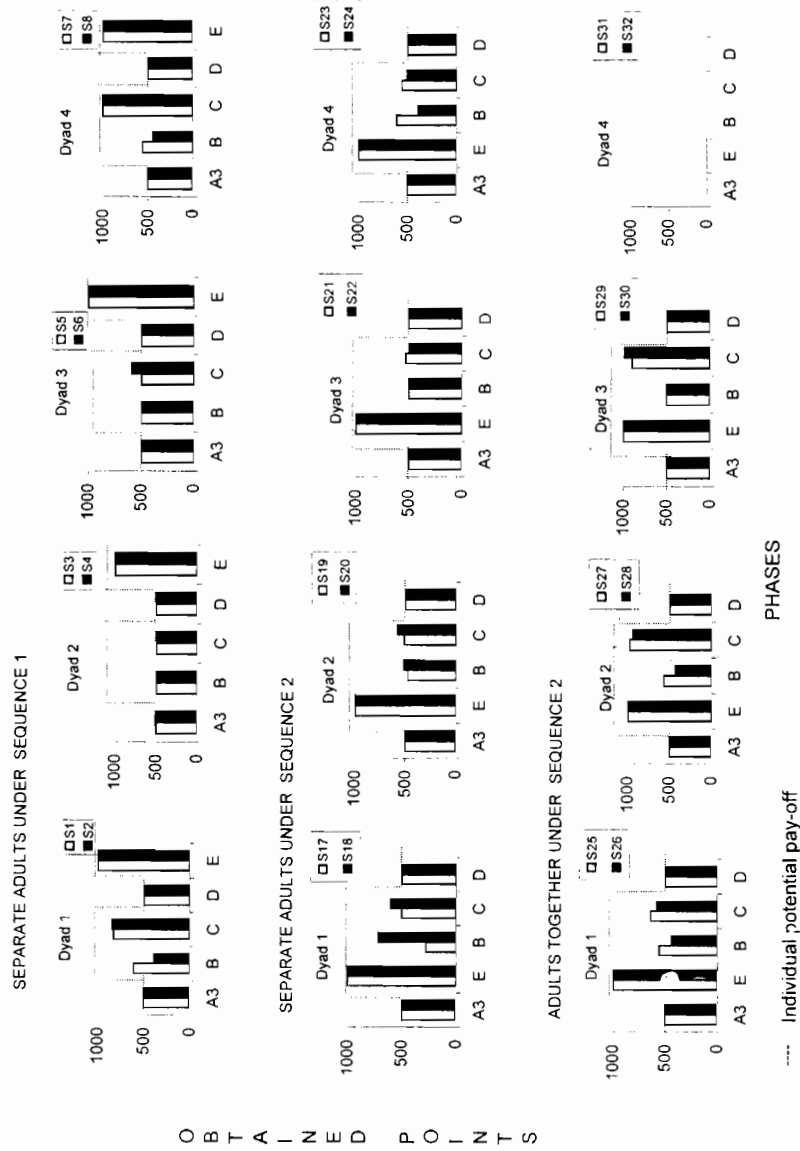


Figure 6. Number of points obtained by the adult dyads in the two contingency sequences (separate and together). Sequence 1 began with the multiple individual-competition contingency while Sequence 2 began with the unavoidable-sharing contingency. The dotted line indicates the maximum number of points that could be obtained individually under each contingency.



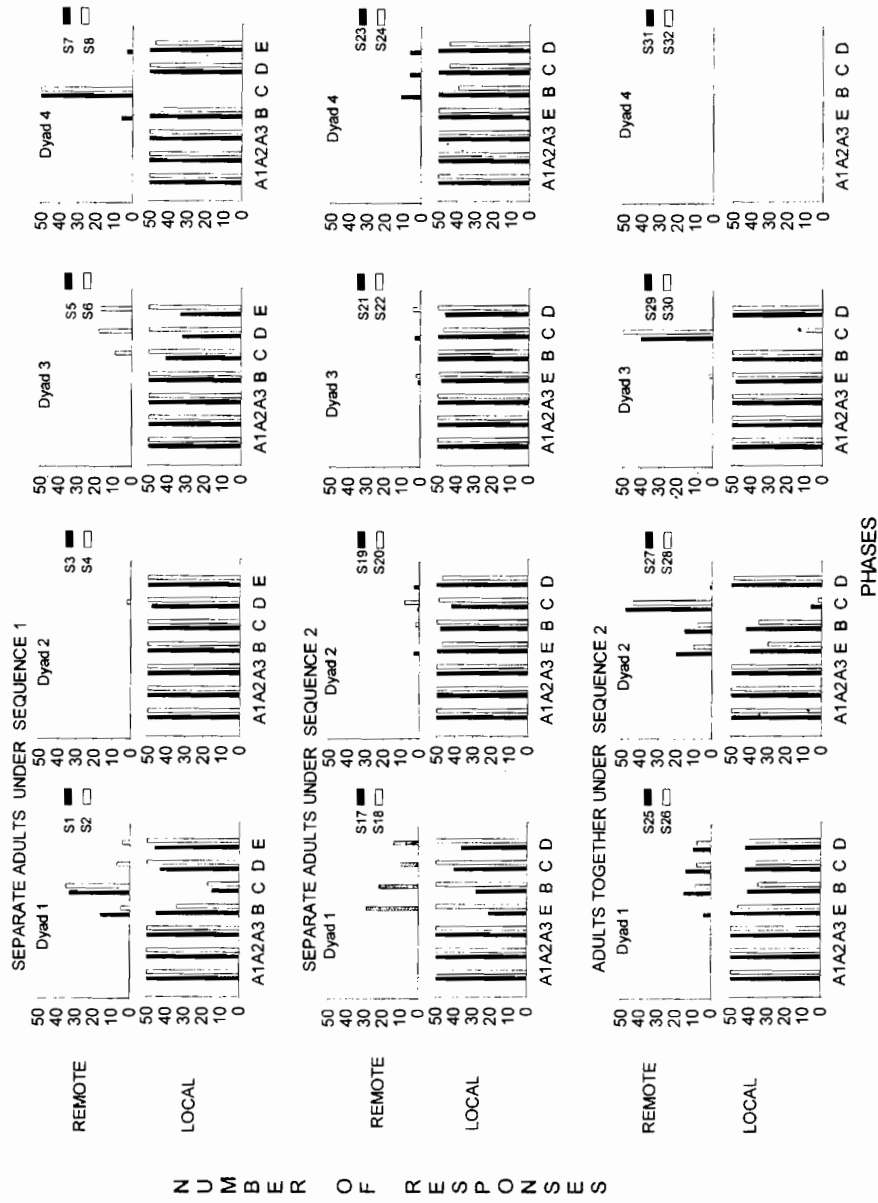


Figure 7. Number of responses for each adult in his/her own puzzle (local) or in the peer's puzzle (remote).

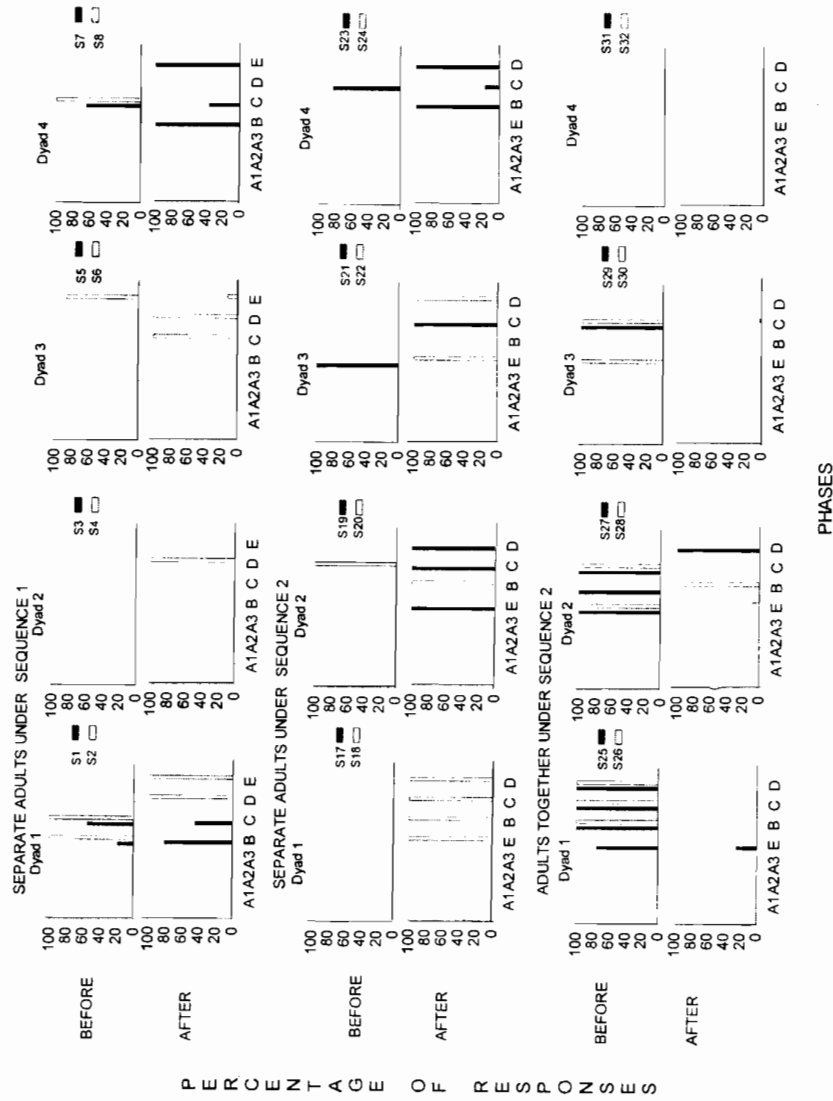


Figure 8. Percentage of responses in the peer's puzzle for each adult. The upper panel of each graph shows the responses made before the adult completed his/her own puzzle. The lower panel shows the responses made after the adult completed his/her own puzzle.

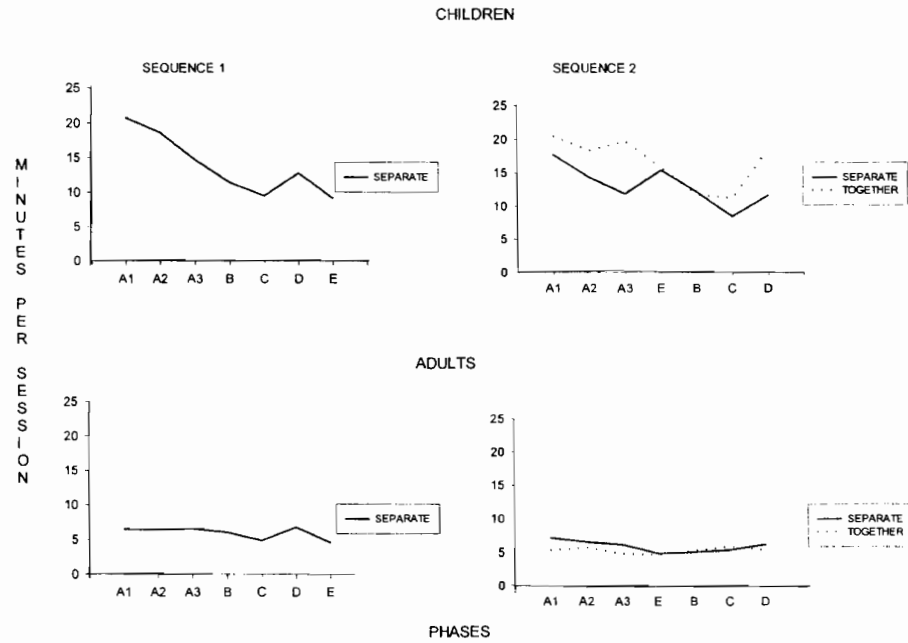


Figure 9. Mean duration in minutes for each session for child and adult dyads in the various sequences.

to respond in the peer's puzzle before they completed their own puzzle. When subjects were in separate rooms there was no consistent effect in this regard.

The adults took less time to complete their puzzles, compared to the children (see Figure 8). When the children were together in the same room, the average session duration was longer and varied from session to session. Casual observations indicated that the children talked to each other during the sessions and that, sometimes, one child moved to the other computer to help his/her peer. This may account for the increased duration and variability in duration of experimental sessions when children were together, although the time difference in performance may also be due to the relative difficulty of solving the task for each age-group.

In order to assess for any preference regarding a particular kind of interaction prior to their exposure to exchange contingencies, subjects were tested on their preference for each condition. Before the beginning of the experiment, they were asked to choose under which condition they would prefer to work in completing the puzzle, by circling one of two options in a piece of paper that contained all possible pairs of contingency comparisons. The percentage of choices of a same

condition under all possible paired comparisons are shown in Figure 9 and 10. In the case of adults, this evaluation was not made for subjects under Sequence 1. Children did not show any consistent preference for any of the conditions, even for the individual contingency which was the most frequently chosen during the experimental conditions. Only adults that worked together in the same room showed a relative preference for the multiple altruism and the multiple competition contingencies, preference that did not correspond with their effective performance during the experimental sessions.

The results of these exploratory studies are suggestive. They show that, most of the time, when the participants were under multiple contingencies that involved individual or shared performances, they chose to respond under non-social conditions, despite the fact that the social conditions provided them with a larger payoff. Starting the sequence of joint contingencies with the unavoidable-cooperation condition, which potentially provided twice the points for every participant for responding either in his/her puzzle or in the peer's puzzle, did not facilitate the participants' switching to joint contingencies in successive conditions. The children did not even complete one of the puzzles. Also, preferences for joint contingencies prior to the experimental task were not predictive of the performance under those contingencies. Finally, there were differences between the children and the adults. The children practically did not respond in the peer's puzzle, while adults tended to do so when they worked together in the same room. Additionally, the children, in contrast with the adults, frequently ended the experimental sessions before their peer had completed his/her puzzle.

The experimental preparation described in the present paper, and its grounding rationale, may be a fruitful instrument for the design of experimental situations that sample meaningful social interactions that involve power, exchange, and sanction contingencies. Until now, the mainstream in the experimental analysis of social behavior has consisted in setting up tasks for two individuals, which are extensions of the operations involved in operant conditioning experiments. Nevertheless, the importance of social stimuli (Cohen & Lindsley, 1964), the choice between individual and shared contingencies (Schmitt & Marwell, 1968), exchanges to retribute inequities (Marwell & Schmitt, 1972; Shimoff & Matthews, 1975), structural power for giving and taking (Molm, 1990), and social valoration and sanction of inequitable behaviors (Marwell & Schmitt, 1975), have been identified as crucial variables in the regulation of dyadic interactions. The present preparation, which was explicitly designed to analyze power, exchange, and sanction contingencies, may constitute a reliable tool for the systematic and parametric exploration of social contingencies in institutions, cultures, and structural features of societies regarding their economic, political, and normative systems.

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