INTERACTIONS, RELATIONSHIPS AND SOCIAL STRUCTURE

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The conceptual framework presented involves three levels—interactions, relationships (described by the content, quality and patterning of interactions) and structure (described by the content, quality and patterning of relationships). At each level it is necessary to abstract generalisations valid over a range of instances, and to seek for organisational principles which account for the patterning at that level. 'Institutions' appear both as abstractions from the surface structure and as organisational principles.

I

Introduction

The recent accumulation of facts about social relationships in non-human primates has revealed hitherto unsuspected complexities in their social behaviour. As yet, however, primatologists lack a theory of social behaviour adequate to order the facts, and only a few have started to integrate their data on social interactions in a way that could lead to an understanding of social structure (e.g. Sade 1972*a*; 1972*b*; Simpson 1973*a*; Kummer 1968; 1971). As a result the facts tend to accumulate in part along well-worn paths, such as the study of social dominance, from whose strait-jacket primatologists have only recently begun to escape (see Gartlan 1968); and in part at random, with no direction or cohesiveness. In the absence of a theory, perhaps we should search for a conceptual framework which may help us one day to build our facts into a theory. This article represents an attempt in that direction.

This attempt deliberately uses concepts derived from the human social sciences, in the belief that studies of non-human primates (and of other animals) will be the more valuable if they clarify both differences from and similarities with man. Furthermore, there may be some traffic the other way. So complex are the phenomena with which social psychologists, sociologists and anthropologists must grapple that it may be helpful to them to see some of the concepts they use put through their paces in relatively simple situations. Sometimes it is fruitful to build up from the relatively simple as well as to analyse the complex; and study of the differences between relatively simple and more complex phenomena can help to reveal what is special about the latter.

This is not to suggest that relationships between chimpanzees are just like human relationships, or that the structure of gorilla groups resembles that of the groups of early man. It is extremely improbable that any of the great apes could form individual relationships comparable with those of which man is capable. It is certain that none has a social structure precisely similar to that of any contemporary human

Man (N.S.) 11, 1–17.

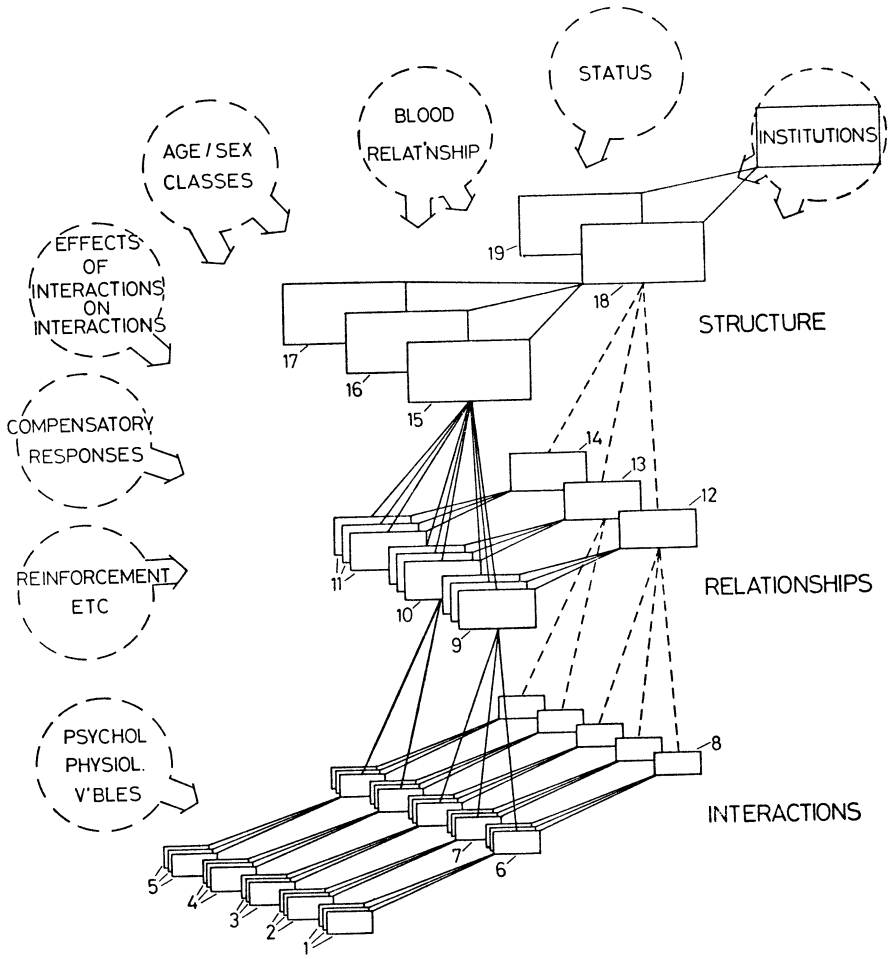

FIGURE 1. Diagrammatic representation of the relations between interactions, relationships and social structure. Interactions, relationships and social structure are shown as rectangles on three levels, with successive stages of abstraction from left to right. The discontinuous circles represent independent or intervening variables operating at each level. Institutions, having a dual role, are shown in both a rectangle and a circle.

In the specific instance of a non-human primate, the rectangles might represent:

1. Instances of grooming interactions between a mother A and her infant B.
2. Instances of nursing interactions between A and B.
3. Instances of play between A and B.
4. Instances of grooming between female A and male C.
5. Instances of copulation between A and C.
6. First stage abstraction—schematical grooming interactions between A and B. Abstractions of grooming interactions between other mother-infant pairs are shown behind, but the specific instances from which they were abstracted are not shown.
7. First stage abstraction—schematised nursing interactions between A and B. Abstractions of nursing interactions of other mother-infant pairs are shown behind.
8. Second stage abstraction—schematised grooming interactions between all mother-infant pairs in troop.
9. Mother-infant relationship between A and B. Mother-infant relationships of other mother-infant pairs are shown behind (but connexions to grooming, nursing, etc., interactions are not shown).

society, and it is at best a matter for speculation whether man ever passed through a stage in his evolution in which he lived in groups comparable with those of any modern primate. But if we recognise the differences between ape and man we can put them to good use: for that reason, this search for a conceptual framework lays as much stress on the differences in social organisation between animal and man as on the similarities.

The conceptual framework involves three levels. These are schematised in Fig. 1, which is intended to summarise much of the argument presented later in this article.

1. Interactions between individuals are seen as basic elements of social structure. Description of an interaction requires specification of what the individuals are doing together (its content) and how they do it (quality).

2. Relationships involve a succession of interactions between two individuals. Description requires specification not only of the content and quality of the interactions, but also of how they are patterned with respect to each other and in time.

3. The 'surface structure' of a group, i.e. that which is apparent in empirical data derived from that group, is to be described in terms of the nature, quality and patterning of relationships (cf. Hinde & Simpson 1975; Hinde in press).

This distinction between three levels in the conceptual framework of course carries no implications about the direction of causal relationships: as discussed later, interactions influence, and are influenced by, relationships and thus by social structure.

At each of these levels, there are many characteristics that could be described or measured, and we must select those relevant to the task in hand. It is then necessary to seek for generalisations in two directions. First, from the data concerning *particular* interactions, relationships or structures, we must make generalisations about the same characteristics over a wider range of occasions, individuals, circumstances, cultures or species. This is represented in fig. 1 by successive blocks of rectangles from left to right. In general, the wider the generalisation, the more superficial it will be in the sense that more information about particulars must be added to relate it to an empirical instance. Such generalisations are often sought by averaging (by mean, median, or mode) from particular instances: in other cases it is more useful to abstract essential characteristics and the interrelationships between them.

Second, at each stage we must search for principles which will 'explain', in a causal or functional sense, the empirical data. Some examples are shown by the discontinuous circles in fig. 1. As discussed later, at each level the principles employ concepts (e.g. intervening variables) additional to those required at the level below

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10. Consort relationship between A and C. Other consort relationships are shown behind.
11. Specific relationships of another type (e.g. peer-peer).
12, 13, 14. Abstraction of mother-infant, consort and peer-peer relationships. These may depend on abstractions of the contributing interactions.
15. Surface structure of troop containing A, B, C etc.
16, 17. Surface structures of other troops (contributing relationships not shown).
18. Abstraction of structure of troops including that containing A, B, C etc. This may depend on abstractions of mother-infant, etc., relationships.
19. Abstraction of structure of a different set of troops (from another environment, species, or etc.).

it. At each level more than one principle will be required, so that the manner in which the principles interact must also be specified. The principles may be applicable at any level of generalisation, but usually concern a supra individual one. These principles could lead us to the 'deep structure' of the system (see discussion on pp. 8–9).

Although these two methods of proceeding—seeking for descriptions with increasing degrees of generality, and seeking for principles with which to understand causation—appear to be orthogonal to each other, they may meet in the study of human institutions (q.v.). This is discussed later.

II

Interactions

Interactions need be considered only briefly. An interaction involves two or more individuals and one or more types of behaviour. It can be characterised in such terms as 'A does X to B' or 'A does X to B and B responds with Y'. Usually a sequence of such incidents is involved: just how many it is useful to regard as constituting 'an interaction' will depend in part on the nature of the problem in hand.

The terms 'interaction' or 'interaction sequence' can be used to refer to a particular incident, or to the common features of a number of such incidents. What are the criteria by which incidents are grouped together as examples of interactions of the same type? In studies of non-human species they usually refer to types of behaviour, which may in turn be characterised either in terms ultimately referable to patterns of muscular contraction (e.g., A directs an open-mouth threat to B) or in terms of consequences (A behaves aggressively to B, where aggressive behaviour includes any action directed towards harming B, no matter what its nature) (Hinde 1970). In man not only is the number of possible types of behaviour much larger, but the nature or content of the behaviour involved may be less important than the quality of the interaction—for instance, that an interaction was gentle or rough, or involved related or conflicting goals, may be more relevant to some issues than what the participants actually did together (Hinde in press *c*).

The further understanding of interactions must depend on analyses of the behaviour of each interactant, including the verbal and non-verbal signals employed. It must include understanding not only of the behavioural propensities of each of the participants (as an individual, a member of an age/sex class, etc., according to the level of generalisation), but also of how each reacts with that particular other (or with an individual from a particular class of others) to produce the behaviour observed. The qualities of the interaction emerge as a result of the particular combination of participants, and it has properties that are not present in the behaviour of either participant alone.

Interactions may differ according to the relationships that the participants have with each other or with others. For instance the nature of a threat, or of a mounting sequence, may vary with the dominance relations of the individuals. Such influences of social structure or relationships upon interactions can be regarded as being mediated through the behavioural propensities of the participants at the start of the interaction.

To understand the mechanisms of an interaction, we must seek for principles

that employ concepts not present in the language required for describing the interactions themselves. These concepts may be physiological (e.g. steroid levels), behavioural (e.g. 'motivation', 'conflict') or ideational.

Interactions are regarded here as occupying a limited time span. If an interaction is extended in time, or if a sequence of interactions occurs, the two participants will begin to know each other as individuals. This brings us to the next stage in our conceptual framework.

III

Relationships

A relationship involves a series of interactions in time between two individuals known to each other. Because the individuals are known to each other, the nature and course of each interaction is influenced by the history of past interactions between the individuals concerned, and perhaps also by their expectations for interactions in the future. It would not be profitable to discuss just where the distinction between interactions and relationships should come. Clearly the essential issues are the duration and extent to which early phases affect later ones. Adequate description of a relationship requires data collected over a period (see Simpson 1973*b*). Just as interactions with an individual are affected by past interactions, so also may interactions with one of a category of individuals be affected by previous interactions with other members of that category. Thus how an adolescent rhesus monkey behaves to an adult male may be affected by his past encounters with other adult males. Such influences may be mutual: the behaviour of a motorist to a policeman is affected by his past encounters with (other) policemen and *vice versa*. In such cases we may speak of relationships between categories of individuals. This is a weak usage of 'relationship' in comparison with series of interactions between individuals.

Now the term 'relationship' can refer to the idiosyncratic modes of interacting of specific individuals, or to generalised patterns of behaviour, as in 'the mother-infant relationship'. In either case the characteristics of the relationship include those of the interactions involved, that is the content of the interactions and their qualities. It is because particular types of interaction tend to be associated together, that relationships can be named according to the types of interaction they characteristically contain (Simpson 1973*b*). Thus a monkey mother-infant relationship involves nursing, maternal grooming, protection, play, etc., while a consort relationship involves sex behaviour, grooming and mutual proximity. But to characterise a relationship fully we need to know not only the content and quality of the interactions, but also how they are patterned—patterning being taken here to include the absolute and relative frequencies of the component interactions, when they occur with respect to each other, and how they affect each other. For example, grooming of A by B has quite different implications if it occurs only after A has threatened B from those it would have if unrelated to agonistic episodes. Some of the properties of a relationship depend on the way in which the interactions are patterned (Hinde & Simpson 1975; Hinde in press *c*).

The approach adopted here focuses on behaviour. This does not imply any underestimation of the fact that, in monkey and man, the interactions within a relationship may be accompanied by affective and cognitive events that not only

relate to the immediate present, but involve shared experiences of the past or expectations for the future. But where the relationships of others are concerned, the only access to such feelings is through behaviour. That such properties as inter-subjectivity (Asch 1952; Heider 1958) may be identified even in non-verbal animals seems not impossible (Hinde & Simpson 1975). Further discussion of how the properties of relationships can be described is given elsewhere (Hinde in press *c*): among the properties that are important are the nature and diversity of the component interactions, their quality and patterning, the extent to which the interactions are reciprocal (i.e. the partners show similar behaviour) or complementary (the partners behave differently), and the cognitive and moral levels of the participants.

The stability of a relationship must of course be considered in dynamic terms. Just because each interaction is affected by previous interactions, a relationship is unlikely to be static. Indeed stability of a relationship does not necessarily imply a constant pattern of interactions, but a smoothly changing one: just how much change a relationship can show and still merit the label of 'stable' is of course a matter of opinion: the point emphasised here is that a changing pattern is to be expected rather than regarded as exceptional. The questions of the factors determining the stability of a relationship, and that of how the patterning of the component interactions is determined, are closely related. Now at the data level of describing a particular relationship over a particular time span, and the further levels of abstraction of seeking for common features or norms in sets of relationships, the language required remains the same—it requires reference to what the participants in the relationship do together, how, and how often. But if we are to understand the dynamic stability of a relationship we must seek for principles employing concepts additional to the physiological, behavioural and ideational concepts used in understanding the component interactions. Four groups of inter-related principles seem likely to be of use (see Hinde & Stevenson-Hinde (in press) for more detailed discussion).

1. Principles concerned with learning. Three learning paradigms have been applied to the formation and maintenance of inter-individual relationships—exposure learning, classical conditioning, and operant conditioning. These labels of course refer to paradigms, not processes: learning in real-life situations may be considerably more complex than that studied in the laboratory situations in which the paradigms were defined. In applying these paradigms to real-life situations, a major difficulty arises from the impossibility of obtaining independent criteria of what will, and what will not, constitute a reinforcer: if the reinforcement theorist restricted himself to tangible reinforcers he would neglect much of the complexity of inter-individual relationships, but as he introduces more ad hoc intangible reinforcers his theorising becomes incontrovertible.

2. Principles concerned with the relations between the different types of interactions within a relationship. Some types of interactions are especially likely to occur together, whilst others are incompatible. Some such associations can be described in terms of 'status': thus individuals of markedly differing status are likely to interact in some ways (e.g. gestures of condescension/obeisance) and unlikely to interact in others (e.g. eat at the same table). Some interactions affect the subsequent probability of others: thus courtship may increase the probability

of copulation and reduce that of aggression in many species. In the long term, learning in the course of one type of interaction may affect the course of others. Clearly the mechanisms by which one type of interaction affects others are diverse.

3. Principles concerned with the operation of positive and negative feedback in dynamically changing systems. In some relationships the continued association of the participants depends on external constraints—for instance two female monkeys may interact intermittently with each other only because they both seek proximity with the same male. But in many cases the participants in a relationship actively seek each other's company. In such cases negative feedback can be said to operate—for instance external vicissitudes that tend to reduce the association may be countered by a positive striving for association. In other cases positive feedback may occur: thus if one partner is unwilling to interact in a manner desired by the other, the consequent frustration-induced aggression in the latter may enhance the former's unwillingness. Such feedback effects may or may not involve reinforcement, and may or may not depend on mutual influences between interactions. If one partner changes his propensity to engage in a particular type of interaction, dynamic stability is more likely to be maintained if the partner changes in the *same* manner in the case of reciprocal interactions but in a *complementary* way in complementary interactions. For such reasons an adequate means of describing the properties of relationships is a necessary prerequisite for understanding their dynamic stability (Hinde in press *c*).

4. Principles concerned with the institutionalisation[1] of relationships. In man, though to a lesser extent if at all in other species, some of the characteristics of relationships are determined by cultural conventions. Thus how a motorist interacts with a policeman is determined in part by what he has learned about behaviour appropriate to policemen. Again, the difference between a non-human consort relationship and human marriage lies partly in the extent to which the marriage partners guide their behaviour to conform to cultural expectations. How far institutionalisation can be described in terms of the specification of reinforcers is an open issue.

In conclusion, an understanding of relationships requires an understanding not only of the component interactions, but of how those interactions are patterned in time. This requires new principles which employ concepts not present in the data language used for the initial description of the interactions and their patterning, and for the generalisations derived therefrom. 'Social structure' poses essentially similar problems, as we shall see in the next section.

IV

Structure

Terminology. So far we have been concerned primarily with pairs of individuals and the relationships between them. We have seen that relationships, while based on interactions, involve properties concerned with the patterning of those interactions and qualities derived from that patterning. We may now move to a more complex level, and consider the structure of groups. 'Structure' has been used as a broad blanket term to cover diverse phenomena by sociologists, and in more precisely but diversely defined ways by anthropologists (Nadel 1957). In the present

context the concept of structure is or could be used in three ways, and these must be carefully distinguished:

1. *Surface structure*. In describing a particular group we must describe not only the relationships existing within that group, but also how they are patterned—for the group will possess properties that arise from the manner in which the relationships are patterned but are not present in the individual relationships themselves. In describing a particular group we may say that its 'surface structure' is the content, quality and patterning of the relationship within it. Like 'relationship', 'surface structure' implies a time dimension, and its description must be based on data gathered over a period.

2. *Structure*. Just as, from data on particular relationships, we make generalisations about categories of relationships, so also from the 'surface structure' of a number of groups we can make generalisations applicable to all of them. Generalisations derived from a number of instances of 'surface structure' are here said to be concerned with 'structure'. 'Structure' thus refers to a patterning of relationships that is independent of the particular individuals concerned. In moving to this more abstract level we focus on aspects of the content, patterning and quality of relationships that show regularities across individuals and across societies, and neglect the peculiarities of particular ones. We also move from the realm of interest of the psychologist to that of the social scientist (Devons & Gluckman 1964).

Primatologists have so far given little thought to the precise methods by which 'structure' (in the sense of a norm or essential structure) can be derived from a study of 'surface structures' (i.e. the actual content, patterning and quality of relationships as observed in particular instances). In considering relatively superficial characteristics (e.g. group size or composition), average (mean, median or mode) data from several groups are often presented. But means, at any rate, are likely to be affected by aberrant instances; and do not indicate either a norm or an essential characteristic. The qualitative statements made about primate groups (of the type 'a central group of adult males, with females and young nearby and subadult males on the periphery') imply the abstraction of an essential or normal pattern of relationships rather than mere averaging. This writer has the impression that primatologists are not alone in having given inadequate attention to the methods to be employed in drawing generalisations from empirical data.

Used in these ways, 'surface structure' and 'structure' are useful terms because, by virtue of association with usages in other contexts (cf. Boudon 1971), they imply that the individuals (or incumbents) within a group do not associate at random, that their relationships are influenced by their membership of the group, and that the group has properties that are more than the sum of the constituent relationships. There are, however, two ways in which we must beware of associations with usages of 'structure' in other contexts. First, the word can have static implications that are quite erroneous when applied to social phenomena. Over a short time span, the relationships that contribute to structure are themselves dynamic, and affect each other in a dynamic fashion. Over a longer time span, individuals enter and leave the group, or grow up to form relationships comparable to those formed previously by their elders. In some monkey species the cycle is even longer, troops increasing in complexity up to the point at which they split into simpler components, which then increase in complexity in their turn (e.g.

Eisenberg *et al.* 1972; Furaya 1969; Nishimura 1973). Second, while 'structure' (as opposed to 'surface structure') is independent of the elements of which it is composed, just as a pyramid is a pyramid whether made of stone or wood, we must be careful not to push the abstract nature of the concept of structure too far. When applied to groups it must contain some reference to the nature and quality of the relationships. To take the simplest case, where each of three individuals has relationships with the others, the structure can be described as triangular, but this tells us little unless we also know, for instance, which of the relationships are hostile and which friendly.

3. *Principles of organisation* (*deep structure*). To understand the stability of social structures we must come to terms with the determinants of the patterning of their constituent elements. As with relationships, principles involving concepts not found in the data language are required. These principles could lead us to a model which could provide understanding in dynamic terms of the pattern of relationships that constitutes the structure. Such a model could be described as the 'deep structure': however, although the present approach is essentially structuralist in this sense (Lévi-Strauss 1958; Boudon 1971), such a model is as yet a long way off and 'organisational principles' will generally be used here instead.

We shall return briefly to this terminological issue later: first, however, we may consider some categories of principles important for understanding group structure.

Principles

In studies of non-human primates, three groups of principles have proved useful:

1. Principles concerned with relationships within or between age/sex classes (e.g. peer/peer; adult male/adult male; female/infant; male/infant; male/consort female). Whilst preferential relationships within or between age/sex classes are ubiquitous, their nature varies markedly between species (references in Hinde 1974).

2. Principles concerned with relationships between blood relatives. Detailed studies of a number of species of macaques, baboons and chimpanzees have revealed the crucial importance of matrifocal relationships (e.g. Sade 1965, 1972*a*, 1972*b*; Yamada 1963; Kawai 1965). Apart from those species in which male, female and offspring travel about as a nuclear family (e.g. Mason 1973), the importance of blood relationships in other species has been little investigated.

3. Principles concerned with status. In considering relationships the concept of status is useful in describing (or explaining) consistency in the direction of complementary interactions within a relationship (see above and Hinde in press *c*). In considering social structure it is useful in a slightly different way—namely for describing (or explaining) patterning in the nature or quality of relationships. The classical dominance hierarchy is well known—A can peck B and all below him, B can peck C and all below him, and so on down to the Z individual who can peck no-one. Often there are triangular relationships, such that A can peck B, C, and D, B can peck C, C can peck D, but D can peck B.

Now if that were all, the dominance/subordinance concept would be of little more than descriptive value, useful only for describing the patterning of the (agonistic) relations between individuals. It becomes of greater explanatory usefulness when a number of different characters of behaviour are correlated with each

other. For instance Simpson (1973*a*) has shown that the length of grooming bouts between adult male chimpanzees in a community in the Gombe Stream National Park in Tanzania is related to the participants' absolute and relative dominance ranks as assessed from agonistic interactions.

In non-human primates, dominance based on agonistic interactions is the most usual form of status, though it is by no means always correlated with the amount or direction of other forms of interaction (e.g. Bernstein 1970; Hinde 1974). However, whilst dominance is assessed from agonistic interactions, dominance and aggression are not to be confused: dominance/subordinance refers to patterning in the interactions between two individuals, not to the absolute amount of aggressive behaviour that they show. Indeed a dominance/subordinance relationship implies that aggression is reduced or absent, and agonistic interactions between two individuals are usually the less frequent, the greater the difference in dominance between them (Bernstein 1970). Furthermore the hierarchy is often maintained by the avoidance behaviour of the subordinates as much as by the overt aggression of the dominants (Rowell 1966).

Furthermore agonistic dominance is not the only form of status. Bygott (1974) found that age was a more accurate predictor of some measures of grooming between adult male chimpanzees than was agonistic dominance. Human societies, of course, may involve the interdigitation of many different hierarchies.

4. Principles related to institutions. The special status of institutions in this conceptual scheme will be considered later.

Each of these sets of principles may be hierarchically organised, so that high level principles of wide applicability (e.g. that concerned with the existence of dominance/subordinance) are modified by lower level principles (e.g. that concerned with the difference between relationships involving individuals close together and far apart in the hierarchy). The principles can be regarded as akin to natural laws, describing the forces at work.

The surface structure is to be regarded as an expression of the interactions between these organisational principles. For example the (surface) structure of the relationships between the triad A, B, C may be an expression of the facts that A and B are adult males and C is an adult female, A and C have the same mother but B does not, and the dominance ranks are in the order A, C, B. Thus to understand structure we must deduce principles of organisation, and also discover how those principles interact. Only in rare artificial instances, such as a group containing three-year-old males all initially strangers to each other, will one set of principles (dominance/subordinance) find relatively pure expression. As an example of the situation in natural troops, in Japanese macaques the matrifocal families may form a dominance hierarchy with all members of one being dominant to all members of the next (e.g. Kawai 1958; Kawamura 1958). In rhesus monkeys and in Japanese macaques the rank of daughters is often determined (and that of sons sometimes influenced) by that of their mother, and younger daughters come to rank above their elder sisters when about three to four years old (Sade 1972*a*).

Institutions demand special attention here as the concept has a dual role. On the one hand, in so far as institutions represent a sought-after pattern of relationships, a goal of one or more of the participants, institutions have the same status as organisational principles: just like dominance/subordinance, blood relationships,

and age/sex class relationships they provide insight into the causal mechanisms that shape the actual pattern of relationships (i.e. the surface structure) that we observe. But at the same time, as we move from the study of particular instances of human groups, and through successive levels of abstraction search for common features, the best *general* description we can find may well be the sought-after institution (or set of institutions). Thus the concept of institution appears both as a causative principle expressed in the structure observed, and as an abstraction. Although the processes of abstraction from surface structure to structure generalisable across instances, and the processes of searching for principles (deep structure, see above) by which structure (or surface structure) can be understood, are orthogonal to each other, they may lead to related end points in the study of institutions. For this reason 'institution' is shown by both symbols in fig. 1.

The relationships between institutions and the other principles discussed are diverse. Thus institutions may be based on the organisational principles found in non-human societies: those of marriage and of some all-male groups (Tiger 1969) are perhaps examples. Or they may depart more or less radically from them: systems of sociological kinship do not necessarily follow biological blood relationships (Fox 1972; Leach 1966). Or institutions may cut across the principles of organisation we have just been discussing—a commercial concern may employ adult males and females as well as adolescents; some (perhaps the directors) may be by preference blood relatives but most, perhaps by order of the directors, are not; and few of the adults are married. In such cases the principles of organisation of the institution may conflict with the others—marriage may be discouraged, and the adolescents segregated in different departments to discourage interaction amongst them. The surface structure observed (i.e. the nature, quality and patterning of the relationships) will be an expression of these principles (including interactions between principles) whose precise form is affected by the material available and by environmental constraints.

Longer-term stability

The principles discussed so far have been concerned with the patterning of relationships over a relatively limited time span. Longer term stability of structure requires further consideration. Stability of structure may be maintained in spite of environmental changes which produce temporary changes in the pattern of relationships (e.g. Bernstein 1969; Durham 1971; Crook 1966; Wrangham 1974; Aldrich-Blake *et al.* 1971); and in spite of chance fluctuations in the sex ratio (Rowell 1972). Furthermore it survives the birth and death of individuals and cyclic changes in troop composition, as described earlier.

In the first place, this implies that the troop provides an environment for the growing young such that they develop into individuals which form relationships similar to those formed by their elders. Recent studies showing how dramatically social behaviour can be affected by the early social environment (e.g. Sackett 1968; Harlow & Harlow 1969) indicate that the balance between the various developmental forces necessary to achieve this may be a delicate one. Furthermore the behavioural development of individuals, although to some extent susceptible to social influences, must also be to some extent buffered against their effects: social influences cannot be so great that social experience within the range of the species

norm produces a propensity to form a pattern of relationships that is outside the species norm.

In non-human species pressures towards conformity to the species norm must be exerted in the absence of verbal precepts, but in man verbal language and institutions provide the processes of socialisation with overtly recognised goals. In spite of this, the social structures of human groups tend to change with time.

This must mean that the mechanisms promoting stability are not fully effective, and are over-ridden by mechanisms promoting change. Change could arise by:

1. Extrinsically caused environmental changes, including climatic and ecological changes. In the short-term these are compensated by the buffering mechanisms referred to above. In the long term they have produced changes in the social structure of non-human species through the agency of natural selection acting on individuals.

2. Intrinsic changes in social structure independent of environmental change. Whether such changes ever arise 'spontaneously' in a previously stable social structure would seem to be a matter of how stable is defined.

3. Intrinsically caused environmental changes, including the depletion of food resources, agriculture, etc. In animals this is at least rare, in part because the reproductive potential of each resource is usually sufficient to permit recovery from the level at which it ceases to be used as an economic source. In man it has been and is of frequent occurrence. It seems likely that changes in social structure initiated in this way involve positive feed-back, a relatively small initial deviation resulting in increased divergence either directly or as a consequence of further environmental change engendered by the initial social change (Buckley 1967).

V

Some reflections on the approach

It will be apparent that the conceptual framework proposed here for studies of non-human primates bears many similarities to those used by some social anthropologists. For example, Fortes (1949) studying the Ashanti, proceeded by first abstracting from concrete reality (i.e. 'the complicated skein of behaviour, feelings, beliefs, etc., that constitute the tissue of actual social life'), and then seeking to account for the resulting structure in terms of principles (concerned with kinship, economic relations, etc.) that had general validity in the society. Lévi-Strauss (1953), citing Fortes, referred to such principles in terms of models, and stipulated that they should consist of a number of interdependent parts and be susceptible to ordered series of transformations resulting in a group of models of the same type: these properties would make it possible to predict how the model would react if one or more of its elements were modified.

We must, however, return briefly to the terminological issue. Fortes (1949) used the term 'structure' not for empirical reality, but for something derived from it. '. . . structure is not immediately visible in the "concrete reality". It is discovered by comparison, induction and analysis based on a sample of actual social happenings in which the institution, organisation, usage etc. with which we are concerned appears in a variety of contexts' (1949:56). Thus for Fortes, structure is reached after a process of normalisation. Lévi-Strauss (1953) goes even further, stating

categorically that 'The term "social structure" has nothing to do with empirical reality but with models which are built up after it.' One trouble is that, if structure is reserved for something one or more stages removed from reality, then what term can be used to describe the empirical facts? Many writers in fact use structure loosely, or, in attempting to be precise, are forced into such clumsinesses as 'Social structure in practical situations (as contrasted with the sociologist's abstract model) . . .' (Leach 1954:4). The procedure followed here, therefore, has been to use 'surface structure' for the empirical instance; 'structure' for that which we reach by abstraction, normalisation or averaging from a number of instances, and which can be described in the same language as the empirical instance; and deep structure or 'organisational principle' when moving to the sphere of explanation.

The importance of maintaining a sharp distinction between the procedures of abstraction and generalisation on the one hand, and the search for causal principles on the other, cannot be too strongly emphasised. When 'institution' is used to describe the results of abstraction from empirical instances, it is to be regarded as in the data language. When 'institution' is used to describe a sought-after pattern of relationships it is part of the language of explanatory principles. Some of the controversy surrounding the use of models in anthropology seems to turn on these two facets of the concept of 'institution', and is revealed in the hesitation with which 'institutions' are ascribed a causative or merely descriptive role.

A related point concerns the level of generality of the organisational principles. We could seek for these at any level of abstraction from the surface structure of the empirical instance to those of more generalised structures. Thus it is open to us to be satisfied with principles from which the structures to be found in a particular species in a particular environment can be derived: these principles will comprehend the nature of the environment. Or we can seek for principles of wider generality, from which we can predict structures in diverse environments: these will still comprehend the nature of the species. Or, at an even more remote level of abstraction, we can seek for principles which comprehend the properties common to social structure in (say) all Cercopithecines but are expressed differently in different Cercopithecine species and in different environments. In general, the more abstract the principle, the more empirical facts is it relevant to, and the less precisely does it predict them (i.e. the more additional factors must be considered). On this view, then, a further difference in orientation between social scientists who see structure as either related to or nothing to do with empirical reality (cf. Schneider 1965) lies in the level of generalisation. On the present view, progress from the level of empirical reality to an adequate level of generalisation, and thence to the specification of organisational principles, demands a succession of stages, and it is at least an open issue how far the latter can be reached directly by 'inspired guesswork' (Leach 1966).

VI

The comparative study of animal and human groups

In the preceding section a crucial difference between the structure of animal and human societies emerged. The principles emerging from the study of animal groups relate fairly directly to the way in which individuals behave. They interact

with each other according to their nature, and form relationships that develop in their own ways, but the manner in which they do so is not, so far as we know, guided by rules or directed towards communally accepted ideals. The regularities of structure that we observed are statistical regularities, consequent upon similarities in the relationships individuals form. This does not necessarily mean that the cultural transmission of structural norms is totally absent in non-human forms: a macaque male will have seen older individuals behaving as peripheral and dominant individuals, and it is an open issue how far he may use them as models. But the institutions which play so large a part in shaping human societies depend on verbal language, and must be absent from non-human forms. The latter receive no verbal instructions on how to behave, or on the successive positions in society they are likely to occupy, nor on abstract sub-groups with specific codes that they may one day enter. While the structures of human societies depend in large part on shared beliefs, norms and institutions, those of non-human societies must depend fairly immediately on the behaviour brought forth in individuals by the immediate social situation. That monkeys and apes do not seek for relationships whose characteristics have been verbally defined must be a major factor limiting the complexity of their social structure.

However these differences between the structures of non-human and human groups do not mean that the former are of no relevance for understanding the latter. For one thing, every human institution is a product of, and must be compatible with, human nature: to some extent, therefore, they may involve the reification of some out of a number of possible patterns of relationships understandable in terms of other principles. For another, in so far as human institutions constrain human behaviour, the structure of human groups must be a product of both specifically human institutions and of forces similar to those that determine the regularities in non-human species. To teaze apart the two in studies of human groups might well be impossible, and one cannot form human groups with no heritage of verbal tradition (cf. Golding 1954) for comparison. But perhaps here the differences between non-human primates and man can be exploited. A comparative approach between man and non-man, in which the *differences* between human and animal groups were used to throw light on aspects that are peculiar to the former, may well be fertile.

Indeed a comparative approach may well prove useful in resolving a particular current dilemma. Human social structures can be viewed as the product of enduring relationships, organisations and institutions which constrain individual behaviour; or as the outcome of the behaviour of individuals who create the social world about them (Lévi-Strauss 1953; Garbett 1970). The former structural view involves a high degree of abstraction from the real-life data, but provides a procedure for viewing societies as unities of interdependent parts and processes according to principles of wide validity (Fortes 1953). The latter approach starts from the individual, seeking for statements about the manner in which he manages his relationships (e.g. Barth 1966), and attempting to map the relationships in which he is involved (Barnes 1972).

The differences and relationships between these approaches have been discussed by Mitchell (1969) and Garbett (1970). Both clearly have validity: human behaviour is constrained by human institutions but at the same time displays regularities that

are not the product of institutions that are common between societies. Among non-human primates institutions are either non-existent or vastly less important than organisational principles depending on regularities in the behaviour of individuals. Thus the non-human primate group provides a situation where the one approach has at least much more validity than the other. Non-human primates may throw light on human social structure not so much because they resemble man, but because they lack his most special attributes.

The validity of Lévi-Strauss's (1963) insistence that neither the origin nor the persistence of social constraints can be explained as the effects of impulses or emotions which appear again and again over centuries or millennia in different individuals, but that they can be found in recurring properties of the human intellect, depends on the aspects of social structure under examination. Most aspects of empirical structure depend on both, and the social scientist must seek principles of organisation related to both. That principles related to the intellect are the more important and the more complex in man must not blind us to the fact that the observed structure is a consequence of principles related to both. In considering structure, to limit discussion to 'relationships between actors in their capacity of playing roles relative to one another' (Parsons 1951; Nadel 1957), where playing roles refers to the occupancy of a particular position in the society, is to consider only part of the whole, and to seek for principles whose pure expression is always confounded by that of others.

VII

Conclusion

The conceptual framework presented here involves three levels—interactions, relationships, and group structure. Each level involves patterning of items in the level below it, and qualities that result from that patterning. At each level it is necessary both to seek for successive abstractions which have increasing degrees of generality but are increasingly remote from the empirical data; and also to seek for principles of organisation to explain the patterning. The scheme is illustrated in fig. 1, but that figure is not to be taken too rigidly: for instance, the number of stages of abstraction will vary with the task in hand.

The conceptual framework presented here is by intention flexible: it is hoped that it will serve to accommodate studies of diverse non-human species and to relate them to studies of man himself. Even more, it is hoped that it will help to pinpoint where the problems lie, and where more data or more conceptual clarity are needed. For example, the question of how 'qualities' of interactions and of relationships can be studied objectively has so far been little discussed. Many qualities are multi-dimensional (e.g. affection, Hinde 1972), but can be studied quantitatively in at least some aspects (e.g. how far the behaviour of the two interactants 'mesh'; Hinde & Simpson 1975). As another example, primatologists have so far given little consideration to the problem of how to move from data on specific instances to generalisations of wider applicability. Again, the nature of the organisational principles necessary for understanding the patterning of interactions within relationships, and of relationships within structures, have been merely hinted at here: much work will be necessary to work them out in detail. The study of social behaviour in non-human primates is at an exciting stage, and it is to be hoped that

the present scheme will both accelerate and be modified by the accumulation of new facts.

NOTES

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[1] Institution is used in this article to refer to sets of one or more recognised positions in a society which constrain the behaviour of the incumbents, and thus covers unique positions (e.g. the king), recognised relationships (e.g. marriage) and large-scale systems (e.g. the National Health Service). In that the common feature is one or more positions with recognised rights and duties, it is linked to the concept of role. The usage approximates to that of Parsons (1951). An institutionalised relationship is thus one in which the participants have recognised rights and duties.

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