Summary

In the first place I have reviewed the true foundation of Einstein's theory of general relativity, the so-called *principle of equivalence*, according to which there is no essential difference between "genuine" gravitation and inertial forces, well known from accelerated vehicles. By means of a comparison with Gaussian geometry of curved surfaces—the background of Riemannian geometry, the tool used by Einstein for the mathematical formulation of his theory—it is made clear that this principle is incompatible with the idea proposed by Mach and accepted by Einstein as an incitement to his attempt to describe the main situation in the universe as an analogy in three dimensions to the closed surface of a sphere. In the later attempts toward a mathematical description of the universe, where Einstein's cosmology was adapted to the discovery by Hubble that its observed part is expanding, the so-called cosmological postulate has been used as a kind of axiomatic background which, when analyzed, makes it probable that this expansion is shared by a very big, but still bounded system. This implies that our expanding metagalaxy is probably just one of a type of stellar objects in different phases of evolution, some expanding and some contracting. Some attempts toward the description of this evolution are sketched in the article with the hope that further investigation, theoretical and observational, may lead to an interesting advance in this part of astrophysics.

References and Notes

1. G. de Vaucouleurs, *Science* **167**, 1203 (1970).
2. O. Klein, *Soc. Roy. Sci. Liège Ser. 4*, **13**, No. 3, 42 (1953); *Inst. Int. Phys. Solvay Cons. Phys.*, **11**, 33 (1958); *Einige Probleme der allgemeinen Relativitätstheorie, Werner Heisenberg und die Physik unserer Zeit* (Vieweg et Sohn, Braunschweig, 1961), p. 58; "Mach's principle and cosmology in their relation to general relativity," in *Recent Developments in General Relativity* (Pergamon Press, New York, (1962), p. 293; "Some general aspects of Einstein's theory of relativity," *Astrophysica Norvegica* (1964), p. 161; "Boundary conditions and general relativity," in *Preludes in Theoretical Physics in Honor of V. F. Weisskopf* (North-Holland, Amsterdam, 1966), p. 23; *Nature* **211**, 1337 (1966); *Ark. Fysik* **39**, 157 (1969).
3. A. Einstein, *Ann. Phys. Ser. 4* **35**, 898 (1911).
4. ———, *ibid.*, **49**, 796 (1916).
5. ———, "Kosmologische Betrachtungen zur allgemeinen Relativitätstheorie," Sitzungsberichte der Preussichen Akademie der Wissenschaften, 1917.
6. ———, *The Meaning of Relativity* (Princeton Univ. Press, Princeton, N.J., 1921), quotation from ed. 3, Princeton Univ. Press, 1950.
7. H. Thirring, *Phys. Z.* **17**, 33 (1918).
8. Z. Horák *Bull. Astron. Inst. Czechoslovakia* **21**, 96 (1970).
9. H. Bondi, *Cosmology* (Cambridge Univ. Press, London, 1952).
10. H. Alfvén and O. Klein, *Ark. Fysik* **23**, 187 (1963); H. Alfvén, *Rev. Mod. Phys.* **17**, 652 (1965).
11. B. Laurent and L. Söderholm, *Astron. Astrophys.* **3**, 197 (1967).
12. B. Bonnevier, *Ark. Fysik* **27**, 305 (1965).

Interpersonal and Economic Resources

Their structure and differential properties offer new insight into problems of modern society.

Uriel G. Foa

Man doth not live by bread only.
DEUTERONOMY 8 : 3

Human needs are seldom satisfied in solitude; because people depend on one another for the material and psychological resources necessary to their well-being, they associate to exchange these resources through interpersonal behavior. In the study of these exchanges there has been a traditional division of tasks. Economists have long been concerned with the exchange of money with goods, and, more recently, with labor and with information, while psychologists and sociologists (*1*) have investigated transactions that involve more subtle resources, such as attraction, devotion and affect, esteem, respect, and status. This professional specialization does not, however, obviate the fact that the same behavior is often influenced by both economic and noneconomic factors: one may, for example, prefer a less paid but prestigious job to another where salary is higher but status is lower; and a small shop may attract customers by giving them the individual attention they miss at the less expensive but more impersonal department store. In view of this interplay of economic and noneconomic resources in the conduct of human affairs, it appears unrealistic to expect that social problems will be solved by material means alone. ". . . There are no 'economic' problems; there are simply problems and they are complex," observes Myrdal (*2*) in discussing international development. Closer to home one can see model housing projects built a few years ago turning into model slums, possibly because their dwellers were provided with houses, but not with self-pride and a sense of community.

Attempts to bridge the dichotomy between economic and noneconomic resources came mainly from sociologists and social psychologists (*3*) who sought to interpret every interpersonal behavior as an exchange, characterized by profit and loss. Extension of the economic model to noneconomic resources, however, produced difficulties for the social exchange theory. The fact, for instance, that resources like information and love can be given to others without reducing the amount possessed by the giver has been considered contradictory to the very notion of exchange (*4*) since this effect does not occur in transactions of money and goods. Likewise it makes little sense to consider economic transactions of a person with himself; one can, on

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Table 1. Percentage frequency distribution of resource returned as being most similar to resource received. With a few exceptions, the highest frequencies in each row or column are in the two cells bordering the main diagonal. Frequencies in the cells two steps removed from the diagonal are lower and the lowest frequency is in the cell which is three steps removed, and thus most distant from the diagonal.

Resource received	Resource returned					
	Love	Status	Information	Money	Goods	Services
Love		65	10	0	2	23
Status	62		20	10	3	5
Information	17	34		11	24	14
Money	0	16	8		60	16
Goods	6	5	21	55		13
Services	41	18	7	16	18	

the other hand, express self-esteem or give information to himself by exploratory behavior. If, as these examples suggest, different resources follow distinct rules of exchange, how can they be reconciled within the same conceptual framework? A way out of this dilemma is to develop a theory that will reveal order in this diversity. In this article I review part of the research recently directed toward this goal and discuss some of its applications to social problems.

Classification of Resources

A first step in the search for order among various exchange rules is to devise a classification system which will group and distinguish resources in a manner that reflects similarities and differences in the behaviors associated with them. In order to achieve this purpose the classification should be based on those resource attributes which account for behavioral variance so that similarity of attributes correspond to similarity of behavior. If such a classification system can be found, it will then be possible to predict which resources share more similar rules and to anticipate conditions under which certain resources will be valued and exchanged and what exchanges will not take place.

This article will propose a classification system based on two coordinates of resource characterization: concreteness versus symbolism and particularism versus universalism. By classifying resources on the basis of these two attributes it is suggested that the resulting spatial location will provide a parsimonious framework for the beginnings of a theory of resource exchange.

Observation of interpersonal behavior shows that it varies from concrete to symbolic. Some behaviors, like giving an object or performing an activity upon the body or the belongings of another individual, are quite concrete. Some others are more symbolic: language, posture of the body, a smile, gesture, or facial expression (*5*). Another characteristic on which resources differ is the significance of the person who provides the resource. Changing the bank teller will not make much of a difference for the client wishing to cash a check. A change of doctor or lawyer is less likely to be accepted with indifference. One is even more particularistic with regard to a friend, a spouse, or a mother. Harlow (*6*) showed that when the facial features of a surrogate mother are altered, the baby monkey reacts with fear, refusing to accept the change. In some animal species certain communications are more target specific than others. Mating calls are more particularistic than status signals and the latter are less general than distress or alarm signals (*7*).

In order to facilitate plotting interpersonal resources on the two coordinates, I first grouped them into six types (*8*): love, status, information, money, goods, and services. "Love" is defined as an expression of affectionate regard, warmth, or comfort; "status" is an expression of evaluative judgment which conveys high or low prestige, regard, or esteem; "information" includes advice, opinions, instruction, or enlightenment, but excludes those behaviors which could be classed as love or status; "money" is any coin, currency, or token which has some standard unit of exchange value; "goods" are tangible products, objects, or materials; and "services" involve activities on the body or belongings of a person which often constitute labor for another.

Each of the six resource types can be classified on the basis of the two coordinates suggested: concrete-symbolic and particularistic-universal. On the first coordinate, concreteness, services, and goods involve the exchange of some overtly tangible activity or product and are classed as concrete. Status and information, on the other hand, are typically conveyed by verbal or paralinguistic behaviors and are thus more symbolic. Love and money are exchanged in both concrete and symbolic forms, and thus occupy intermediate positions on this coordinate.

The positions of love and money are extreme and opposite on the particularistic coordinate. It matters a great deal from whom we receive love since its reinforcing effectiveness is closely tied to the stimulus person. Money, on the other hand, is the least particularistic resource, since, of all resources, it is most likely to retain the same value regardless of the relation between, or characteristics of, the reinforcing agent and recipient. Services and status are less particularistic than love, but more particularistic than goods and information.

The position of the six resource classes plotted on the two coordinates is shown in Fig. 1. For simplicity's sake these six classes of resources have been represented by discrete points. It is more accurate to consider each class as occupying a range in the order, so that some of its elements will be nearer to one of the two neighboring classes than to the other. A verbal expression of love such as "I like you very much" is symbolic and thus is more similar to status than to services. Conversely, fondling and kissing are concrete ways of expressing affection, closer to services than to status. Services to the body are proximal to love, while services to one's belongings are nearer to goods. Likewise consumption goods are closer to services than durable goods. A credit card can be considered a kind of money, but it is more particularistic than currency; not every merchant will honor a credit card, and the card is not issued to everybody. This form of payment is also more symbolic than currency; although nothing concrete is given in a credit card payment, currency actually changes hands. Thus a credit card will be nearer to information than currency. In fact, the card provides information on the solvency of its holder.

Empirical Evidence

The value of the proposed theoretical structure depends on the possibility of deriving meaningful empirical predictions from it. It is hypothesized here that resources proximal to one another in the structure will be responded to more similarily than distal ones. In particular, it is predicted that resources proximal in the order will (i) be perceived as more similar, (ii) be more substitutable for one another, and (iii) elicit similar resources in social exchange. These hypotheses were tested in a number of studies (*9*) which will be briefly described.

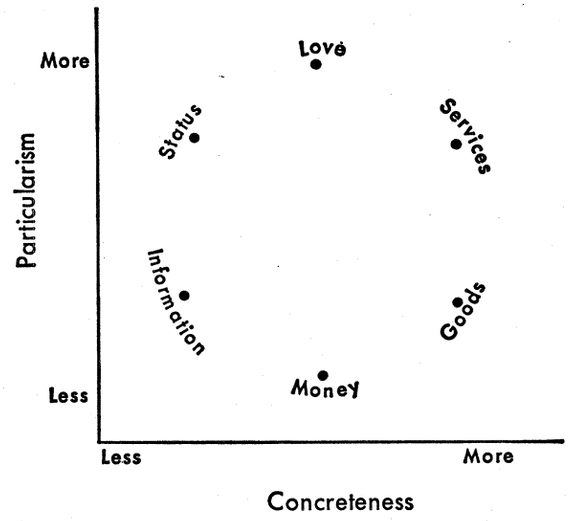

Fig. 1. Position of the six resource classes plotted on the two coordinates of particularism and concreteness. The resources follow an approximate circular order so that each class has two neighbors, one on each side. The order shows the relative proximity of any two resources. Love, for example, is near to services and status and most distal from money. Information is a neighbor of status and money and is most distant from services.

Homogeneity of classes. The first question to be answered was whether our classification of resources into six classes was used by naive subjects when given the task of categorizing them. Each of 11 subjects was provided with a deck of 18 cards. This deck contained three representative messages for each of the six resource classes, one message to each card (*10*). Subjects were told to sort the 18 cards into as many different categories as they thought appropriate. Only one subject used more than six categories in performing this task. Several subjects initially used less than six categories. In each case this was a result of combining messages from neighboring resources into the same category. The most common tendency was to use six categories of unequal numbers of cards. Here again it was always neighboring resources that were combined. The most common "error" was to combine love with status and/or goods with money. When further instructed to sort the cards into six different categories of three cards each, there was substantial agreement across subjects that each triplet of messages belonged to the same distinctive class.

Similarity and substitution. The same message cards were later used in another group of 37 subjects. This group received, in succession, a series of messages and were asked to return, from the messages available to them, the one most similar as well as the one most dissimilar to the message just received. In the deck of messages provided to the subject, all classes were represented except the one to which the message received belonged, so that he was denied the option of returning a message from the same class. The hypothesis was, of course, that he would be more likely to substitute for the missing class a proximal rather than a distal one. The frequency distribution of responses ably supported this prediction (see Table 1). When the instructions were to choose the most dissimilar resource the same order was obtained, but the size of frequencies was reversed as expected; the highest frequency occurred in the cell three steps removed from the diagonal with a decrease as one approached the diagonal from either direction.

Exchange. In another study 160 subjects were presented with six hypothetical situations in which they had given a certain resource to a friend and were instructed to indicate what they would prefer to receive in return (*11*). It was found that for each resource given there was one resource which was most frequently chosen in exchange, while the frequency of choosing other resources was directly related to their proximity to the most preferred one. Thus these results, like those of the previous study, support the proposed order. Nevertheless, switching from perceived similarity among resources to an exchange situation between friends had some interesting effects. In an exchange the most preferred resource is not necessarily identical with the one given; for instance, when one had given goods his highest preference was to receive love in return. Goods given to a friend are called "gifts" in plain English, and the donor expects affection in exchange. In a different social institution, such as trade, the suitable remuneration for goods would be money, hence the appropriate type of exchange is determined by the institution. At the same time, the social institution imposes certain constraints on the frequency of using certain resources. Love is unlikely to be in great demand in the stock exchange. Money, on the other hand, is shunned among friends; indeed the frequency of money was almost always the lowest in this study, regardless of the resource given. Thus each social institution appears to be characterized both by specific exchange patterns and by a typical profile of the overall frequencies of the resources exchanged. The profile obtained for friendship, regardless of the resource given, is shown in Fig. 2.

This study was replicated, with minor modifications and practically identical results, in another group of 120 subjects (*12*). Preference scores were intercorrelated to find out whether resources closer in the order would elicit more similar responses. As expected, the correlation was higher the more proximal the resources. More important, this intercorrelation pattern remained invariant for different exchange situations, that is, when the resource given by the subject or the resource desired by him varied (see Table 2 for an example).

Exchange in frustration-aggression. The generality of the order was considerably extended as a result of another experiment (*13*) which differed from the previous study in two respects: (i) it involved exchange of aggression, rather than exchange of giving; and (ii) it dealt with overt behavior rather than with verbal responses. A total of 90 subjects were randomly assigned to six experimental

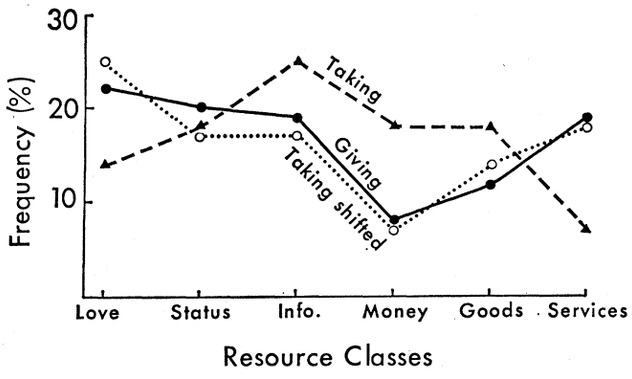

Fig. 2. Total percentage of choice for each resource class regardless of the preceding resource stimulus, for the behavior of "giving" between friends (solid line) and for the behavior of "taking away" in frustration-aggression (broken line). Although their peak frequencies are on different resources, both profiles rise and/or drop gradually following the circular order. The similarity of the two profiles becomes clear when the profile for taking is shifted two positions to the left (dotted line) so that the most chosen resource for aggression (information) is made to coincide with the most preferred resource for giving (love).

groups, 15 subjects to each condition. The subject was first frustrated by another subject (actually a confederate of the experimenter) while working with him at a joint, block-building task. The frustration consisted of taking away a given resource, different for each group. In one group the confederate expressed distaste for having to work with the subject (taking away of love); in another group the confederate criticized the performance of the subject (taking away status); in a third one the subject was given misleading suggestions for performing the task (taking away information). In other situations the confederate arbitrarily appropriated most of the money or goods that he was supposed to share equally with the subject. In the "taking away services" condition the subject was administered electric shock by the confederate. After having been so frustrated the subject was given an opportunity to aggress toward the confederate, ostensibly in the context of another experiment. Two alternative forms of aggression were made available to each subject—he could take away either the resource previously found (see Table 1) to be most similar to the one employed in frustrating him, or the resource most distal from it. As predicted by the order, most subjects chose the proximal class over the distal one (see Table 3). The overall frequency of aggression resources, regardless of the resource employed in frustration (*14*), again followed the order (see Fig. 2). Since the order is valid for exchanges of aggressive behavior as well as for positive ones, it appears justified and parsimonious to consider the frustration-aggression sequence as an exchange in which resources are reciprocally taken away rather than given.

The studies reviewed have provided strong empirical support for the theoretical order of resource classes on a two-dimensional space; it has been shown, over a fairly wide range of situations, that proximal resources elicit similar responses, so that behavioral similarity is a direct function of structural proximity. Extension of this relationship to rules of exchange suggests that the closer two resource classes are, the more similar will be their rules. Thus rules for economic exchange are only one set of rules, covering one subset of resources. Different rules may exist for the exchange of other resources. Six such rules, which differ for various resources, will be discussed next.

Order-Related Properties of Resources

Six exchange properties have been identified and related to the position of the resources in their space. These properties may well provide an explanation for the value that each resource takes on the particularistic-universalistic dimension. Indeed, love and money, the two classes at opposite poles of this dimension, appear to differ most with regard to these properties; stating the values that love and money assume on each property will therefore be sufficient to provide an approximate idea of the values appropriate to other resources as well. Services and status will be more similar to love than to money, while the contrary will hold for information and goods. Differences, within each pair of classes, on the concreteness dimension will not be discussed here. The first two properties refer to exchange outcomes, while the others deal with environmental conditions which enhance or hinder particular exchanges.

Relationship between self and other. The relationship between giving the resource to the other and giving it to self is positive for love but decreases and becomes negative as one moves from love toward money, its opposite in the order. This prediction is related to the intuitive notion that the ability to love others requires self-acceptance and is supported by the repeated finding of a positive relationship between giving love to self and to others (*15*). Quite the opposite is true with regard to money, since one person's gain is another's loss. In consequence, an exchange of money can be a zero-sum game, while an exchange of love cannot.

Relationship between giving and taking. In love there is usually a certain degree of ambivalence even in normal individuals; giving love does not exclude the concurrent presence of some hostility, or the taking away of love (*15*). However, giving and taking away money are unlikely to occur in the same act.

Relationship between interpersonal situation and exchange. Money does not require an interpersonal relationship in order to be transmitted or kept for future exchanges, and it can conveniently be sent through a third person. Love, on the other hand, can hardly be separated from the interpersonal situation, kept for a long time in the absence of actual exchange, or transmitted by an intermediary without incurring loss.

Time for processing input. Giving and receiving love cannot be done in a hurry; it requires time. Money, to the contrary, can change hands very rapidly.

Delay of reward. Love is a relatively long-term investment, with rewards being reaped only after several encounters; a friendship needs to be "cultivated" so that trust (that is, expectation that the exchange will be completed) is a necessary condition. On the other hand, an exchange of money with another resource can be completed in a single encounter.

Optimum group size. It has been noted that in animal species living in groups, such as monkeys and apes, there is an optimum group size, presumably related to the input processing capacity of the species. When this size is exceeded, behavior disruptive to group life seems to increase (*16*). In the human species the optimum group size for an orderly exchange of resources may vary with the resource class, being smallest for love and largest for money. Indeed, Nye *et al.* (*17*) reported a decrease in affective exchanges among members of nuclear families when the number of children increased beyond two. Similar findings regarding services, a neighbor of the love class, were described by Latané and Darley (*18*). While investigating helping behavior in emergency situations, they found that the larger the number of bystanders, the less likely it is for any one of them to intervene and help. On the other hand, large groups meet for trade in a stock or commodities exchange and access to a large market is considered advantageous by businessmen.

The relationship between order and properties of resource classes may originate in the sequence of cognitive development of these classes during socialization; the characteristics of each resource indeed appear to reflect the conditions which existed when it became a distinct cognitive class (*8*). Love develops early, in the small and relatively permanent family group, before the "self-other" and "giving-taking" differentiations have become firmly established. Money, on the other hand, acquires its meaning much later, after one has learned that "self" is not "other" and "giving" is not "taking," and from the beginning it is used mostly for exchanges outside the family. Thus resources are best exchanged in conditions that resemble those under which they had been learned in the past.

After having presented an ordered classification of resources, which was empirically validated, and after discussing differential rules and environmental conditions for exchanging the various resources, I shall give some illustration as to how resource theory explains behavioral patterns, which are otherwise less understandable. In particular, I turn now to examine how urbanization results in deprivation of certain resources and to discuss its effects on social functioning.

Influence of Urban Environment on Exchange

The aspects of resource theory developed in this article may be useful in understanding the effects of urbanization upon human behavior. Three properties of resources—time required for processing inputs, delay of reward, and optimal group size—converge in making the urban environment more suitable to the exchange of universalistic resources than of particularistic ones. Milgram (*19*) proposed that reducing the time allocated to each input is an adaptive response to the overload of interpersonal stimuli which characterizes an urban center. If the processing of input requires more time for love than for less particularistic resources, it follows that, in the city, love will be curtailed more than the latter resources. In an urban setting many interpersonal contacts occur only once, while love, unlike money, requires at least several encounters to be exchanged. Finally, if optimum group size is smaller for love than for money, the large metropolitan crowds will again favor universalistic exchanges over personalistic ones (*20, 21*).

A consequence of the selective influence of urban society on exchange is the facilitation of antisocial or asocial behavior. Particularistic resources, especially status, are powerful instruments for social control; a person who misbehaves is likely to lose status in the community long before he runs into conflict with the law and meets its less particularistic forms of punishment. The relative scarcity of particularistic exchanges in the city deprives society of informal means for social control so that individuals tend to behave less responsibly in the metropolis (*21*). The difficulties posed by an urban environment to particularistic exchanges will also result in isolation and alienation since the feeling of belonging is provided by love, the resource with the highest positive relationship between self and other.

These difficulties are further compounded in modern American society by the tendency of its social institutions to specialize in a narrow range of resources, thus excluding the exchange of particularistic resources from several institutions, even when environmental conditions are favorable. Cultural norms are quite specific with regard to the resources which may be used in a given institution. These norms, as previously noted, are reflected in the institutional frequency distribution of resources (see Fig. 2). Institutional specialization is less pronounced in traditional cultures, so that the profiles of their institutions are more similar to

Table 2. Intercorrelation among preferences for receiving goods from a friend in return for different resources given to him. For any two resources, coefficients tend to be higher the nearer they are in the order. Decimal points are omitted.

Resource given	Love	Status	Information	Money	Goods	Services
Love		67	53	42	45	49
Status	67		74	52	42	45
Information	53	74		69	55	54
Money	42	52	69		65	61
Goods	45	42	55	65		77
Services	49	45	54	61	77	

Table 3. Frequency of choice between two resources of aggression for each given resource of frustration. In general, subjects chose to aggress by taking away a resource proximal to the one of which they were deprived in frustration, more than a distal one. Significance by binomial test varies between 0.018 and 0.000, except for the last row which is significant against the hypothesis.

Resource administered in frustration	Number of subjects choosing resource of aggression for and against hypothesis			
	For		Against	
Love	Status	11	Money	4
Status	Love	11	Goods	4
Information	Status	12	Services	3
Money	Goods	13	Love	2
Goods	Money	13	Status	2
Services	Love	4	Information	11

one another than in American society. More precisely, exchange of particularistic resources tends, in our society, to be restricted to fewer institutions than in traditional cultures. Discussing personal problems with the boss, for example, is customary for a Thai worker, but not for an American one. It has been shown that these cross-cultural differences can be reduced by training American subjects to behave in a manner appropriate to a traditional culture by a more liberal use of love and status (*22*). Increasing particularistic exchanges is also the goal of various forms of sensitivity training and encounter marathons, particularly those stressing nonverbal communication. Thus, while in traditional cultures opportunity for particularistic exchanges is offered by less institutional specialization, in our society, in line with its strong institutional differentiation, special institutions for these exchanges are set up.

The importance of adequate provision of resources for the social functioning of the individual has become painfully apparent only recently in America, as changes in the social environment have created conditions which are unfavorable to particularistic exchanges. In the same way as with physical environment, we have begun to recognize indispensable features of the social environment only after they had been altered in the wake of technological change.

Deprivation and Social Functioning

Evidence indicating that resource deprivation, particularly at an early age, impairs social functioning continues to accumulate. With regard to information, an exhaustive review by Hunt (*23*) of findings in animals and humans concludes: "It is fairly clear from the evidence surveyed in these chapters that impoverishment of experience during the early months can slow up the development of intelligence." When studying the effects of early deprivation of contacts with mother and peers, which involve services, love, and status, Harlow and Harlow (*24*) found that deprived baby monkeys had subsequent difficulty in mating, in establishing dominance relations (status), and in taking care of their offspring. Likewise, adult schizophrenic patients have been found (*25*) to have a lower rate of exchange than normal individuals, particularly with regard to love, and to be more likely to receive than to give resources.

When a needed resource is not readily available through access to appropriate institutional channels, the deprived individual may be forced to take longer and devious routes to achieve what he needs, and his behavior may appear peculiar to the outsider. A good example is provided by the American blacks. Let us consider the following behavior patterns which have been ascribed to some of them: (i) preference for conspicuous consumption items like flashy cars and clothes, rather than purchasing more "solid" items; (ii) demanding integrated facilities where there is separation and separate ones where there is integration; and (iii) enrolling in black studies programs which do not provide training for specific future jobs. There seems to be little in common among these behaviors except that none of them appears oriented toward long-range goals. A meaningful picture emerges, however, when they are seen as different paths to achieve status, the resource of which black people have been most deprived. Conspicuous consumption goods are exchangeable with status. Refusal of social contact, by insisting on separate facilities, means taking away status from the rejected ones; thus the real issue is not integration versus separation but who is taking away status from whom. The information gained in black studies may not be useful on the job, but it is a means to a needed increase in self-pride.

When an individual is denied the most needed resource he tends to choose the resource which is nearest in the order to the preferred one. This response preference was found both for giving, in the similarity study (see Table 1), and for taking away, in the frustration-aggression experiment (see Table 3). We do not yet know what happens when the only resource available is distal from the one most preferred, but two hypotheses can be advanced: (i) intensity of response will be higher, the larger the distance between the preferred and available resource; and (ii) need satisfaction will be lower, the larger such distance. Thus a person who needs to be loved and can obtain only money will never be satisfied no matter how rich he becomes. In the same manner, an individual who has been insulted (deprived of status), and can retaliate only by destroying goods belonging to the insulter, will inflict a great deal of material damage and still be left with a grudge. This line of investigation has considerable practical significance. It might explain, for example, the extensive destruction of property during riots and the decrease in this type of aggression as blacks are either given more status or become increasingly able to reciprocate in kind by taking away status from white people rather than burning their shops.

Conclusion and Summary

High population density and increased institutional specialization, which are relatively novel features of human society, have provided conditions for a more efficient exchange of universalistic resources, while decreasing the opportunity for exchanging particularistic ones. The parallel with physical environment is striking: in both cases technology has created new problems in the process of solving old ones. Whether it is natural resources or interpersonal resources, physical ecology or social ecology, recognizing and defining the new problem is the first step toward its solution.

The importance of particularistic resources in solving problems of modern society has scarcely been recognized. Welfare institutions, for example, often require clients to lose status for the money they receive. This form of exchange deprives the client of a resource which is already scarce for him, thus further reducing his chances of autonomous performance as a resource exchanger in society. By ignoring the significance of particularistic resources for social functioning, we tend to see the solution of social problems exclusively in terms of a better distribution of economic resources. Improvement of education, for instance, is considered almost equivalent to allocating more money for schools. Truly money is one of the neighbors of information in the order, but the other one is status. Evidence to suggest that higher status improves educational achievement has, indeed, been repeatedly reported (*26*).

The very mention of particularistic resources in social planning causes uneasiness and bafflement. The economist Levitan (*27*), for example, in reviewing the activities of VISTA (a program of the Office of Economic Opportunity),

wonders how to evaluate goals such as dedication, involvement, and good feeling. The reluctance to include particularistic resources in social engineering will hopefully decrease as we improve techniques for their observation and measurement and as we begin to understand their rules of exchange and their relationship to other resources. The work described here may constitute a step in such a direction.

The opportunity to progress more decisively toward a comprehensive picture of the state of resources in society is provided by the proposal to institute social indicators (*28*). Properly constructed they could supply much needed information about resource deficiencies that affect the health of society and could suggest measures to overcome them.

The purpose of this article has been to summarize some of the knowledge we already possess about interpersonal resources and to outline its application to certain problems of modern society. It has been shown that when resources are classified into six categories and plotted on a two-coordinate space a definite structural pattern emerges. The position of each resource class in the structure appears related to certain properties which in turn affect differentially the exchange of resources in an urban environment. The structural characteristics of resources provide a theoretical basis for the understanding and solution of social problems in modern culture.

References and Notes

1. See, for example, A. Etzioni, *The Active Society* (Free Press, New York, 1968) and A. H. Maslow, *J. Humanistic Psychol.* **7**, 93 (1967).
2. G. Myrdal, *The Challenge of World Poverty* (Pantheon, New York, 1970), p. 13; J. Herbers, *New York Times* (2 Nov. 1970), pp. 1 and 36.
3. P. M. Blau, *Exchange and Power in Social Life* (Wiley, New York, 1967); G. C. Homans, *Social Behavior: Its Elementary Forms* (Harcourt, Brace and World, New York, 1961); R. Longabaugh, *Sociometry* **26**, 319 (1963); J. W. Thibaut and H. H. Kelley, *The Social Psychology of Groups* (Wiley, New York, 1959).
4. D. Cartwright and A. Zander, in *Group Dynamics: Research and Theory*, D. Cartwright and A. Zander, Eds. (Harper & Row, New York, 1968), p. 215. The price asked for giving information was lower than for giving material goods in an experimental three-person game described by S. Rosen, *J. Exp. Soc. Psychol.* **2**, 211 (1966).
5. Only recently we have become aware of the importance of nonverbal behavior in interpersonal communication. See S. Duncan, Jr., *Psychol. Bull.* **72**, 118 (1969).
6. H. F. Harlow and S. J. Suomi, *Amer. Psychol.* **25**, 161 (1970).
7. P. A. Johnsgard, *Animal Behavior* (Brown, Dubuque, Iowa, 1967), pp. 71–72.
8. U. G. Foa and E. B. Foa, in *Studies in Dyadic Communication*, A. W. Siegman and B. Pope, Eds. (Pergamon, Elmsford, N.Y., in press).
9. J. L. Turner, E. B. Foa, U. G. Foa, in preparation.
10. Examples of messages are: I feel affection for you (love); you do things very well (status); here is my opinion (information); here is some money for you (money); here is a package for you (goods); and I ran that errand for you (services).
11. Some of the situations presented are as follows. For love, "You convey to a person that you enjoy being with him and feel affection for him." For status, "You convey to a person your respect and esteem for his talents." For goods, "You give a person certain objects that you possess." Each situation was followed by 15 pairs of items, where each item in the pair belongs to a different resource class. Since there are six classes of resources, the 15 pairs allow for the combination of each resource with every other one. In each pair the resource was represented by a different item, so that there were five items for each class. The subject was instructed to choose in each pair the item which he preferred in exchange for what he had given. Examples of the items are as follows. For love, "The person indicates that he wants to be your friend." For status, "You are told that the person has confidence in your abilities." For information, "The person gives you the benefit of his familiarity with a certain subject." For money, "You receive cash from the person." For goods, "The person gives you a certain product." For services, "The person runs an errand for you." In order to balance sequential effects, both the order of presentation of the situations across subjects, and the order of presentation of paired comparison within each situation, were randomized. The frequency of resources preferred as exchange was then calculated for each of the six stimulus situations. These frequencies were also added up across situations to obtain a distribution of resource preferences among friends regardless of the stimulus situation. The latter frequency distribution is given in Fig. 2.
12. In this replication each resource item was rated separately on a five-point scale, ranging from highly desirable to not at all desirable, rather than being compared in pairs of alternatives, as in the previous study.
13. E. B. Foa, thesis, University of Missouri, Columbia (1970).
14. This frequency was computed by adding up the number of times each resource was chosen and dividing this sum by the number of times it was made available for choice. Goods, for example, were presented twice and chosen 17 times, or about an average of 8 times (18 percent) for each presentation.
15. U. G. Foa, *Psychol. Monogr.*, No. 623 (1966).
16. J. B. Calhoun, *Sci. Amer.* **206**, 139 (1962); C. R. Carpenter, in *Primate Social Behavior*, C. H. Southwick, Ed. (Van Nostrand, Princeton, N.J., 1963), p. 24.
17. F. I. Nye, J. Carlson, G. Garrett, *J. Marriage Fam.* **32**, 216 (1970).
18. B. Latané and J. Darley, *Amer. Sci.* **57**, 244 (1969).
19. S. Milgram, *Science* **167**, 1461 (1970).
20. Recent experimental results suggest that these environmental factors affect exchanges of giving but not exchanges of taking. Lack of previous contact and reduced feedback from the potential victim have been found to increase the probability of aggressive behavior. See J. L. Turner, thesis, University of Missouri, Columbia (1970).
21. P. G. Zimbardo, paper presented at the Nebraska Symposium on Motivation (1969).
22. M. M. Chemers, D. Lekhyananda, F. E. Fielder, L. M. Stolurow, *Int. J. Psychol.* **65**, 301 (1966); U. G. Foa, *J. Abnorm. Soc. Psychol.* **68**, 517 (1964); U. G. Foa, in *Communication: Concepts and Perspective*, L. Thayer, Ed. (Spartan Books, Washington, D.C., 1967), p. 135; U. G. Foa and M. M. Chemers, *Int. J. Psychol.* **2**, 45 (1967); U. G. Foa and G. V. Donnenwerth, *Sociolog. Inq.*, in press; T. R. Mitchell and U. G. Foa, *Australian J. Psychol.* **21**, 31 (1969); additional references in F. E. Fielder, T. R. Mitchell, H. C. Triandis, *Organizational Research Report 70-5* (Department of Psychology, Univ. of Washington, Seattle, 1970).
23. J. McV. Hunt, *Intelligence and Experience* (Ronald, New York, 1961), p. 346.
24. H. F. Harlow and M. K. Harlow, *Sci. Amer.* **34**, 136 (1962). For recent and comprehensive reviews of the effects of resource deprivation, see D. C. Glass, Ed., *Environmental Influences* (Rockefeller Univ. Press and Russell Sage Foundation, New York, 1968); National Institute of Child Health and Human Development, *Perspective in Human Deprivation: Biological, Psychological and Sociological* (NICHHD, Washington, D.C., 1968).
25. S. H. Eldred, N. W. Bell, L. J. Sherman, R. H. Longabaugh, *Disor. Commun.* **42**, 381 (1964); *Psychiat. Res. Rep., No. 19* (1964); E. B. Foa, in preparation.
26. J. S. Coleman *et al.*, *Equality of Educational Opportunity* (U.S. Department of Health, Education, and Welfare, Washington, D.C., 1966), chap. 3; R. Rosenthal and L. Jacobson, *Pygmalion in the Classroom* (Holt, Rinehart & Winston, New York, 1968).
27. S. A. Levitan, *The Great Society Poor Law: A New Approach to Poverty* (Johns Hopkins Press, Baltimore, 1969), pp. 223–224.
28. A recent discussion and a selected bibliography on the social indicators proposal is given in *Annals of the American Academy of Political and Social Sciences* (March 1970).

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