

HUMAN BEHAVIOR: POSSIBILITIES EXPLAIN ACTION *

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Received September 6, 1985; accepted January 16, 1986

The first and decisive stage of human decision making is determined by constraints and knowledge about the alternatives available to an individual. Four types of constraints define the individual's possibility set: resources, the state of technique, standards, and self-imposed constraints. Knowledge may be objective and subjective, but for individual behaviour personal knowledge which tells the particular individual what applies to himself, is decisive. In the second stage the individual decides between the (few) alternatives in the possibility set. This perspective is contrasted with expected utility maximization and with Becker's theory of behaviour. It is illustrated with various applications.

1. Beyond expected utility

Maximizing subjective expected utility is the dominant approach to explain human behaviour in the social sciences. Thus, in an authorita-

* This paper is the outcome of intensive discussions of the authors (an economist and a psychologist) during their stay at the Wissenschaftskolleg (Institute for Advanced Study) in Berlin in 1984/85. We are grateful for helpful suggestions to the participants of the study group on economics, psychology and sociology, Hans Albert, Willi Meyer, Karl-Dieter Opp, Kurt Stapf and Wolfgang Stroebe; to the members of the Research Seminar at the chair in the theory of economic policy at the University of Zürich, Heinz Buhofer, Reiner Eichenberger, Beat Gygi, Barbara Krug, Mico Loretan, Werner W. Pommerehne and Hannelore Weck-Hannemann, as well as to Helmut Jungermann, Jack Knetsch, Wolf Lepenies, Mancur Olson and Hansjörg Siegenthaler. The two referees also made most useful suggestions for improvement. The first author is also grateful to the Thyssen Foundation for financial support of the subsequent research.

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tive survey of the existing state of decision theory it is stated:

'It is no exaggeration to consider expected utility theory the major paradigm in decision making since the Second World War' (Schoemaker 1982: 529).

The overriding importance of expected utility maximization is well documented in monographs (e.g., Raiffa 1968; Fishburn 1970; Arrow 1971) and in surveys (e.g., Friedman and Savage 1948; Becker and McClintock 1967; Einhorn and Hogarth 1981), at least in economics. In psychological decision theory the situation is somewhat different – see, e.g., Pitz and Sachs (1984). As a descriptive model, the theory states that people behave as if they obeyed certain axioms (established by Von Neumann and Morgenstern (1944)), i.e., as if they maximized expected utility. As the Von Neumann-Morgenstern axioms are taken to be 'reasonable', a behaviour following the principle of expected utility is called 'rational'.

In the past few years, this hypothesis about human behaviour has been applied by economists (and by rational choice political scientists and sociologists) to areas beyond traditional economics, such as to crime (e.g., Becker 1968; Ehrlich 1973), to tax evasion (e.g., Allingham and Sandmo 1972; Andersen 1977; Christiansen 1980), and even to revolutions and wars (Tullock 1971; Bueno de Mesquita 1981, 1985).

At the same time there is increasing evidence that the expected utility model must be *rejected* as a general positive theory of individual behaviour (see Schoemaker (1980) for an extensive discussion, Arrow (1982), and for particular instances Kahneman and Tversky (1979), Kahneman et al. (1982)). The Allais-paradox (Allais 1953), the Ellsberg-paradox (Ellsberg 1961) and preference reversals (Lichtenstein and Slovic 1971; Grether and Plott 1979) are well-known cases. The model has also been rejected in real-life studies such as by Katona (1965, 1975) and Kuenreuther et al. (1978). In this situation, it is worthwhile to look for a more satisfactory theory of individual behaviour which is psychologically more acceptable and which is able to take into account the new insights gained in recent years about human actions (see Frey 1983a; Van Raaij 1985) within a coherent framework.

This article suggests a 'new' *perspective* emphasizing aspects which have been neglected by economists, psychologists and other social scientists. The goal is to provide an analysis of human behaviour which is more compatible with the psychological processes taking place when individuals act and decide. The perspective is also 'economic' in two

senses compared to existing approaches: (1) It provides a more parsimonious basis for explaining the macro-phenomena resulting from human behaviour. (2) It is more in tune with the fundamental idea of the economic approach to social problems (see Becker 1976; McKenzie and Tullock 1975) by distinguishing between individual preferences and constraints, and by taking changes in constraints to be the driving force for human action. In addition, the approach here outlined investigates the ways in which individuals infer possible actions from objective pieces of information.

The perspective here suggested is not claimed to be the only sensible one for looking at human behaviour. The formalism of traditional expected utility maximization can always be used. Even the new psychological results mentioned may be embraced within that approach by more or less sophisticated reformulations. Subjective expected utility theory is certainly not incompatible with the perspective suggested here. A benefit-cost calculus is applicable (also) to a situation in which behaviour is solely determined by changes in the possibility set (or constraints). The expected utility language does not, however, put the main emphasis on the constraints but, on the contrary, easily leads to an analysis purely in terms of individual preferences. The essential question is not whether the expected utility theory or the perspective suggested here are correct but rather which of them is more fruitful, and leads to more insights.

Section 2 develops the new perspective which distinguishes *two stages* of human decision making. The first and *crucial* stage determines the alternatives within the possibility set known to an individual. In this phase, a great many potential alternatives are excluded, the possibility set open to an individual shrinks. It is argued that in most cases it contains only few or only one alternative. Consequently, the second stage of decision making is comparatively unimportant: the choice *within* the (small) individually known possibility set may be analyzed by the expected utility theory if one so chooses.

The attention in section 2 will be concentrated on the first stage; first we discuss the *constraints* objectively determining the possibility set, secondly the *knowledge* individuals have about their opportunities.

Section 3 sketches applications of this perspective to marriage and crime. In section 4 the perspective is set against the existing general decision making theory, as well as to the existing economic theory. Section 5 offers concluding remarks.

2. Behaviour is determined by the known possibility set

2.1. Types of constraints

Four types of constraints will be distinguished which shape the possibility set: resources, technique, standards, and self-imposed constraints. This set determines the range of activities which an individual may undertake. The consideration of the constraints by the individual constitutes the *decisive* stage in the behavioural decision process: as a rule it narrows down strongly the opportunities available to an individual, so that as a rule he or she has little to choose from. In most situations, the second decision stage – the choice *within* the opportunity set – is of minor importance.¹

The four types of constraints and their subgroups are shown in table 1 and will now be discussed in turn.

2.1.1. Resources

(1) *Income and prices.* The 'classical' constraints in economic science limiting and determining individual behaviour are income (including wealth and credit opportunities which in turn can be related to income flows) and relative prices. Their role in shaping human behaviour is part of virtually every (micro-economic) textbook. Usually, it is illustrated for the case of two goods x_1 and x_2 , with prices p_1 and p_2 . Total income (or more precisely current expenditure) Y may be used to purchase goods: $Y = p_1x_1 + p_2x_2$. This budget line divides the accessible from the non-accessible quantities of the two goods (e.g., if $x_1 = 0$, $x_2 = Y/p_2$, etc.). Changes in income and relative prices p_1/p_2 allow us to generate testable propositions. In particular, the 'law of demand' forming the basis of all micro-economic theorizing, can be derived. It says that an increase in the relative price p_1/p_2 leads to a decrease in the relative quantity x_1/x_2 demanded (provided income is kept constant).

This proposition is usually derived by combining the budget line with the indifference curve of the individual. However, the law of

Table 1

The individual's possibility set: types of constraints.

Resources

- (1) Income and prices
- (2) Available time
- (3) Physical and mental attributes

State of technique

- (1) Technology
- (2) Social technology

Standards

- (1) Codified norms
- (2) Informal norms and values

Self-imposed constraints

demand may also be derived by considering the change in the consumption possibility set resulting from the increase in the relative price p_1/p_2 , only (see the neglected contributions by Becker (1962), Sanderson (1974)). Fig. 1 shows the initial possibility set OAB indicating the feasible combinations of the quantities x_1 and x_2 which can be purchased with the given income Y . If the two goods are indeed valued positively by the consumers, they will buy the maximum quantities within the budget, i.e., they will line up along the efficiency frontier

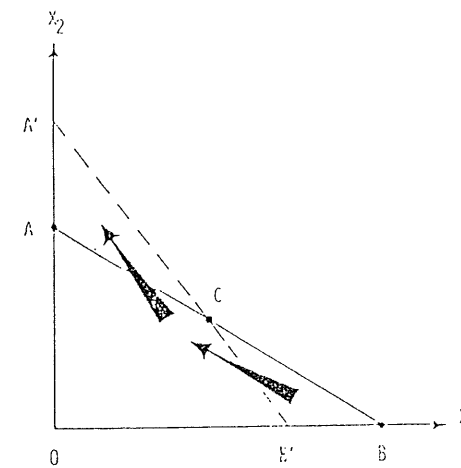


Fig. 1. The law of demand derived from a change in the possibility set.

¹ There is an analogy to the constitutional approach to economic policy emphasizing the basic 'rules of the game' or institutional constraints. Once these basic conditions are laid down, the current politico-economic process takes its course and there is little an economic advisor can do to influence it. See Buchanan (1977) and Frey (1983b).

AB. As nothing is known about preferences, it may be assumed that they are distributed randomly along *AB*.

Assume that p_1 rises and p_2 falls. The maximum amount of good 1 which can be bought falls (say, from *B* to *B'*), and the maximum quantity of good 2 rises (say from *A* to *A'*). The new possibility set is *OA'B'*. The quantities of x_1 and x_2 within area *B'CB* are no longer attainable, while combinations of x_1 and x_2 within *AA'C* can now be chosen. The arrows indicate that the randomly distributed consumers tend to purchase less x_1 and more x_2 . The relative price increase p_1/p_2 leads to a decrease in the relative quantities x_1/x_2 , confirming the law of demand.

(2) *Available time*. The second resource constraint is the absolute limitation in time: a day has not more than 24 hours, from which the time necessary for physical and mental recuperation must be deducted. For a great number of people in industrial countries this constraint seems to be extremely limiting, especially for high-income recipients. No complaint is heard more often in certain circles than that 'I have no time'.

This time constraint has been included into economic analysis (see the pathbreaking contribution by Becker (1965)) though it receives much less attention than the monetary constraints. It is able to contribute much to explaining human behaviour. The effect of an increasing price of time due to the higher opportunity cost (higher productivity or income) has been used to account for a surprisingly large amount of important features of modern life (see Linder 1970).

There is an *essential* difference between the income and time constraint which tends to be overlooked in economics:² income is measured in money, and the exchange on a market leads to an (equilibrium) price which is taken as a signal for behaviour by the market participants. When time is exchanged between individuals, however (e.g., when friends talk to each other about their sorrows) a quantitative *quid pro quo* evaluation would be destructive. If time units of equal value were exchanged at each moment, time would have the same property as income, and time exchange would degenerate to the monetary exchange system (see von Weizsäcker 1985). For this reason,

² The two constraints are often collapsed in the so-called 'full income constraint' which describes what income could be gained if all time were devoted to income gaining activities.

income and time are in many important circumstances (for particular relationships such as marriage) no, or a seriously imperfect, substitute.

(3) *Physical and mental attributes*. There are various ways in which physical and mental conditions directly influence human behaviour. An obvious one is that space and time are limited; it is, for instance, impossible to be personally present in two places at the same time.³

Physical attributes of individuals such as age, health and strength; or mental attributes such as intelligence, creative capacities, and motivation are other important determinants of the behavioural possibility set. In many sports (e.g., in swimming or gymnastics) age and health set an effective limit on what can be achieved.

Such attributes may be distributed in such a way that relative price and income effects cancel out in the aggregate. (This is the conventional assumption in economic theory.) But there are also important cases in which they change over time or differ between groups so that there is an effect on aggregate behaviour.

2.1.2. Stage of technique

The individuals' possibility set is affected by two kinds of changes in techniques:

(1) *Technology*. A large part of today's available actions would be completely outside the human possibility set if inventions had not opened new avenues (e.g., if no combustion engine existed and therefore cars had not been invented). No benefit-cost calculus is needed to explain that in the Middle Ages nobody went to Paris from Rome in an hour. The photocopying revolution of the sixties, and the word processing revolution of the eighties have expanded the possibility set into new areas and has therewith opened up completely new kinds of behaviour for individuals. These changes in behaviour have little (or nothing) to do with individual calculation but what matters is simply whether the changes in technology took place or not.

(2) *Social technology*. New techniques of organizing human behaviour tend to be neglected in economic analysis compared to purely

³ Technological progress has made it possible to be at various places at the same time, consider for instance conferences by TV, or various uses of video.

technical changes; but for human behaviour they may be of great importance. Examples are the invention of the corporation by issuing shares, insurance, or new voting mechanisms (e.g., Tideman and Tullock 1976; Mueller 1978).

In order to avoid misunderstandings it should be stressed that both kinds of changes in technique are not taken to be exogenously given. Rather they are variable and their development can at least in principle be explained (as has been attempted in the economics of invention and innovation, see, e.g., Jewkes et al. 1959; Manfield 1968). The available technical knowhow constitutes a limit on individual behaviour; which techniques are actually used depends on the incentives, which in turn depend on other constraints such as the existing relative prices and income.

2.1.3. Standards

Not all attainable resources and techniques are actually used by the individuals. There are two further constraints whose changes bring forth a change in individual behaviour because they affect the possibility set:

(1) *Codified norms.* These contain the whole body of law, formally issued and sanctioned by the public authorities.

(2) *Informal norms and values.* The individuals' behaviour is, in this case, shaped by internal inhibitions ('bad conscience') rather than by expected external punishment as in the case of legal norms. Informal norms and values are often neglected in economic (and social psychological) analysis but there are cases in which behaviour can hardly be explained in another way. One example is provided by the econometric studies of the size and development of the hidden or shadow economy in which 'tax morality' (or the values the individuals attribute to government) have turned out to be essential determinants (see Frey and Weck 1984). Another example are the contributions individuals are observed to make to the production of public goods (see Marwell and Ames 1981; Schneider and Pommerehne 1981), despite the incentive to act as a free rider. This behaviour is difficult to explain without the existence of norms.

It is not argued that individuals always observe codified or informal norms. The point is rather that individual behaviour in an environment in which certain norms are observed differs systematically from a situation where they do not exist. It thus follows that norms shape the possibility set. To give an extreme example: In a society in which theft does not violate any norms, the incentive structure and therewith the behaviour of individuals differ significantly from a society in which theft is legally and morally sanctioned.

Changes in norms lead in our perspective to changes in constraints and do not affect the individual utility function (as would be assumed in traditional economics). The reason is that we consider first the individuals' possibility space (which is obviously shaped by formal and informal norms), and consider at the second stage of the decision process only how such norms are evaluated in terms of benefits and costs.

2.1.4. Self-imposed constraints

The constraints in terms of resources, the state of techniques and standards are imposed from outside. An individual may also decide to impose limits on himself because he knows that he is prone to weakness of will (*akrasia*). A well-known instance of such self-imposed constraints is the 'Ulysses syndrome', as reported by Homer in the *Odyssey*:

'you will come first of all to the Sirens who are enchanters of all mankind and whoever comes their way ... has no prospect of coming home ... [your companions] must bind you hard and fast, so that you cannot stir from the spot where you will stand ... and if you beg [your companions] to release you, they must tighten and add to your bonds.'

The phenomenon has also been discussed as *strategic precommitment* (Elster 1977) or *egonomics*, i.e., the art of self-management (Schelling 1980, 1984), and it has also been discussed early in psychology (Ainslee 1975).

There are a great many everyday examples of the tricks one plays on oneself to achieve things one should do, or to prevent things one should not do. The strategic setting of self-imposed constraints has become particularly important in the health area. In order to stop smoking, people may cross the street when they see a tobacco shop further on, so as not to be exposed to the sight of cigarettes. Or they buy cigarettes in

small quantities, or put them in a place difficult to reach, or enter a smoking clinic where they pay a considerable fee for the help given to them to overcome their addiction.

Precommitment is also a well-known kind of behaviour among academic scholars. Many find it difficult to write or conclude a paper if they are not forced by a deadline. They deliberately contrive such a time limit, the violation of which would be detrimental to them, by agreeing to contribute a paper to a conference. Another area in which people often strategically precommit themselves is with respect to their budget. In Switzerland, for example, taxes are not directly deducted from income. People often establish a savings account in a separate bank 'to put the money away' with which later to pay the taxes. Or one takes little cash and no checks to a gambling hall or to a particularly attractive shop so as to guard against spending too much.

Strategic precommitment has been used to analyze individual behaviour of direct relevance for the economy (Strotz 1955-56; Thaler and Shefrin 1981; Winston 1980; Margolis 1982; Hirschman 1982). One may distinguish two 'persons' within an individual in order to study the intertemporal problem of conflict between the short and long term. The first person is a planner who is concerned with the life-time utility of the individual, the second person is a doer who exists only for one period and who is only interested in current consumption. There is an analogy to the principal-agent conflict between the owner and the managers of a firm which is used to formalize the intertemporal choice problem. The planner has a mental technology available with which he can influence the doer's behaviour. The most important instrument is the imposition of internal *rules* which the doer is supposed to observe. This strategic precommitment by the planner alters the possibility set of the doer and therewith changes his behaviour.

2.2. Knowledge about constraints

The *existence* of constraints is only one dimension shaping human behaviour; a second dimension of importance is the degree to which individuals know about these constraints. Economic theory holds that 'not all people can be fooled all the time' (to say the least). This implies that the individuals learn so that subjective and objective knowledge merge ('adaptive expectations'), or that they immediately use the existing theoretical information in order to reach the objective knowl-

edge (rational expectations').⁴ Accordingly, in empirical studies objective knowledge may substitute the subjective knowledge of the individuals. In his econometric study of crime, Ehrlich (1973), for example, uses the objective probability of being apprehended and punished in order to explain the behaviour of (potential) criminals.

According to our view, an individual's knowledge about his possibility set may, *over the time period relevant* for explaining human behaviour, not only diverge systematically from what is objectively correct, but also be resistant to what is objectively happening. It cannot, moreover, be excluded that the views individuals hold diverge increasingly from what is objectively true for a considerable time period.

It is useful to distinguish three types of knowledge:

(1) *Objective knowledge.* For practical purposes of social research⁵ these are the findings included in (official) statistics. In the area of crime, for instance, it would include the share of punished illegal acts to all illegal acts (disaggregated for the various types of crime).

(2) *Subjective knowledge.* This type of knowledge refers to what the individuals *believe* to be objectively true. It can, of course, deviate; an individual may, for instance, have vast delusions about what share of murderers is convicted.

(3) *Personal knowledge.* This type of knowledge constitutes a new category which has been neglected in economics. Personal knowledge is what a particular individual takes to *apply to himself*, and which is therefore taken into consideration for his *own* behaviour. Much of what is subjectively known is not accepted for oneself. A would-be criminal may well know subjectively the official conviction rate but he may think that this 'probability of conviction' does not apply to himself.

Personal knowledge may deviate strongly and over an extended time period from subjective knowledge. An example is provided by hang glider flyers. When asked whether this sport is dangerous, they invaria-

⁴ See e.g., the discussion of the Phillips curve as presented in any modern textbook in economics: The individuals either adapt their inflationary expectations to the one actually existing over time, or they use their (implicit or explicit) knowledge about the inflation-unemployment nexus in order to immediately settle at the equilibrium (where the Phillips curve is vertical, and an increase in inflation cannot be traded against a reduction in unemployment).

⁵ No deep philosophical discussion of whether objectivity exists is intended here.

bly answer that it is not, provided that one sticks to the rules and is careful. As oneself behaves in the appropriate way, hang gliding is not dangerous. However, as *all* tend to answer in this way, it cannot be a true risk evaluation in the aggregate, in view of the grave accidents happening in this sport.

The interesting question is how individuals manage to systematically deny that the knowledge they subjectively have also applies to themselves. An answer may be that the basis to which the subjective knowledge refers is ill defined, so that the individuals may hold that they belong to a different basis and/or that they represent a category of their own. A hang glider flyer may believe that the statistics of accidents he knows have nothing at all to do with him because *he* is careful and sticks to the rules. In the extreme, therefore, the objective and subjective knowledge seems to be irrelevant to any individual because he or she refers them to a different basis or set.

Two systematic misperceptions may be distinguished which drive a wedge between subjective and personal knowledge:

(i) *Control misperceptions.* Individuals tend to overestimate the extent to which they can influence outcomes. They believe that they can control the results even if in reality these are completely independent or 'non-contingent'. The discussion of the 'locus of control' is closely related; see Rotter (1966) and Van Raaij (1985). This control misperception has been found in many experiments (see, e.g., Langer 1975). An example is that individuals believe that they are able to influence the outcome of pure games of chance. Closely related is the experimental evidence with the 'one-armed bandit' where many individuals believe that they have discovered a causal mechanism producing the outcome though in reality it is randomly produced. (Once individuals believe they know the causal relationship, they, as a rule, also think that they can use it to influence the outcome.)

In the case of control misperception, the subjective knowledge (in the way defined) differs systematically from the personal knowledge because an individual thinks that he or she is *better* able to influence the outcome than the other individuals. The representative hang glider flyer believes that he is better able to control himself, by taking care and keeping to the rules under all circumstances. The same holds for car drivers most of whom think that they are able to control the

outcome and therefore tend to significantly underestimate the chance of being involved in an accident.

(ii) *Data misperception.* A second wedge between subjective and personal knowledge is due to a systematic bias in the selection of information. When individuals come to judge their *own* actions they tend to concentrate on specific or *singular* data, while outsiders tend to see the whole *distribution* of the data (see, for the case of predictions, Kahneman and Tversky (1982)). As we all know, academics are notoriously prone to underestimate the time required to complete a paper or a book even if they have considerable experience of past failures to live up to planned schedules, and even if they are well able to predict the time needed by *others*. The failure is the consequence of focusing on the determinants of the specific or personal problem rather than on the distribution of outcomes in similar cases.

2.3. Combining (objective) constraints and (personal) knowledge

Human behaviour can only be explained in a satisfactory way if both dimensions are taken into account: the possibility set as determined by the objective constraints and the personal knowledge about these constraints. If an individual has no personal knowledge about a particular feature of his possibility set he or she will not act in the way predicted on the basis of a consideration of the objective constraints only. Thus, if a certain social technique is available, but the particular individual knows nothing about it, the behaviour will not be affected. Similarly, if an individual does not consider an activity dangerous for himself, he or she may undertake it, and will run the objective risk of having an accident.

Conversely, individuals may have some particular personal knowledge about the constraints they face, but which in reality do not exist. This is, for instance, the case if individuals think that a certain action is forbidden (with a heavy punishment) and therefore do not do it (they drive, e.g., below 100 km/h on the highway because this is supposedly the maximum speed, while in reality the maximum speed limit is 120 km/h). For individuals it is not easy to perceive and to correct their errors of knowledge because they do not experience that no such norm exists as long as they do not infringe on it.

The objectively existing constraints and personal knowledge about

them do not exist in isolation but affect each other. These relationships have been little explored so far; they constitute an important future research topic.

2.4. Choice and the possibility set

Behaviour is crucially determined by the set of possibilities open to an individual. In order to explain and predict human action, the constraints determining the individuals' possibility set must be analyzed and operationalized most carefully. Our perspective goes in this respect much further than the 'economic' approach to human behaviour as championed by Becker (see his collection of articles (1976); and Stigler and Becker 1977). This and our approach both emphasize that changes in behaviour should be explained by changes in (observable) constraints (and not by usually non-observable or non-operationable changes in preferences). Our approach differs, however, in three main respects from Becker's:

(i) *Two stages* of decision making are distinguished. In a first and crucial phase, the possibility set relevant to an individual is determined. Due to the many types of constraints, this possibility set is normally small. In a second phase, a choice among the (few) alternatives within the (small) possibility set is made. Becker collapses these stages into one. He restricts himself in relative prices, income and time as constraints, and does not consider the constraints imposed by physical and mental attributes, by changes in technology and social innovations, and by formal and informal norms and values. Accordingly, Becker does not make any statement whether the individuals' possibility set is large or small.

(ii) Individuals act on the basis of their *personal* knowledge about the possibility set, which may, and often does, systematically differ from subjective and objective knowledge. The processes driving a wedge between personal knowledge on the one hand, and subjective and objective knowledge on the other hand must be analyzed; evidence about control and data misperceptions exists. Becker assumes that subjective knowledge is sufficient for explaining behaviour, and when his approach is empirically applied, objective knowledge is substituted for subjective knowledge.

(iii) The possibility set being *small* (as a rule) due to the many types of restrictions an individual is faced with, the second phase of the choice among the alternatives remaining is relatively unimportant. Our approach mirrors the feeling of many people that 'the whole day runs by; there is little to be decided about on the basis of a benefit-cost calculus'. This feeling seems to be widespread and applies to both workers and managers, to the poor and the rich, to people employed in firms as well as to self-employed such as artists. Under these circumstances, it does not contribute much to our understanding of human behaviour how this choice is theoretically modelled. In contrast, Becker strongly emphasizes that utility or wealth maximization is the clue to understanding how individuals behave; he includes maximization among the major defining characteristics of the economic approach (see Becker 1976: 5). Our view is more in line with *satisficing* (see Simon 1955, 1979). It is usually not worth maximizing among the few available alternatives but it is sufficient to reach an acceptable or satisfactory situation. To phrase it differently: in most cases it is optimal *not* to take the trouble of maximizing, but to *satisfice*.

The perspective of human behaviour here suggested thus differs in important respects from the present economic model of behaviour (of the Becker variant). It is at the same time more encompassing (more constraints are taken into account) but also makes new propositions (about personal knowledge and about the relative unimportance of the choice among given alternatives). As a consequence, this perspective also leads to differences in applications, and in empirically testable propositions.

3. Applications

This section discusses consequences of applying the approach here suggested, in order to give the flavour of the new perspective and to show in what way, and to what extent, it deviates from the expected utility maximizing approach. Of course, no exhaustive treatment is intended. The applications refer to behaviour with respect to marriage and crime. Both are areas in which the economic model of behaviour à la Becker (1976) has most prominently been applied and where, therefore, the perspective here suggested stands out most clearly.

3.1. Marriage

In the traditional economic theory of the family (again championed by Becker (1975)), marriage partners are chosen by comparing (expected) benefits and costs, so that one's utility is maximized compared to alternative partners or remaining single. A marriage market is envisaged where demand for, and supply of, desired characteristics of marriage partners meet. In equilibrium, it is possible to derive testable propositions about who marries whom.

According to the perspective proposed here, this utility maximizing approach does not capture essential features of marital choice behaviour. Contrary to Becker we assume:

(i) In the first, crucial stage of the decision process, the possibility set is determined. A very large number of potential marriage partners is excluded from the possibility set of a given individual for rather obvious reasons, most importantly because the potential marriage partners do not know each other, and have little chance to meet. The actual 'choice' set is rather small, if not restricted to one person: a surprisingly large number of people get married to a friend of their youth without seriously having considered other marriage partners. In many societies (perhaps America is an exception) there exists no marriage *market* which would in any way resemble 'normal' markets such as for houses, refrigerators or cars. To actively search for a marriage partner, and to openly evaluate his or her traits in a benefit-cost calculus is frowned upon, and is morally unacceptable. The marriage market is at best partial, which correspondingly results in strongly biased selections of partners.

A promising endeavour for research is to explain why no well functioning marriage market exists and, therefore, why the opportunity set for many or even most individuals is very limited in this respect. To *assume* that there is a marriage market removes one of the most important aspects of marriage choice. Empirical research (for a survey see Kerckhoff (1974)) suggests that the opportunities (or availability), and not preferences, are indeed the most important determinants of partner choice. The locations of growing up and of working provide dominating contact opportunities. The field of potential partners is restricted to those persons whom one is likely to meet in situations which are conducive to the development of informal relationships. A

particularly important determinant of availability is geographic proximity. The frequency of marriage has been found to decrease with increasing distance between the residence of partners before marriage (see, e.g., Katz and Hill 1958). The observed similarities between marriage partners with respect to social class, education, race and religion are likely to be more the effects of increased opportunities of getting into contact than an expression of similarity of preferences.

In social psychology, marriage choice used to be explained in terms of preferences, but in recent works the importance of 'availability', i.e., of opportunities, has been stressed (see Stroebe and Stroebe 1982; Stroebe and Frey 1980). The brunt of the new perspective here proposed is that it is equally good or better at explaining the marriages observed by carefully analyzing the constraints, rather than to construct an (unrealistic) decision calculus. It is worth noting that the intuitive rejection of such a benefit-cost calculus by most people (except perhaps by hard core economists) as 'repugnant' or 'immoral' may not *only* be a misunderstanding of the economic approach and of 'as if' reasoning, but may also indicate that such a calculus may be inappropriate to apply to marriage decisions. To argue in terms of the opportunity set – which is, of course, also a concept used in economic theory – does not induce any feeling of being inappropriate even among lay people.

(ii) A second aspect in which the new perspective is found superior to the traditional benefit-cost approach refers to the chances of the *break-up* of the marriage. The expected utility approach assumes that the marriage partners know the objective probabilities of divorce (or at least that the subjective probabilities do not systematically deviate from them), and that they act accordingly. In our competing perspective the objective divorce rates or the subjective knowledge about the real divorce rates are taken to be irrelevant for individuals planning to get married. The reason is that in most cases the individuals concerned do not consider that these objective or subjective probabilities refer to them because they feel that they are taking a *unique* decision of forming a union with a *unique* person, so that the general divorce rates are not taken to apply to them. Parents and friends often see the situation more clearly and tend to warn against high risk marriages such as between partners of different cultures or races. This rarely helps: the would-be marriage partners reject the warning by typically

responding that though the empirical evidence may be unfavourable, it does not apply to the particular marriage contract one is envisaging. In short: the two systematic misperceptions of control and data selection discussed above fully apply to the case of marriage partners.

3.2. Crime

As has been pointed out in the opening section, the economic theory of illegal behaviour (crime, tax evasion etc.) explicitly uses the utility maximization framework. A potential criminal compares the benefits of an illegal act with the subjective probability of being detected, apprehended and sentenced, multiplied by the utility loss imposed by the punishment. In the literature (see in particular the important econometric analysis by Ehrlich (1973)) the subjective probabilities are substituted by the objective probabilities as published in statistical sources.

Following the perspective here proposed, a careful analysis of the *constraints* to which a particular (potential) criminal is subjected reveals the decisive determinants of behaviour. Three constraints seem to be the most pertinent:

(i) The possibility of embarking on a criminal act depends on physical strength and aptitude (e.g., if a bank robbery is envisaged) and/or on mental attributes such as intelligence and information (e.g., if a computer crime is planned). If these resources are lacking, a corresponding crime is out of the question. To give an extreme example: if somebody is very old or has difficulties in walking, no benefit-cost calculus needs to be subsumed in order to explain and predict that such a person does not undertake bank robberies.

(ii) New opportunities for committing crimes emerge due to changes in 'technique'. An example would be the new social institution of the European Community with its agricultural policy which makes it possible to acquire illegally large sums of money by exploiting the complex set-up of protectionist rules and subsidies.

(iii) The number of crimes committed does not depend on codified norms and the punishment by the state but to a very large extent on implicit norms and values, i.e., the internal inhibitions and guilty conscience when infringing upon them. Many illegal acts which are

within one's set of possibilities are outside one's consideration; they are not subject to (even an implicit) benefit-cost calculus. It is therefore of little help and often misleading to employ the 'as if' construction of expected utility maximization. The research emphasis should rather lie on explaining, operationalizing and measuring the implicit norms and values which shape the individuals' possibility set.

The amount of crimes also depends strongly on the number of individuals involved. Under certain circumstances, subjective knowledge about the objective conditions may have perverse effects: when individuals are informed that others commit a given illegal act to a considerable extent, they become aware of the fact that this crime is considered to be advantageous by others. They may come to the same conclusion for themselves and also commit the crime. The subjective knowledge may thus serve to destroy an implicit norm. These circumstances have been identified, for example, in an experimental setting (Tittle and Rowe 1973) for the case of cheating in exams. When the school class was morally appealed to by the teacher not to cheat the effect was partly counterproductive, because those pupils who so far had kept to the rules now discovered that cheating is indeed widespread, and also started to engage in it.

In the area of crime it is particularly clear that individual behaviour depends on *personal* knowledge, and that objective and subjective knowledge may be quite irrelevant. A rational (potential) criminal has to take into account the likelihood *for himself* of being apprehended, convicted and punished. But what is the *sample space* for the corresponding probabilities? Each individual thinks that his case is a *particular* one. His subjective knowledge of the objective possibilities or risk, while applying to others, is of little importance to him because he considers himself to be special. While others may be caught when robbing a bank, a particular individual may easily attribute that to the fact that those caught were not careful enough or did not keep to the rules of the criminal profession – mistakes which the given individual is determined not to make. Experiments suggest indeed the robust result that people are generally overconfident (Lichtenstein et al. 1982).

Our perspective of analyzing human behaviour suggests that the research should be directed towards identifying the relevant constraints determining the individual possibility set *directly*, and to analyze the systematic biases in knowledge between what an individual thinks applies to *him* and what counts as objective and subjective knowledge.

4. Contribution to decision-making theory

The two-step procedure here proposed for analyzing the complete decision-making process stands in strong contrast to human decision-making theory which uses formulations in terms of *expected probabilities* of different events. General decision-making theory is directly based on the *mathematical theory of gambling*, going back to the ingenuous work of Daniel Bernoulli in 1738. The definite axiomatic formulation of Von Neumann and Morgenstern (1944) explicitly uses the same framework as they rely heavily on the concept of lotteries. Traditional decision theory has been virtually dominated by this analogy to gambling. As long as it is understood as a normative theory, there is little to say against this procedure. Only when expected utility is interpreted as a *descriptive* theory do problems arise.

In our perspective, analyzing human behaviour in terms of gambling and heavily relying on (expected) probabilities⁶ constitutes a contrived and artificial formulation. A more adequate and fruitful analysis of human action considers the *whole* decision process whose crucial first stage consists in the identification of the possibility set applicable to a given individual. Only in the second – and probably less important stage – a benefit–cost calculus may (but need not) be employed. Viewed over the whole decision process, the central role of probabilities for explaining human behaviour is lost. As has been found in corresponding surveys (see, e.g., Schoemaker 1980, 1982), individuals – except perhaps people trained as economists and statisticians – do *not* work with, nor do they understand well, the concept of probability. Rather, *personal* experience gives them some notion of whether something occurs, or does not occur. Probability is a relatively recent formal construction whose existence is not based on primary sensory evidence (Hacking 1975).

The artificial approach of mathematical decision theory has been transferred too readily to *experiments* as undertaken particularly by psychologists. Individuals are put into situations which have little to do with real-life decision making. Only the second stage of decision

⁶ That individuals have great difficulties with high and low probabilities has been a major theme of the research by Kahneman and Tversky. They state e.g. 'Low probabilities ... are overweighted, and very low probabilities are either overweighted quite grossly or neglected altogether ...' (Kahneman and Tversky 1984: 345). Thus, not even the direction of the systematic biases connected with probabilities is known.

making is modelled, where both the alternatives available and the probabilities in which the events occur are given. This particular 'constitution of reality' in the experimental setting even applies to such eminent decision theorists as Kahneman and Tversky. A typical decision situation analyzed in their work is (Kahneman and Tversky 1984: 345):

'Consider the following two-stage game. In the first stage, there is a 75% chance to end the game without winning anything and a 25% chance to move into the second stage. If you reach the second stage you have a choice between:

- A. a sure win of \$30
- B. 80% chance to win \$45.

Your choice must be made before the game starts, i.e., before the outcome of the first stage is known. Please indicate the option you prefer.'

In order to avoid any misunderstandings: it is perfectly acceptable to consider such choice situations. What is argued here is simply that they are extremely artificial, and that they completely leave out the decisive *first* stage of human decision making behaviour: the reduction of opportunities to a possibility set including the alternatives available to the individuals, and the dependence of this possibility set on personal knowledge.

5. Concluding remarks

Human behaviour can be analyzed in a satisfactory way if the complete process of decision making is considered. The first and decisive stage is determined by constraints and knowledge about the alternatives available to an individual. The most important constraints defining the individuals' possibility set consist of resources (income and prices, available time, physical constraints), the state of technique (both technological and social) and standards (formal and informal norms and values). For individual behaviour, objective and subjective knowledge is less important than personal knowledge which tells us what the particular individual takes to apply to himself and which determines what an individual takes into consideration. This perspective goes beyond the subjective expected utility maximizing model used in the economic model of behaviour which is (at best) appropriate to

the second stage of decision making where the individual chooses among alternatives within the (normally small) possibility set.

The perspective here suggested requires a redirection of the research emphasis away from decisions among given alternatives and given probabilities (as in general decision theory and psychological experiments) to a careful analysis of the nature of the constraints and the personal knowledge of individuals.

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