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Source: *Journal of Institutional and Theoretical Economics (JITE) / Zeitschrift für die gesamte Staatswissenschaft*, Vol. 145, No. 3 (September 1989), pp. 423-437

Published by: Mohr Siebeck GmbH & Co. KG

Stable URL: <http://www.jstor.org/stable/40751219>

Accessed: 20-02-2018 09:38 UTC

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## Anomalies and Institutions

by

BRUNO S. FREY and REINER EICHENBERGER \*

### *I. Reasons for Institutions*

In the social sciences, and above all in economics the paradox that individually rational behavior can lead to collective or social irrationalities has received great attention. Indeed, research in this area has led to major advances in our knowledge in the post-war period. The most important cases of social irrationalities uncovered have been found to be the paradox of preference aggregation and the paradox of free-riding in the presence of public goods, the latter of which offers insight into a great many urgent problems such as the plight of the natural environment. As a consequence of these social irrationalities an extensive literature has been devoted to the norms, rules and institutions which may emerge, or may be created, to overcome these paradoxical outcomes<sup>1</sup>.

The converse situation has received much less attention, particularly in economics: It deals with the *social consequences of individual irrationalities*. There are two good reasons why this converse case has largely been neglected:

(i) The rational choice approach, on which modern (mainstream) economics is based, is identified with rational behavior by individuals. In formal theory, it is assumed that the average or representative person acts according to the VON NEUMANN/MORGENSTERN [1947] axioms. This implies that he (she) maximizes subjective expected utility. In institutional economics, rational behavior is associated with stable individual preferences, and with a systematic reaction to changes in constraints or relative prices (BECKER [1976], STIGLER and BECKER [1977], BRUNNER [1987]).

(ii) The aggregation process eliminates any irrationalities to which particular individuals may be subjected. Above all, (perfect) markets guarantee that non-

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\* Parts of this paper were presented at research seminars at the Universities of Basel and Zurich. The authors are grateful for helpful discussions, particularly to Max Albert, James Coleman, Barbara Krug, Douglass North, Karl-Dieter Opp and Carl Christian von Weizsäcker.

<sup>1</sup> See e.g. ULLMANN-MARGALIT [1978], NORTH [1981], SCHOTTER [1981], OPP [1983], COLEMAN [1988]. In this literature another, but less important reason for the emergence of institutions (including norms and rules) is also discussed, the need for coordination.

rational actors lose income relative to rational actors, thereby experiencing a declining share of total purchasing power, so that they become less and less important on the aggregate level. Non-rational entrepreneurs must leave the market because they go bankrupt.

Over the last few years, a rapidly growing volume of empirical evidence has been gained through experiments and field studies that individuals under certain conditions *systematically deviate from rationality* as applied in economics. Instances of such anomalies in individual behavior have been given names such as:

*Reference point effect*: Alternatives are evaluated by individuals not in terms of total wealth but relative to a reference point, often the status quo.

*Sunk cost effect*: People tend to take foregone costs into account in their decisions.

*Endowment effect*: Goods in a person's endowment are valued more highly than those not held in the endowment.

*Framing effects*: The way a decision problem is formulated and the way the information is presented has a marked effect on individual decisions.

*Availability bias*: Recent, spectacular and personally experienced events are systematically overweighted when individuals make decisions.

*Representativeness bias*: Individuals systematically misconceive prior probabilities, and are insensitive to sample size.

*Opportunity cost effect*: Out-of-pocket monetary costs are given greater weight in the decision calculus than opportunity costs of the same size.

*Certainty effect*: Outcomes obtained with certainty are attributed greater weight in an individual's decisions than those which are uncertain even when the (known) expected utilities are the same.

These and other anomalies of individual behavior<sup>2</sup> can be interpreted as violations of the von Neumann/Morgenstern axioms, and therefore of the model of classical subjective expected utility maximization. The economic model of behavior is directly affected in so far as expected utility maximization is applied for analyzing behavior under uncertainty.

Anomalies result also in violations of the assumptions of stable preferences. Anomalies intervene between what may be termed "basic" preferences (which can still be taken to be constant) and "effective" preferences which shift over time, and differ between individuals due to the working of anomalies. For example, the reference point effect leads "effective" preferences to differ ac-

<sup>2</sup> See the early cases found by ALLAIS [1953] and ELLSBERG [1961], and the collections in KAHNEMAN, SLOVIC and TVERSKY [1982], HOGARTH and REDER [1987], ARKES and HAMMOND [1986] and THALER [1987a]. Surveys are provided from the point of view of psychology by SLOVIC, FISCHHOFF and LICHTENSTEIN [1977] and PAYNE [1982], from the point of view of economics by SCHOEMAKER [1980, 1982], SHAPIRA [1986] and MACHINA [1987].

ording to which particular reference point is chosen. As a consequence, if it is not known and taken into account in explaining behavior that different reference points are chosen under different conditions, the preferences which effectively determine behavior exhibit unexplained vagueries. The sunk cost effect and the endowment effect are two other anomalies which intervene between the "basic" and "effective" preferences and which therefore lead to violations of the assumption of stable preferences. Anomalies moreover destroy the systematic relationship postulated between changes in constraints and changes in behavior. When individuals are subject to biases with respect to the framing of decisions, the use of information (availability bias, representativeness bias, etc.), and opportunity cost, distorting intervening factors enter. If the individual anomalies are indeed as important as suggested by experimental research, it is no longer possible to rely on a systematic, and therefore predictable, effect of the constraints on behavior. If, for example, the relative price of an activity increases due to a rise in opportunity cost, the "law of demand" would predict a relative reduction in that activity. That prediction would, however, not hold if the opportunity cost effect (stating that such costs are fully or largely disregarded) applies. Conversely, people subject to the sunk cost effect perceive an additional constraint, and therefore act differently than they would according to existing economic theory which disregards this type of "irrational" cost.

All in all, the research on individual behavior anomalies gives rise to great doubt whether the conventional model of expected utility maximization can any longer be applied for a positive analysis of individual behavior under uncertainty (see, in particular SIMON [1979], SCHOEMAKER [1982] and MACHINA [1982]). Economics must take individual level anomalies seriously unless it is taken for granted that the aggregation process *always* and *completely* eliminates individual irrationalities. However, there is little reason to assume such complete elimination because there also exist aggregation processes which may even strengthen some anomalies (especially those involving government and public administrations), and because even 'perfect' markets such as the stock market or public lotteries are not able to remove irrationalities at the aggregate (market) level<sup>3</sup>.

This paper takes anomalies in individual behavior seriously and looks into *their effects at the social level*. It will be shown that:

- (1) Institutions (may) emerge which deal with individual level anomalies. Thus, a *new reason* for the emergence of institutions is postulated.
- (2) There is a systematic relationship between the number and kinds of paradoxes which exist, and the institutions which exist.
- (3) Three types of institutions emerge: (i) to prevent the appearance of individual anomalies; (ii) to mitigate the cost consequences for the individuals;

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<sup>3</sup> These two propositions are discussed in depth and supported by empirical evidence in FREY and EICHENBERGER [1989] where also the pertinent literature is quoted.

and (iii) to redistribute cost. The type of institution that emerges depends on empirically observable conditions relating to the awareness of the individual of the cost of behaving in an anomalous way, and the different opportunities of reacting to these costs.

Accepting the existence of irrationalities in individual behavior does *not* mean that the rational choice approach must be given up. On the contrary, the analysis pursued here remains completely within the rational choice framework. However, it approaches the subject from a more general point of view. It is accepted that human beings are fallible and are unable to always act rationally (see SEN [1979]), but that the social process spontaneously creates, or individuals consciously design, institutions which correct (part of) these individual irrationalities. In a sense therefore, our analysis relies even more strongly on rational choice than conventional theory because it (at least partly) serves to overcome irrationalities.

Section II discusses the relationship between individual anomalies and cost. The emergence of institutions as a consequence thereof is treated in section III. Section IV deals with the extent to which the anomalies are eliminated by the emergence of institutions. Section V offers concluding remarks.

## *II. Anomalies and Their Cost*

Irrational behavior in the sense of deviations from the von Neumann/Morgenstern axioms leads to cost for the individual concerned. These costs may be the cost of missed opportunities, or outright monetary cost. They provoke various kinds of consequences which are discussed in three hierarchical steps.

### *1. Awareness of Cost*

For various reasons, the cost created by anomalous behavior may not be taken into account by the individual acting. The alternatives offering better opportunities may simply be outside the considerations of the individual (they are outside the 'ipsative' possibility set, see FREY [1988]) and, therefore, an awareness of having missed an opportunity does not arise. Alternatively, an individual may know that superior alternatives are available, but he or she chooses not to evaluate the cost involved in utilizing them. Empirical evidence exists (see THALER [1980]) that individuals do indeed tend to disregard opportunity cost compared to out-of-pocket cost (opportunity cost effect). In both cases, individuals are not concerned with the cost of their anomalous behavior. Hence no reaction is to be expected, and the individuals will pursue their irrational kind of behavior.

Normally, however, individuals falling prey to anomalies become aware of the costs entailed, at least after some period of adjustment. This may happen either by the anomalously acting individuals *themselves* noting the cost, or they

are made aware of it by *other* persons. It is useful to distinguish between two different kinds of anomalies in this context:

(a) There are anomalies to which (almost) all individuals fall prey. Examples are the tendency to misevaluate small probabilities<sup>4</sup> or the certainty effect<sup>5</sup> (KAHNEMAN und TVERSKY [1979]). Other instances are provided by framing effects, i.e. almost nobody is immune to the way in which alternatives are formulated. It has been shown (SLOVIC and LICHTENSTEIN [1971], LICHTENSTEIN and FISCHHOFF [1977], TVERSKY and KAHNEMAN [1971, 1974]) that even experts fall prey to such anomalies; even statisticians who have themselves contributed to the formulation of expected utility theory have committed mistakes when they were confronted with experimental tasks. Being in the position of an outside observer does not help.

(b) Other anomalies are *only* relevant for those individuals acting, while outsiders are immune from them. This applies to two important anomalies often to be observed in daily life: the sunk cost effect (THALER [1980]) – people take into account past cost though they should not – is obviously irrelevant to other people because they did not have to bear these costs. The endowment effect (THALER [1980]) – people attach a higher value to what they own than they would do if they did not own the object – is also specific to the person acting and outsiders are not affected.

In the second type of anomaly, outsiders are equipped to inform the individual falling prey to the anomaly about his or her irrationality. It remains open, however, whether the individual concerned accepts the information offered.

## 2. *Reaction to Cost*

Even when an individual behaving in an anomalous way is aware of the cost entailed by his/her action, he/she may still not react but continue as before. The reason is that the cost of reacting (transaction cost) may be too high compared to the possible cost reduction or the potential gain. This applies, for instance, to some of the stock market anomalies<sup>6</sup> noted by SHILLER [1981], CAMPBELL and SHILLER [1988], DE BONDT and THALER [1985, 1987, 1989] and THALER [1987 b, 1987 c] where the buying and selling fees may be higher than the profit that can be made. The reluctance to act though one is aware that one's position is not 'optimal' has been stressed as an important feature of procedural ratio-

<sup>4</sup> Almost all people react differently to a doubling of a probability from 30% to 60% compared to one from 0.005% to 0.01%, a fact which violates expected utility theory.

<sup>5</sup> The certainty effect is seen e.g. in the experimental observation that most people prefer a certain win of \$ 3000 to an 80% chance to win \$ 4000, but give up a 25% chance to win \$ 3000 for a 20% chance to get \$ 4000. This is anomalous because the two set ups are identical except that in the second one both probabilities are divided by four.

<sup>6</sup> E.g. the excess volatility of stock prices (compared to the present value of future earnings), the overreaction of the stock market or seasonalities in the returns on stocks like the January or Weekend Effect.

nality in SIMON's [1957, 1978] 'satisficing', or 'bounded rationality', and in LEIBENSTEIN's [1976] concept of 'inert areas'. The consequence is that the anomalies and their concomitant cost remain and can be empirically observed.

In many cases, however, the transaction costs are not so high as to prevent action. Individuals then consider and compare alternative possibilities for action, depending on a cost-benefit calculus. Such action may be undertaken by the individual falling prey to the anomalies. Often, action is undertaken by other decision makers who see the chance of reaping profits from the irrationalities. Straightforward examples are subjectively undervalued or overvalued stocks, or public lotteries where it is known that some numbers are more unpopular than others<sup>7</sup> (see THALER and ZIEMBA [1988]). Hence a profit may be made by betting on such numbers because when they win, the lottery sum is divided among fewer participants than in the case of more popular numbers. Another example is the disregard of small probabilities with respect to natural disasters (KUNREUTHER [1976], KUNREUTHER et al. [1978]). Irrational people are prepared to pay a higher price for land which may be affected by such natural disasters. This may happen because they wrongly believe that no disaster is going to occur. Rational people may reap a profit by offering such land at a higher price than it is worth if the correct disaster probabilities were taken into account. As a result of this supply of land, the price moves in the direction consistent with a rational evaluation, and the anomaly is no longer visible.

### 3. Level of Reaction

The reactions to the cost of anomalies may take place at two different levels.

(a) On the *individual level* persons may resort to self-commitment, i.e. they may impose rules upon themselves designed to help them to evade anomalies. The individual may be regarded as a 'multiple self' (ELSTER [1986]) consisting of a planner who knows that there is a risk of irrational behavior, and of a doer (MARGOLIS [1982]) who tends to fall prey to the anomalies. This concept has been discussed as a solution to 'akrasia', or weakness of will (SEN [1979]) but is perfectly applicable to the case of anomalies. An example may be a professor who is well aware that he tends to accept too many tasks which later he will regret. Knowing this, he may impose upon himself the rule that he will never accept any task immediately but only make a decision of whether he wants to do so some days later (when he hopes to see more clearly).

(b) Reactions to the cost of anomalies may also occur at the *collective level*. Irrationally acting individuals may seek help from outside. Such help may come from other outside individuals, in particular the family, or from friends

<sup>7</sup> The reader may like to know what these numbers are. In a Lotto choice of six out of 49 numbers, the following twelve are chosen to a systematically lower extent: 10, 12, 18, 29, 30, 32, 38, 39, 40, 41, 42, 48. These numbers tend to be 15 percent to 30 percent less popular than average. (THALER and ZIEMBA [1988, 168])

come from other outside individuals, in particular the family, or from friends or colleagues (e.g. the professor just mentioned may ask his wife to restrain him when he tries to undertake too much). Another possibility is to resort to institutions: The endeavor to deal with individual anomalies thus constitutes a reason for the existence of institutions.

### *III. Emergence of Institutions*

#### *1. Conditions*

As is well known, institutions do not necessarily emerge even if the individuals are willing to pay for their establishment and functioning. On the 'constitutional' level (BUCHANAN [1977]) or level of social consensus (FREY [1983]) the veil of ignorance may help to overcome the free riding problem; on the level of the current politico-economic process at least one of OLSON's [1965] conditions for collective action – small groups, selective incentives, or coercion – must be fulfilled in order for institutions to emerge. If an already-existing institution assumes the additional function of dealing with anomalies, only marginal cost (which are often small) matter.

#### *2. Process of Emergence*

Institutions may come about by *spontaneous* action of which the *market* is the most prominent case. Entrepreneurs offer devices which help individuals who are willing to pay the price demanded to overcome the anomalies to which they are subject. It has already been mentioned in section I that the irrational behavior of others may be exploited provided competitive markets exist.

On the market, suppliers may in particular offer counselling services designed to overcome the anomalies. With respect to business and financial affairs, many different forms of consult firms exist or rapidly emerge when an opportunity arises. Tax consultants, e.g., help individuals (and firms) to deal with the tendency to disregard opportunity cost noted above; financial consultants help them to deal with the many anomalies observed on the stock market, also noted above. Counselling individuals may go further and also relate to the more private sphere. Privately supplied management seminars teach one how to organize one's activities efficiently and consistently, and the many forms of psychotherapy assist individuals to evade irrationalities, or, more often, to reduce the cost once they have occurred.

Another kind of institution which may spontaneously emerge are *social norms* and *traditions*. The most important ones are in the context of the *family* or other small social groups. The family may prevent irrationalities by inducing individuals to take decisions in the context of a larger set of persons and a longer time horizon (more than one generation). A case of this is provided by anomalies arising when romantic lovers intend to enter marriage. The parents

and other relatives may point out the many other conditions needed for the existence of a well-functioning partnership designed to hold over a long period of time (for life). In more traditional settings, which actually prevail in most parts of the world and which were once also clearly dominant in Europe, parents actually arrange marriages. Families have also always been crucial with respect to inheritance. In some cases family rules have been established which specify e.g. that the ancestral home may not be sold, or even mortgaged<sup>8</sup>. The family setting is also important in reducing the costs of anomalies, be they monetary or psychic. Because the altruism among family members prohibits the exploitation of anomalous family members, the family provides individuals with a safe harbor which is available under all circumstances even if it is needed as a consequence of foolish behavior. Thus, alcohol or drug addicts may turn to their families, as may those who go 'bankrupt' in their marriage and business affairs.

Other institutions designed to deal with anomalies are *consciously designed* by human action. An instance are *clubs* such as college fraternities (at German universities the 'Verbindungen', 'Burschenschaften' und 'Corps'), freemasons, or the Rotary and Lions clubs. One of their important, but of course not their only, functions, is to help members who have fallen prey to anomalies to evade them in the future and to reduce the cost once they have occurred. There are a great number of other institutions, such as churches, which may be seen in this light.

In present times, the *government* has emerged as one of the most important institutions for dealing with individual anomalies. At the *constitutional level* laws may be introduced which serve to restrict those members of society who are thought to be specially prone to act irrationally. Children, the mentally ill, and formerly women and the poor, are not given political rights, and do not have rights to contract. Laws may also serve to regulate those activities wherein people are specially prone to act anomalously. Examples are tight regulations with respect to borrowing and insurance. Thus, in many countries (e.g. in some parts of Switzerland) people are forced to insure their houses against elementary risk, and health and old age insurance is compulsory. (Obviously, other, and supplementary, explanations can be given for the existence of such laws, such as moral hazard or adverse selection.)

At the current politico-economic process government provides for a great many institutions (organizations) which correct individual anomalies and mitigate their effects. An example is the support of the poor.

Yet another institution designed to deal with individual irrationalities are (public but also private) *administrations*. They follow well established and

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<sup>8</sup> This has been the case for noble families in East Prussia, such as the family von Kleist (members of which were the poet Heinrich von Kleist and a large number of generals). See KITTNER [1987, 40–51]).

specified rules of decision making and implementation which help to reduce anomalies. This positive aspect of 'bureaucratic rationality' has been noted by writers on the topic such as WEBER [1922, 1958] while it has been rather neglected by Public Choice analyses (e.g. TULLOCK [1965], NISKANEN [1971]).

### 3. *Types of Institutions Emerging*

While institutions serve several different purposes, three major types may be distinguished with respect to dealing with anomalies of individuals' behavior:

(a) *Prevention of anomalies.* Individuals are guided by institutions so that they behave in line with the von Neumann/Morgenstern axioms.

(b) *Reduction of cost.* Institutions serve to mitigate the cost consequences for the individuals who have fallen prey to anomalies.

(c) *Redistribution of cost.* Institutions shift the cost of irrational behavior among individuals and/or between time periods. Thus, consumption may be reduced in one period in order to compensate the same person when they become the victim of an irrational action brought about by him or herself.

The three 'ideal' types of institutions dealing with individual anomalies may be illustrated for the case of elementary risk insurance. In this area, (a) anomalies may be prevented by enforcing insurance or by providing additional incentives for insurance; (b) cost may be reduced by inducing people by force or incentives to build safer houses which are more resistant to fire and floods, or by prohibiting building in risky areas; (c) cost may be redistributed by compensating through public funds or charitable organizations home owners who are insufficiently insured when they suffer damage<sup>9</sup>.

The three types of institutions are 'ideal' in the sense that in reality there are rarely institutions which serve only one of the three purposes. Usually, they serve all three functions simultaneously, albeit to a different degree.

### IV. *Are the Anomalies Eliminated?*

The purpose of this paper has been to show that anomalies in individual behavior present a (so far disregarded) cause for the emergence of institutions. It is, however, important to realize that institutions may under specific conditions also *strengthen* individual level anomalies by intervening in the aggrega-

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<sup>9</sup> An instructive example is provided by the Swiss Canton Uri, where in 1987 heavy rainfalls led to the destruction of many houses and farmlands. This canton being one of the few without compulsory insurance against natural disasters, many people were in fact not insured and incurred very heavy losses. But charitable organizations were fast at hand: In a very short time they collected over 50 million Swiss Francs to help those affected.

tion process<sup>10</sup> (this is dealt with in FREY and EICHENBERGER [1989]). Even if this latter possibility is disregarded here, the question still arises as to the extent to which the institutions that have emerged are able to eliminate individual anomalies.

This question can only be answered if one considers the relationships which have been established *after* the institutions have emerged. This situation is graphically shown in Figure 1.

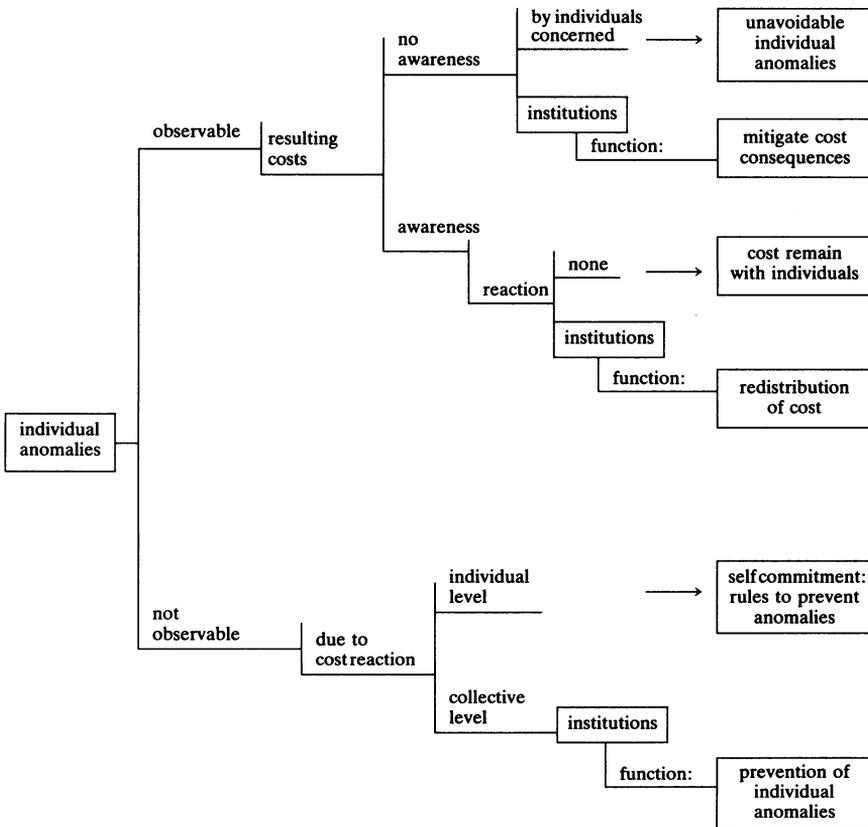


Figure 1

Relationships Between Institutions and Anomalies

<sup>10</sup> To give an example for the purpose of illustration: When governments tax, and therefore ‘punish’ profitable, i.e. rationally acting individuals and firms, and subsidize, and therefore support, irrationally acting individuals and firms making losses, the individual level anomalies are magnified at the macroeconomic (social) level – compared to the situation in which anomalous individuals are driven out of the market by competition.

A reading of Figure 1 reveals the relationship between anomalies and the three types of institutions. The upper part shows the case of (empirically) *observable anomalies*. There are two types of institutions observable which deal with these anomalies: when individuals are not aware of the cost of anomalies in the sense of being motivated to respond institutions may nevertheless arise which serve to *mitigate the cost* consequences. On the other hand, when individuals are aware of the cost and do react, institutions may arise which *redistribute cost* among individuals or over time. It may be noted that if such institutions do not emerge, the psychological anomalies persist without the individuals concerned subjectively being aware of the cost, or they may even persist if the individuals are aware of the cost.

The lower part of Figure 1 illustrates the case in which *anomalies are not* (empirically) *observable*, i.e. they do not *seem* to be relevant. The reason for this lack of observability is that at the individual or collective level action has been taken to remove the anomalies. On the collective level, institutions may emerge which completely *eliminate the anomalies* in individual behavior. The same may be achieved by self-committing rules at the individual level. Our analysis suggests a systematic relationship between anomalies and institutions. The three types of institutions distinguished emerge as a result of empirically observable conditions: cost awareness, reaction (transaction) cost, and the level of reaction (individual or collective). A (seeming) paradox may also be pointed out: while the anomalies in individual behavior may *not* be observable, the phenomenon nevertheless exists but is visible only in the form of institutions dealing with these anomalies. The anomalies are in this sense real, as they reappear if these institutions were suppressed.

#### V. Concluding Remarks

This paper studies the consequences of individuals' irrational or anomalous behavior (which has been established in well defined circumstances) for social institutions. Three major results follow:

- (1) One (so far neglected) reason for the emergence of institutions is individual anomalies.
- (2) The institutions which emerge may either prevent individual anomalies, reduce their cost for the individuals affected, or redistribute the cost.
- (3) The type of institution which emerges depends upon three determinants: the extent to which individuals are aware of the cost resulting from anomalous behavior, the (transaction) cost of reacting to the cost arising, and the individual or collective level of reaction (which in turn depends on the well known conditions for collective action).

It should be reiterated that while a so far disregarded cause for the emergence and existence of institutions has been pointed out, it is, of course, not the only

cause. The reasons for institutions to overcome prisoner's dilemma deadlocks and to coordinate action remain fully valid.

The paper may further be looked at as an effort to show that the *rational choice approach* on which modern economics is based does *not mean* that *rationality of individual behavior* must be assumed under all circumstances. Rather, the rational choice approach may be used to analyze how human beings are able to overcome their weaknesses.

### Summary

Economic models assume that individuals behave rationally. Research by experimental economists as well as by cognitive psychologists reveals, on the other hand, that under many circumstances people systematically deviate from rationality. Anomalous behavior causes, however, costs which in most cases are perceived and which are sought to be overcome. As a reaction institutions may emerge or may consciously be created in order to mitigate anomalies and their cost. This provides a new explanation for the establishment of institutions which so far has been neglected, and which supplements existing explanations.

### Zusammenfassung

In ökonomischen Modellen wird Rationalverhalten der Individuen unterstellt. Aus Forschungsergebnissen der experimentellen Ökonomie und kognitiven Psychologie wird hingegen deutlich, daß Menschen in vielen Situationen systematisch von der Realität abweichen. Anomales Handeln verursacht jedoch Kosten, die zumeist erkannt und zu überwinden versucht werden. Als Reaktion können Institutionen entstehen oder bewußt geschaffen werden, die die Anomalien abschwächen oder deren Kostenfolgen mildern. Damit wird eine Begründung für die Entstehung von Institutionen gegeben, die bisher vernachlässigt wurde und die gängigen Erklärungen ergänzt.

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