Can a Law Be Formulated for Human Behavior?

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Abstract: The aim of this paper is to discuss the possibility to formulate the rationality principle as a law of human behavior. In the first step I will show that from a methodological point of view the rationality principle can only be regarded as a hypothetical law. The second step identifies the rationality principle as a simultaneous maximization procedure. It follows a discussion of experiments and empirical studies which falsify the rationality principle as a hypothetical law. The rationality principle will be rejected as a general theory of human behavior, although no alternative principle provides better results. Finally, three solutions are discussed: an action theory as a heuristic tool (in the sense of Max Weber's ideal-types), probabilistic theory, or meta-theory (in the sense of Gary Becker's human capital theory).

Keywords: Action theory, rationality principle

The social sciences deal with phenomena that are the result of human behavior. The task to explain the phenomena and to predict their changes would be much easier if the human behavior itself could be determined by general statements. But can human behavior be explained in terms of a law? And which theory could be an appropriate candidate for such a law? I think that the obvious candidate would be the economic rationality principle proposed by Carl Menger, William Stanley Jevons, and Marie Esprit Léon Walras. Nowadays, economists state emphatically that *the economic rationality principle is valid for all actors and every behavior* (McKenzie 1983: 13; Opp 1983: 209; Hirshleifer 1985: 53; Brunner 1987: 368; Held 1991: 10; Müller-Funk 1993: 14f.; Demsetz 1997: 1), independent of the question, if the decision to act was made consciously or not (McKenzie/Tullock 1975: 8; Opp 1979: 320; Weede 1992: 97; Ramb 1993: 21). And also Max Weber regarded it in the form of the instrumentally rational action as the most rational ideal-type or the zero hypothesis in sense of the prototype of human behavior.

1. The status of the rationality principle

However, *the status of the rationality principle* can be specified in three different ways. First, it can be stated that the rationality principle is an a priori true law or axiom. Carl Menger regarded it as a law (Menger 1883: 42; Hutchinson 1981: 179; Smith 1986: 3f.; Engelhardt 1989: 39). A test of the rationality principle is impossible in this version, because it is a rule for perceiving the world. "To want to test the pure theory of economy by experience in its full reality is a process analogous to that of the mathematician who wants to

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correct the principles of geometry by measuring real objects" (Menger 1883: 54/1985: 69f.). Menger's position seems to be not very problematic, because it is very plausible to assume that actors use a rational selection procedure for their decisions. The antithesis that actors consciously do not choose the best known alternative for their aim is hard to believe. And if a plausible assumption cannot be tested then it makes sense to formulate it as an axiom. This means only that in the explanation of an actor's behavior the possible use of an irrational selection procedure is excluded (Kleinewefers 1981: 6f.). Unfortunately, the rationality principle implies much more than the exclusion of sub-optimal choices. As I will show, it includes a very specific selection procedure, which no longer seems to be so plausible. In fact, most people regard it as counter-intuitive that everybody uses such a rational selection procedure in every situation. Besides of this consideration, it is not justified to define anything as a priori true from a methodological perspective. Anything that cannot be tested is metaphysical and does not belong to the empirical sciences. Therefore the first status of the rationality principle as an a priori true law cannot be accepted.

The second group of economists regards the rationality principle as a heuristic method. It is thus no longer the subject of analysis but the tool for the analysis (Zintl 1986: 230; Suchanek 1991: 83; Popper 1994: 177f.; cf. Zafirovski 1999: 64). It is an "almost empty principle", which "does not play the role of an empirical explanatory theory, of a testable hypothesis" (Popper 1994: 169). In comparison to the first formulation of the status, it is still a priori given and still not testable, but now it is no longer true. A rationality principle which is not universally true must be false (Popper 1994: 172). It is used as a good approximation to the truth, although it is realized that it is not the truth (Popper 1994: 180). So far this standpoint is similar to Max Weber's position. Max Weber too regarded the ideal-types as a heuristic scheme of interpretation; but the difference is that Weber wanted to test the correctness of the interpretation in each singular case, and he demanded that the instrumentally rational ideal-type be replaced by another type if necessary. In the economic version of the rationality principle as a heuristic tool, the correctness of the interpretation in a singular case is not checked. The rationality principle, in the sense of an instrumentally rational action, is not questioned as the only possible type of action. This is regarded as necessary to falsify a hypothesis in the social sciences. The rationality principle as a heuristic principle requires that a failure of a hypothesis in a test is related to the hypothesis and not to the rationality principle (Popper 1994: 177f.). But the problem with this status of the rationality principle is that we can no longer be sure that a hypothesis that failed is really false, because we have no guarantee that the actors really behaved rationally. As a result we not only do not know if a theory is true, but we also do not know if a theory is false. And anything that cannot be tested is metaphysical and does not belong to the empirical sciences. Therefore the second status of the rationality principle as a heuristic tool cannot be accepted, because it leads to an exclusion of the social sciences from the empirical sciences.

Thirdly, the status of the rationality principle can be regarded as a hypothetical law (Schmid 1979: 79; Føllesdal 1982: 311; Brunner 1987: 374; Opp 1989: 105). In contrast to the previous versions, the rationality principle is no longer a priori given and unfalsifiable. It is an

empirical theory that can be tested (Opp 1989: 106) and it is used as a working hypothesis as long as no better theory is known (Føllesdal 1982: 311). This position is methodologically unproblematic, because this third group of economists admits that the rationality principle could be false, and they accept to decide the issue by evaluating the success of the theory in empirical tests. Michael Schmid gave a formulation of the rationality principle as a law:

> If it is valid: (1) that P [the person] has A [the aim] really, and
> (2) P believes that under the given circumstances M is a means (among other possible means) to reach A directly or indirectly, and
> (3) A is under the given circumstances the highest ranked aim for P, and
> (4) M is under the given circumstances the highest ranked means for A, and
> (5) P knows how to carry out M, and
> (6) P is able to do M,
> then (7) P does M. (Schmid 1979: 69)

The conclusion that the actor P does the behavior M follows logically out of the assumptions (1) to (6), which again can be tested independently. If the premises (1) to (6) are given in a concrete case and the actor does not carry out the behavior M, then the rationality principle would be falsified. Incidentally, the rationality principle does not explain which aims the actor has. It only explains what an actor will do, if an aim and a set of means for this aim are given (Schmid 1979: 71; cf. McKenzie 1983: 15). *The third standpoint, that the rationality principle is a hypothetical law, is therefore the only acceptable status of the rationality principle*. And the empirical tests will decide if it is true in the sense of a universal law which survived the tests.

2. The definition of the rationality principle

As a next step *the rationality principle must be defined*. Three different concepts of the rationality principle are common in economics. The first group of economists defines the rationality principle as a choice of appropriate means to attain one's ends (Mortimore 1976: 93; Boudon 1989: 374; Rosner 1993: 26). This is the weakest and most ambiguous version, and therefore not very useful for a test of the rationality principle as a law. The second and probably largest group of economists provides a stronger version of the rationality principle. It is no longer only a suitable choice of means but now also includes a concrete selection procedure: the utility maximizing procedure (McKenzie/Tullock 1975: 8; Kleinewefers 1981: 11; Raub/Voss 1981: 41; Elster 1986: 4f.; Becker/Murphy 1988: 675; Coleman 1990: 14; Wessling 1991: 33; Marini 1992: 23; Frank 1997: 18). The utility maximization principle is formulated as a simultaneous selection procedure, in which all the alternatives are ranked after the utility they produce. After the ranking is completed, the highest ranked alternative is chosen. The utility concept is an aggregate of all the advantages and disadvantages of the alternatives. It comprises material as well as ideal variables. Originally, the utility concept was

defined by Bentham, Gossen, and Jevons as a measurement for the satisfaction or happiness of the actors (Varian 1996: 54). But the idea of a measurement of happiness was replaced by the modern economists with the concept of "revealed preferences" (Samuelson 1938). The preferences and the expected actions are no longer determined by the utility of the alternatives, but the preferences and the utility function are derived from the observed actions (Sen 1973: 241). In the terms of Schmid's formulation of the rationality principle as a law, this means that out of the sentence (7) that 'P does M' follows (4) that M is the highest ranked means or the means with the highest utility. It is obvious that the concept of the 'revealed preferences' leads to tautological explanations (Fireman/Gamson 1979: 20f.; Opp 1983: 211; 1989: 121; Tietzel 1985: 41; Zintl 1986: 232; Marini 1992: 29; Braun 1998: 157), because the sentence (4) now follows out of (7) and (7) out of (4).

> Why does a person perform an act? Because he finds the results rewarding. How do you know it was rewarding? Because he performed the act. Why did he do this rather than that? Because this has greater expected utility than that. How do you know? Because decisions maximize expected utility. (Emerson 1981: 38)

Therefore the concept of "revealed preferences" cannot be accepted, because statements about concrete human actions and the hypothesis of the rationality of human actions in general would no longer be falsifiable (Schmid 1979: 26; Kerber 1991: 63; Held 1991: 14; Zey 1992: 15; Frank 1997: 215f.; Braun 1998: 157). Finally, the use of the utility concept only makes sense if it is defined as an aggregated criterion for ranking the alternatives in the preferences. And the preferences of the actors have to be determined independently of the observed actions, to make a test of the rationality principle as a hypothetical law possible.

The third definition of the rationality principle by a group of economists, who want to avoid the far-reaching implications of this equation of rationality with utility maximizing, describes the rationality principle as a systematic adaptation of the individuals to the changes of the environment or objective situation (Popper 1952: 97; Kirchgässner 1980: 423; Homann/Suchanek 1989: 77). In this definition, no statements about the selection procedure are made and therefore it cannot be falsified by showing that human actors do not use the utility maximizing procedure. This concept of the rationality principle seems to be supported by an analysis of Gary Becker's in his paper "Irrational behavior and economic theory" (1962). He showed that independent of the selection procedure used—for example, traditional or probabilistic behavior—actors adapt systematically to environmental changes. The reason for this adaptation lies in the objective restrictions of the situation. Even a probabilistic selection leads *on average* to systematic changes, because all actions must be chosen out of the set of possible alternatives and the objective restrictions increase or decrease the set of alternatives. An increasing (decreasing) set of alternatives will therefore *on average* produce better (worse) results than the original set. The same is the case for traditional behavior. A traditional selection procedure will also adapt if the set of alternatives decrease and the traditional chosen alternative is no longer in the set. The new alternative must be chosen in

Table 1: An example of Tversky's lexicographic semi-order

		alternative		
		x	y	z
dimension	I ($)	2$	3$	4$
	II (§)	6§	4§	2§

Source: Etzrodt 2003: 32; cf. Tversky 1969: 32.

this case out of the smaller set, which leads to a worse result. Therefore Becker concluded that actors adapt systematically to the objective situation dependent on the restrictions and independent of the applied selection procedure. However, Becker's argumentation is inconclusive. He neglected the point that a traditional selection procedure does not lead to changes at all if the set of alternatives increases. Only a decreasing set of alternatives forces the traditional actor to adapt to the new situation. But increasing sets will not challenge the sub-optimal results (Etzrodt 2003: 16ff.). In fact, Becker's analysis makes clear that in contrast to his result only the utility maximizing procedure with transitive and complete preferences (Kreps 1990: 21, 23, 27f.; Varian 1996: 35) can guarantee a systematic adaptation to environmental changes. Here the logical proof given by Amos Tversky (1969), that multidimensional preference orders do not necessarily lead to consistent choices, is important.

For example, if an actor has a two-dimensional preference order and a set of three alternatives (see Table 1), and he follows the rule 'If the difference between the alternatives in Dimension I is less than or equal to 1$, choose the alternative that has the higher value in Dimension II', then he has an intransitive preference order. He prefers alternative x more than y (because 6§ > 4§) and y more than z (because 4§ > 2§), but z more than x (because 4$ > 2$). Self-evidently such intransitive preferences do not produce systematic adaptations.

Therefore one-dimensionality of the preferences (measured in utility) and the simultaneity of the evaluations based on this one dimension (which means maximization) are a necessary prerequisite for systematic adaptations of the actors' behavior to environmental changes. As a result, the third definition of the rationality principle as a systematic adaptation to the objective situation implies the second definition in the sense of a utility maximizing procedure. The far-reaching implications of the utility maximizing principle cannot be avoided. Based on these considerations a crucial test of the rationality principle can be simplified. It is no longer necessary to show that in Schmid's formulation as a hypothetical law sentence (7) does not follow in every case out of the sentences (1)–(6). This empirical test can be replaced by a *test of the concrete selection procedure*. If some actors do not maximize their utility—or stated differently, if they do not choose the best alternative from a one-dimensional preference order (this dimension is by definition the utility of the actor), then the rationality principle is falsified.

Table 2: The Allais paradox

Problem 1							Problem 2						
var.	outc.	prob.	var.	outc.	prob.	N	var.	outc.	prob.	var.	outc.	prob.	N
A	2.500	33%	B	2.400	100%		C	2.500	33%	D	2.400	34%	
	2.400	66%						0	67%		0	66%	
	0	1%											
18%			82%*			72	83%*			17%			72

Source: Etzrodt 2003: 58; cf. Kahneman/Tversky 1979: 265f.; Allais 1953: 527.

3. Critical tests of the rationality principle

In economics, *critical tests of the rationality principle*, especially of the expected utility theory, have a very long tradition. Expected utility was designed to allow rational decisions under risk. The utility of an alternative a_i is the sum of the outcomes x_{in} of each possible situation n multiplied by the probability p_n that the situation n will arise: $u(a_i) = \Sigma\ p_n u(x_{in})$. The expected utility theory has the advantage that a concrete selection formula is precisely defined. It was therefore qualified for an empirical test. Maurice Allais (1953) was the first to show that real human actors violate the basic rules of the expected utility theory.

In Table 2 an example of the so-called Allais paradox is given by Kahneman and Tversky (1979: 265f.). Most people state in problem 1 a preference for variant B over variant A. This implies that the majority judges an outcome of 2.400 with a probability of 34% higher than an outcome of 2.500 with a probability of 33% [$u(2.400) > .33u(2.500) + .66u(2.400) \Leftrightarrow .34u(2.400) > .33u(2.500)$]. But in problem 2, 83% of the actors prefer variant C over variant D. Here the majority of the same people find an outcome of 2.500 with a probability of 33% more attractive than an outcome of 2.400 with a probability of 34% [$.34u(2.400) < .33u(2.500)$]. This kind of preference reversal clearly contradicts the rationality principle with the premise of consistent preferences. The percentage of people who violate the expected utility theory differs from experiment to experiment, but it lies in the range of 30% to 60% (Camerer 1995: 623).

A large number of experiments followed the Allais paradox, most of them with similar devastating results for the rationality principle under risk (overviews are given in: Frey 1990: chap. 11; Camerer 1995; Etzrodt 2003: 58ff.). Today, there can be no doubt that the expected utility theory is simply false as a descriptive theory in the sense of a general law. However, the fact that the rationality principle under risk specified as the expected utility theory did not survive the empirical tests does not necessary mean that the rationality principle in general or under certainty is also false. A series of empirical tests of the rationality principle in general was made at the University of Cologne, headed by Jürgen Friedrichs. In these studies, actors were interviewed about their decision process. The decision situations were the problems of choosing their vacation destination, occupation (Friedrichs/Opp 2002), investments (Enste 1998), children's kindergarten (Kehl 1998), and computer purchases (Wald 1998). Common arguments against laboratory experiments are inapplicable to these

studies, because all the questionnaires were made after real decisions. The result showed that a considerable number of actors recognized from the beginning only one “alternative” (10% for the investment decision, 19% for the computer purchase, 21% for the occupation decision, 30% for the vacation destination decision and 41% for the kindergarten decision). However, not every actor who realized only one ‘alternative’ was following a habit.[1] In the case of the choice of kindergarten, at least 31% of the persons were repeating their former decision without evaluating other alternatives (Kehl 1998: 71), but in the computer purchase decision, no actor bought in the same shop again (Wald 1998: 104). Therefore the share of habitual behavior varied from 0% to 31% depending on the problem. The actors who saw more than one alternative on the other side were using several different procedures for selecting one alternative. The share of the simultaneous (utility) maximization procedure was 46% in the occupation and vacation destination decisions, 28% in the computer purchase decision, 20% in the kindergarten decision, and 6% in the investment decision. However, the majority of actors in most of the studies were selecting one alternative with a sequential or mixed procedure (sequential and simultaneous procedures in different phases). A sequential or mixed procedure was used by 72% of the actors in the investment decision, by 48% in the computer purchase decision, by 39% in the kindergarten decision, and by 30% in the occupation and vacation destination decisions. If a mixed procedure was applied, then the sequential procedures were mostly used to reduce the number of alternatives to two, whereas the simultaneous procedures were applied to choose the best out of two surviving alternatives (Enste 1995: 134; cf. Slovic et al. 1977: 8). In sequential procedures a person is not evaluating all alternatives based on an all-embracing (utility-) criterion, but he judges one alternative after another with an aspiration level or with a single knock-out-criterion like the price. He will stop the procedure if he finds an acceptable alternative without evaluating the following alternatives or other criteria. Because sequential procedures operate over more phases, they are usually more complex than simultaneous procedures. But they are less demanding, because they require less cognitive effort in each phase. Sequential procedures in contrast to simultaneous procedures do not guarantee a maximum, because the first best alternative does not need to be the best of all possible alternatives. Because they do not find a maximum, repetitions under the same condition do not lead to the same choices (the choice of an alternative depending mainly of the alternatives’ order). And finally because repetitions do not result in the same choice, intransitive preferences can occur. Herbert Alexander Simon’s satisficing concept is probably the best-known example of a sequential procedure (Simon 1955: 104ff.; 1957: 204f.; 1972: 168; 1978: 10; Selten/Tietz 1980: 19; Klopstech/Selten 1984: 14). Several hypotheses can be derived out of these studies:

1) The higher the frequency and regularity of a decision situation, the more likely a person will behave habitually.

2) The lesser the interest of a person in a decision situation, the more likely he will behave habitually (highly significant with $p \leq .001$ in Enste 1995).

3) The more complex a decision situation, the more likely a person will apply a sequential selection procedure and less likely a simultaneous utility maximizing procedure (highly

significant with $p \leq .001$ in Kehl 1998).

A simultaneous utility maximizing procedure is usually not applied for frequent and regular decision problems, in which the actor is only marginally interested. Here habits explain human behavior significantly better than a rational simultaneous selection procedure.[2] On the other hand complex decision problems also are not solved with simultaneous but rather with sequential procedures. Real actors prefer sequential procedures, because they require less mental effort. These results clearly contradict the expectations based on the rationality principle as a general law. *Therefore the rationality principle is not only false in the case of the expected utility theory under risk but in general. However, can it also be regarded as falsified?*

4. Is the rationality principle falsified?

For Popper a theory is only falsified if a better theory can take its place (Popper 1989: 54f.). And a theory is better if it can explain everything that the old theory could explain, and some of the cases which the old theory could not explain (Popper 1979: 14; cf. Popper 2002: 314f.). Obviously such a 'better' theory does not exist and probably cannot exist. Sequential selection procedures are used more often in reality than simultaneous procedures, but they can neither explain rational decision nor all the cases which the utility maximizing procedure cannot explain (for example habitual behavior or delegation). Additionally the sequential procedures are a heterogeneous group of several completely different decision strategies. None of them is a possible candidate for a 'better' theory. Therefore, economists usually come to the conclusion that the simultaneous utility maximizing procedure and the rationality principle can still explain all human actions better than any other alternative theory (Elster 1986: 27; Opp 1989: 103, 116; Boudon 1989: 194; Kirchgässner 1991: 164; Becker 1996: 4; Braun 1998: 156). They are not willing to abandon rational theories in favor of non-rational theories, because the rationality principle is a "useful approximation of human behavior", although it is not a "precisely true description in all cases". In this sense, it is insufficient "to show counter examples, even many counterexamples" (Roth 1995: 77).

The problem with this argumentation is that Popper's demand of replacing old theories with 'better' theories is based on the assumption that "the number of *possibly* true theories remains infinite, at any time and after any number of crucial tests" (Popper 1979: 15). He had the case in mind wherein a nearly perfect theory of Newton's (cf. Popper 1979: 55) was replaced by an even better theory of Einstein's. But this is unfortunately not the case in relation to human behavior. No theory of human behavior can explain all behavior types. All these theories in the sense of general laws are clearly false. There is no possibility that they could be true. They have a low 'truth content' and a high 'falsity content'. Of course, we can come *closer* to the truth by choosing theories with higher truth content and lower falsity content as proposed by Popper (1979: 57), but in the case of explaining human behavior we will not come *close* to the truth with this strategy. Therefore, does it make sense to call the best theory a law? I do not think so. *It is in my opinion not justified to call a theory which*

explains only around one third of the cases a general law, even if it is the best theory.

5. Action theory as a heuristic tool, probabilistic theory, or meta-theory

But what is the alternative? The alternative would be to formulate a *classification system of different behavior types* as recommended by Max Weber, without assuming that such a system is true. The behavior types or ideal-types are nominal definitions. They do not grasp the essences of these phenomena. They are only defined in the sense of a measurement scale to distinguish different aspects of behavior and to classify the observed behavior based on these aspects. Such a theory in the form of a classification system is a heuristic tool rather than a general statement about human behavior; and it would not make much sense to regard it as a hypothetical law, because the content of classification systems is in general nearly empty. Popper demanded of empirical theories that they proscribe many possible phenomena. The more a theory proscribes, the richer in substance it is. And the richer in substance a theory is, the more easily this theory can be tested. Obviously, the aim of classification systems is the opposite. They usually attempt to include all possible phenomena and therefore proscribe nothing. As a result, an action theory in the sense of a heuristic tool is usually not an empirical theory; because of the nearly empty content, it cannot be tested. It is used to perceive and distinguish different phenomena. And the exact definition of such action types is a prerequisite for formulating testable hypotheses in the social sciences. However, the definitions themselves are arbitrary and not true.

There are only two ways to regard an *action theory consisting of different action types as a hypothetical theory*, which is rich in substance. First, it could be formulated as a *probabilistic theory*. The statement that specific types of behavior occur with a specific probability in specific decision situations is a statement that can be tested and which forbids completely different shares of behavior types in this decision problem. For example, the hypothesis that in decision situations in the context of nearly perfect markets, 80% (±20%) of the actors will maximize their utility is falsifiable. And indeed it would also be falsified. As I previously stated, only 6% of the actors maximized their utility in the investment decision situation (Enste 1998). This example shows that an action theory formulated as a probabilistic theory would be not only a scheme of interpretation but also a testable general statement about reality. I think that such an approach is justified. However, I am not sure that we have enough knowledge accumulated to formulate such a probabilistic action theory at the moment. But in the long run a probabilistic theory seems to be an interesting alternative to an action theory without the claim to be true.

The second approach to formulating an action theory consisting of different action types as hypothetical general statements is the construction of a *meta-theory,* which explains why some actors behave habitually, apply sequential procedures, or maximize their utility. Here the meta-theory would be the law that determines the application of different action types. I will discuss two exemplary meta-theories which are especially important for the explanation of human behavior: Gary Becker's human capital theory and Riker's and Ordeshook's model

of habitual behavior.

5.1. Gary Becker's human capital theory

Becker's *human capital theory* is a two-stage selection model. In the first step the actor has to decide the investments in his human capital. This actually involves two separate choices. First he must decide how much of the resources he wants to consume and how much to invest. And second the resources for investment must be distributed to the different capital stocks. In the second step the actor now chooses the best alternative. All three decisions have to be made simultaneously to secure the choice of the best alternative (Pies 1998: 111; Etzrodt 2003: 50; cf. Habisch 1998: 34). Human capital is regarded as a kind of production function for commodities (Stigler/Becker 1977: 89). This definition is based on the idea that households are not only consumers as in neoclassical economics, but that they also produce goods. The utility gained in the household does not depend directly on the consumed goods, but "on household-produced commodities, such as health, social standing and reputation and pleasures of the senses". And the production of these commodities depends on goods and human capital (Becker 1996: 5). In this sense "future household *production possibilities* are altered by current consumption because it changes the human capital stock" (Winston 1980: 297). For example, if somebody invests in the capital stock 'music', then in the future he will gain more utility by consuming music.

> An increase in this music capital increases the productivity of time spent listening to or devoted in other ways to music. (Stigler/Becker 1977: 78)

In other words, the more a person studies music the more this person will be able to enjoy the profundity of good music. The increase of music capital leads to an increase of the utility gained from the alternative 'listening to music' (Becker 1996: 8), and therefore the actor will most likely listen to music more often in the future. The result is that experience changes the production possibilities and with this the expected utility of alternatives (Stigler/Becker 1977: 78f.; Becker 1996: 9). Changes of behavior are not caused by shifts of taste in favor of music, but by a decrease in the shadow price of listening to music based on an increasing skill to appreciate music (Stigler/Becker 1977: 79). This model has the advantage for economists that they do not need to understand the concrete motives of actors. Every explanation of human behavior only refers to typical economic variables as prices and objective opportunities.

> The great advantage, however, of relying only on changes in the arguments entering household production functions is that *all* changes in behavior are explained by changes in prices and incomes, precisely the variables that organize and give power to economic analysis. (Stigler/Becker 1977: 89)

The accumulation in specific types of human capital can now explain why and when

actors carry out a specific type of behavior. Becker claims that his human capital theory can determine “personal habits and addictions, peer pressure, parental influences on the tastes of children, advertising, love and sympathy, and other neglected behavior” based on the assumption that actors maximize utility (Becker 1996: 4). The explanation of habitual behavior is important here. Habitual behavior is described as a result of an investment into a capital stock, which contains the production-technical knowledge of how to behave in a specific situation approximately optimally. A behavior is then habitual, if in slightly modified situations no disinvestment occurs, because the costs of a new investment go beyond the expected utility of an adjustment of the knowledge (Stigler/Becker 1977: 82). The suboptimality of this choice is only apparent because rational actors also optimize the costs of disinvestments and new investments in the human capital (Voss 1985: 75f.).

> The cost of searching for information and of applying the information to a new situation is such that the habit is often a more efficient way to deal with moderate or temporary changes in the environment than would be a full, apparently utility-maximizing decision. (Stigler/Becker 1977: 82)

Such an optimal investment decision can explain why old people usually have many more problems than young people with adjusting to a new environment or situation. Because of their high age and their low life expectancy, the probability is very low that the investment will pay off. Therefore old people will much more likely give up making disinvestments or new investments to adjust (Stigler/Becker 1977: 83).

Four critical points can be objected to with regard to the human capital theory. The first is a typical sociological criticism. Sociologists normally have a problem with the fact that economists are using a model based on instrumentally rational behavior for the explanation of habitual or traditional behavior. Since Max Weber’s (1980: 12) classification of behavior types, it has been considered common knowledge for sociologists that instrumentally rational and traditional behavior are motivated in different ways:

> [Action] based in tradition is not means-ends related. In the past, people may have made these decisions on a rational basis. Now, these decisions are based on habit, experience, and traditional ways in which the collective has always operated. These types of decisions do not require calculations of means-ends relationships. (Zey 1992: 23)

The second criticism refers to the common-sense meaning of the concept of habitual behavior. Normally people define habitual behavior as less complex than rational behavior. The reduction of mental effort is an important aspect of the meaning of the term ‘habit’ (Shweder 1987: 168; Etzrodt 2000: 775; cf. Hodgson 1993: 45). The problem with the human capital theory is that the usual one-phase maximization model for rational behavior is replaced by three maximization problems for explaining habitual behavior which have to be solved simultaneously. This increase in the model’s complexity clearly violates the common-

sense understanding of habits. But it not only violates the common-sense meaning of habits, it also contradicts Herbert Alexander Simon's insight that human actors have only a bounded rationality (cf. Bohman 1992: 217). For Simon, actors try to avoid complex maximization problems and prefer to apply sequential selection procedures.

This leads to the third point that the results of the abovementioned empirical studies at the University of Cologne are in contradiction to the human capital theory. The human capital theory states that in the first phase the actor applies a rational maximization procedure in the investment decision and in the second phase he follows the habitual alternative or uses a rational selection procedure dependent on the prior investment decisions. However, the findings of the empirical studies are quite the opposite. If a decision is made over more than one phase, human actors usually apply non-rational procedures in the first phases to reduce the number of alternatives and only in the last phase a simultaneous maximization procedure to choose between the two surviving alternatives. Altogether, the human capital theory might give a good explanation for some important investment decisions such as the choice of a university or a profession. But it is doubtful that human tastes in general can be explained in this way. I do not think that somebody prefers to drink beer instead of wine because he was consciously investing in his human capital. But if actors usually do not make such an investment decision, then the human capital theory is simply false as a general theory for human behavior.

The fourth and last criticism refers to the belief that the human capital theory has an advantage over other theories because it relies only on objective variables like prices and income instead of the subjective motives of the actors. This argumentation might be reasonable as long as the researcher is only interested in the capital stock 'formal education'. Here it is relatively easy to evaluate the investments, because standardized educational degrees exist. But on the other hand an evaluation of the capital stock 'music' is much more difficult. In this case an evaluation is impossible without a closer inspection of the actor's life history (Vanberg 1998: 145). But if the life history must be known for this analysis, then the life history can also explain the preferences directly. In other words, the advantage of the human capital theory in dealing only with objective variables vanishes if no objective prices are given anymore. If the theory has to rely on shadow prices, then a correspondence of the theory with the empirical facts is the result of the large scope of ex-post interpretations of the facts (Meyer 1979: 309). It is therefore a question (Weizsäcker 1984: 91) of whether the human capital theory is "at all an empirically refutable hypothesis—or [...] rather a tautology".

My conclusion is that the human capital theory in the sense of a general hypothesis about human behavior is simply false. It cannot replace an action theory consisting of different types of behavior in the sense of a scheme of interpretation. However, I am willing to admit that the human capital theory could be useful for some important investment decisions in capital stocks. Nevertheless, the human capital theory is no solution for the problem discussed here.

5.2. The Riker-Ordeshook model of habitual behavior

In the Riker-Ordeshook (1973: 22f; cf. Etzrodt 2004: 73) *model of habitual behavior*, an actor is facing the following decision problem over two phases. In the first phase the actor has to choose between the two strategies σ_1 (to select the optimal alternative from the set A = $\{a_1, a_2, ..., a_i, ..., a_n\}$ in the second phase) and σ_2 (to search for an additional alternative a_{n+1}, to evaluate it, and to select the optimal alternative from the enlarged set A' = $\{a_1, a_2, ..., a_i, ..., a_n, a_{n+1}\}$ in the second phase). The first strategy σ_1 is equivalent to a routine-following behavior, if set A comprises only one alternative (n = 1) or if the actor chose in the past in a stable environment the best alternative out of set A. The expected utilities of the two strategies appear like this:

$SEU(\sigma_1) = u(x_i)$;

$SEU(\sigma_2) = p_k u(x_{n+1}) + (1 - p_k)u(x_i) - c$.

The probability p_k is the probability of finding a better alternative during the search process, and c is the cost of the search process. The actor has in the second strategy σ_2 the certain utility of the routine $u(x_i)$. He will start the search if the expected benefit from the additional better alternative is greater than the search costs: $p_k(u(x_{n+1}) - u(x_i)) > c$. In the Riker-Ordeshook model, an actor will choose in *every* time period. He acts rationally in the sense of a systematic adaptation to the environment.

Three of the four criticisms of the human capital theory refer also to the Riker-Ordeshook model. First, habitual behavior is again explained as a result of an instrumentally rational choice, although the motivation for this behavior should be different. Second, the model for explaining habitual behavior is more complex than a normal one-phase rational choice, which violates the common-sense meaning of the term 'habit'. And third, the theory is in contradiction to the empirical results that in early phases non-rational procedures are usually preferred, whereas in the last phase rational selections occur more often.

A specific criticism of the Riker-Ordeshook model refers to the problem that a person must have at least an idea about the variables p_k and $u(x_{n+1})$. Normally only actors with experiences in similar decision situations are used to calculate with these variables. This problem is related to the neglected ambiguity problem in the (subjective) expected utility theory. The Ellsberg paradox (1961: 651f.)[3] shows that real actors take not only subjective probabilities but also their confidence in these estimated probabilities into consideration. Therefore the correct formalization would be a multiplication of an ambiguity term q_h with a subjective probability term p_k: $SEU(\sigma_2) = q_h p_k u(x_{n+1}) + (1 - q_h p_k)u(x_i) - c$. If a person has had no or only a few experiences with the search process in a specific decision situation, the ambiguity term q_h or his confidence in his probability estimation will be close to zero. As a result the term $q_h p_k(u(x_{n+1}) - u(x_i))$ will usually be very small and lower than the search costs c. Therefore a person with no experiences will choose the routine or habitual alternative and will not use the unknown variables p_k and $u(x_{n+1})$. It seems that the ambiguity term q_h plays a vital role in the explanation of human behavior *under risk*, which was completely neglected in the model of Riker and Ordeshook (Etzrodt 2004: 74).

As a result, the Riker-Ordeshook model in the sense of a general statement about human

behavior does not survive the empirical tests. But in contrast to the human capital theory, I do not even see that this model could be useful for explaining a specific kind of behavior. Nobody decides in *every time period* to behave habitually. This model is not only false but also unreasonable.

The result is that none of the discussed meta-theories in the sense of hypothetical laws can explain the diversity of human behavior without contradictions to the empirical facts. The basic problem is that economists usually try to formulate rational models of rational action, although it would be much more appropriate to construct rational models of whatever kind of behavior exists (Schutz 1953: 35). *My conclusion is that we have at least at the moment no alternative to an action theory in the sense of a scheme of interpretation without the claim to be true.*

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Notes

1 A habit is by definition a behavior which is repeated.

2 However, it has to be stated that this effect can be reversed by another variable. If the actors are trained to apply rational procedures as the expected utility theory, then the share of simultaneous selection procedures increases drastically (significant with $p \leq .002$ for male participants and $p \leq .02$ for female participants in Schoemaker1980). And because the training effect is domain specific (Fong/Nisbett 1991), it is expectable that a frequent decision problem *in which the actorreceived training* will be solved by a simultaneous maximizing procedure and not by following habits. The frequent appearance of the decision problem would only strengthen the application of the rational procedure, because therepetition is itself a form of training.

3 The Ellsberg paradox describes a violation of the sure-thing principle of the SEU theory. Table 3 presents two lotteries that differ only by the irrelevant event of the yellow balls. All the variants have the same subjective probabilities. But most of the people choose A and D against the predictions based on the SEU theory (80% vs.6% in Becker/Brownson 1964: 67; 58% vs. 26% in MacCrimmon/Larsson 1979: 374). They choose A and D because in both cases the win-condition is not ambiguous. It is certain that every third ball is red in variant A and it is certain that twothirds of the balls are black or yellow in variant D.

Table 3: The Ellsberg paradox

In an urn containing 90 balls are 30 red balls and 60 black or yellow balls.							
roblem 1				problem 2			
variant	red	black	yellow	variant	red	black	yellow
A	$100	$0	$0	C	$100	$0	$100
B	$0	$100	$0	D	$0	$100	$100

Source: Ellsberg 1961: 653f.