

A Game for Life

When people make economic decisions, they're not driven solely by the desire to maximize their personal gain. **Werner Güth** and his colleagues at the **Max Planck Institute of Economics** are seeking to discover what really determines our economic behavior.

TEXT **RALF GRÖTKER**

At the end of the 1970s, a thousand deutschmarks were worth about 1,200 euros in today's money – not necessarily a sum you'd carry as cash in your pocket. “A thousand marks – that was how my colleagues used to persuade people to play along. I was essentially inveigled into it,” says Werner Güth. It was at a meeting of social psychologists and economic mathematicians in the Allgäu that colleagues from the University of Augsburg slipped him the cash – as play money. The idea was for Güth to use the money to experiment with real economic incentives: those taking part in the experiments are paid according to how skillful or selfish they are, or also how cooperative, in various game situations.

Güth is a rather tall man with a confident air about him and an accent that points vaguely to an upbringing somewhere along the Rhine or in the Ruhr region. Only the rather striking frames of his dark glasses hint at a certain eccentricity. The *HANDELSBLATT*, Germany's leading business newspaper, ranks him among the country's top economic researchers. He held professorships in Cologne, Frankfurt and Berlin before accepting an appointment in 2001 as Director at the Max Planck Institute of Economics in Jena, where he established a department of “Strategic Interaction.”

It was Reinhard Selten, mathematician, economist and winner of the 1994

Nobel Prize for his work on game theory, who in 1970 gave the young Werner Güth his first taste of experimental research. The experiments that Güth conducted with his thousand marks ultimately led to his first international publication. Ever since, Güth has been the “ultimatum game man.”

HOMO SAPIENS IS NOT HOMO OECONOMICUS

In this game, one of a pair of participants, the proposer, is given a sum of money that he/she may divide as he/she sees fit between himself/herself and one other person, the responder. The responder is given an ultimatum – hence the name of the game – to either accept the proposed share-out, in which case both players receive the suggested payments, or reject it, in which case both players are left empty-handed.

The two players are anonymous and are aware that this interaction will take place exactly once. They also know that they will never be able, in the future, to identify former game partners. On this basis, a responder motivated by his or her own profit ought to accept even the smallest sum that is offered. If a real-life responder rejects a positive offer, however small, he or she must – so the scientists conclude – be interested in something other than maximizing his or her personal gain.

The results of experiments such as the ultimatum game show that people do not act in anything like the selfish and future-oriented ways proposed in the standard models propounded by economists. Time and again, players have been willing to forego a profit entirely if they considered the proposed distribution to be unfair.

This and similar findings have since been reproduced many thousands of times. Each individual experiment requires the game to be played in multiple rounds in which the players interact repeatedly. The Max Planck Institute of Economics has a computer laboratory devoted to experiments with such illustrative names as ‘*Forbearance*’, ‘*Communication in charitable giving experiments*’ or ‘*Dictator IN/OUT*’. In addition, control experiments are carried out in the video laboratory in the institute's cellar, primarily to discover whether discussions between participants with joint decision-making powers confirm the scientists' expectations.

Today, after decades of experimentation, the focus of Werner Güth's interest has shifted somewhat. In the words of Güth's long-standing colleague, co-author and friend, the Frankfurt-based philosopher and economist Hartmut Kliemt, “The ultimatum game has long since ceased to be an ‘*experimentum crucis*’.” The emphasis is no longer on a fundamental criticism

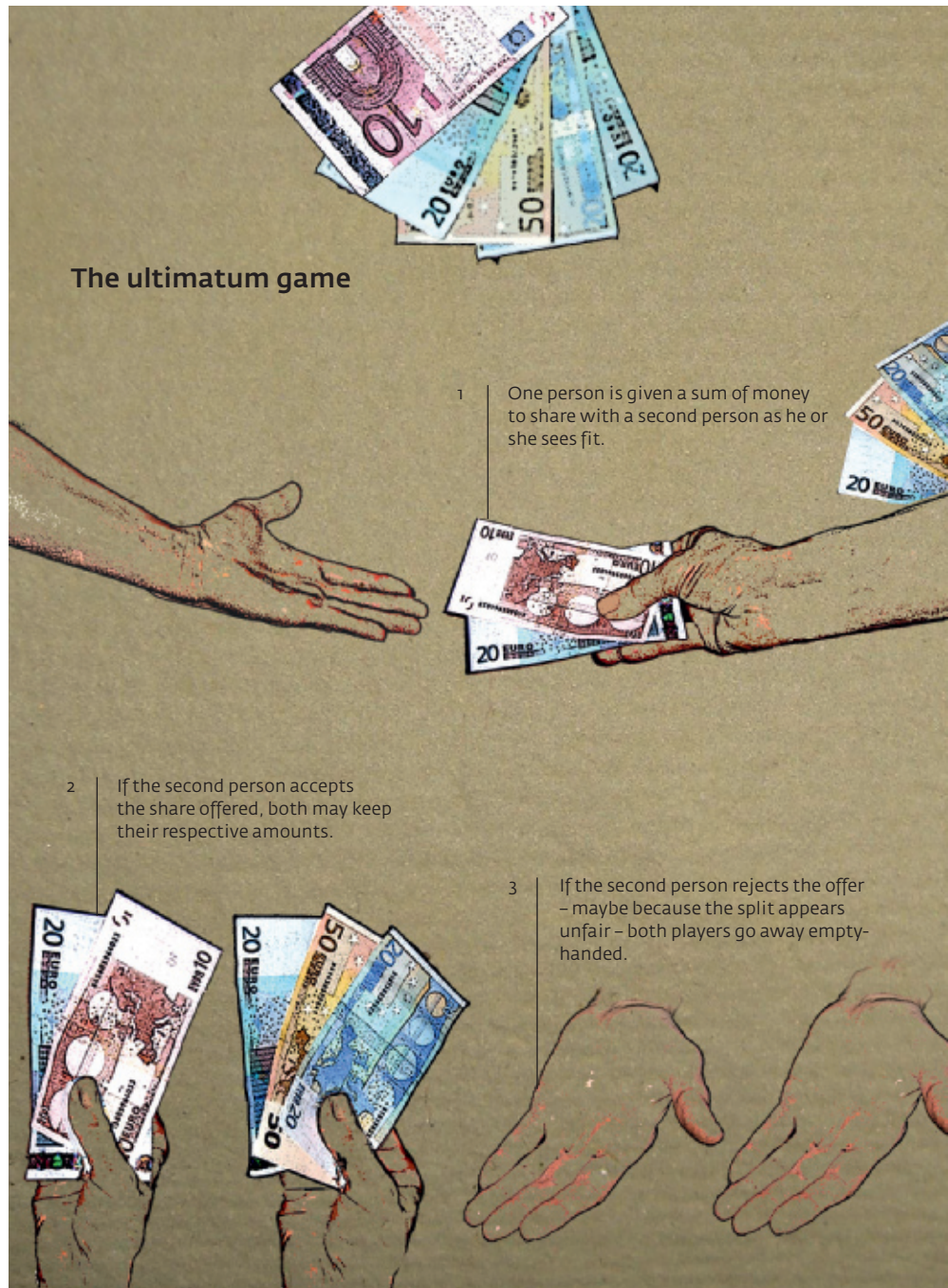
In the ultimatum game, a person can divide a sum of money between himself/herself and one other player as he/she sees fit. The offer is made only once and may be either accepted or rejected by the responder. The game allows a wide variety of associations to be studied.

of the imagined view of human beings as profit-oriented maximizers of personal gain.

It is now more a question of the minutiae. For example, which aspects of game behavior are dependent on a specific social environment – and which are even common across a wide variety of cultures? Answer: There are differences between cultures. Or another: How do chimpanzees differ from humans? Answer: Animals are more likely to match the caricature of *Homo oeconomicus* than humans (see box). To what extent is game behavior affected by how high the stakes are? Answer: ‘Moral’ behavior is more likely when the sums involved are small.

All of these things are worth knowing, and not just per se. Over the years, they have provided a solid basis for comparison, allowing researchers to assess the plausibility of individual results and the potential influence of subsidiary factors. This, in turn, opens up a lot of new opportunities. “In terms of social psychology, the ultimatum game has proven to be far more multifaceted than theory would have led us to expect,” explains Güth.

If you replicate on paper the various moves available to the individual players, there is, in fact, only one interaction taking place: one player makes a proposal and the most the other can do is think, why is he giving me so little? “From that point of view, it really is



The players in the ultimatum game are anonymous. They know that they will never be able to identify former game partners. The saying “we always meet twice in life” simply does not apply in the ultimatum experiment.



a trivial game,” says Güth. “But in practice it has proven to be the case that, even in this simple situation, the players’ mutual expectations of one another give rise to what is effectively a social field.”

THE EXPERIMENT – MEDIATING BETWEEN REALITY AND MODEL

The ultimatum game therefore lends itself to the study of a wide variety of things – in a strikingly simple context. Consider downsizing, for example. A company decides – as Deutsche Bank did not so long ago – to reduce its workforce, even though the business is operating profitably. Güth and his colleagues asked themselves under what circumstances people are willing to do that.

So the scientists replicated the situation in an ultimatum game. Either one player proposes how a given amount should be distributed and two players respond, or two players band together and dismiss the third player and so increase their own profit. Admittedly, that’s highly abstract. “But it covers the essential facets of the downsizing decision,” Güth explains. “And there is the big advantage of comparability with other experimental data – which you would have to do without if you really wanted to replicate specific corporate decisions in the model.”

In a similar manner, Güth and his colleagues have used the experiment to find out what role small-group loyalty plays in networking behavior, and how



buyer protection insurance might work on eBay – a study that Güth conducted together with Cologne-based experimental economist Axel Ockenfels. The experiments with small groups within larger networks showed that the propensity for cooperation is apparently more an anthropological constant than exclusively group-based egoism. As far as eBay was concerned, the studies showed that, as soon as buyer protection insurance was introduced on the auction platform, buyers paid less

attention to how traders were rated by previous purchasers. The result is an increase in the fraud rate – which is already a real problem for eBay.

Naturally the question also springs to mind as to whether research of this kind into the development of mutual expectations in networks might shed some light on the latest financial and economic crisis. Many commentators are, after all, interpreting it as a crisis of confidence. Could this not be spelled out in game theory? Not by a mile.

“Confidence only comes into it when one of the two game players has the opportunity to frustrate the other’s expectations of him or her in terms of fair play,” explains Güth’s colleague Oliver Kirchkamp. In the latest crisis, however, it is not expectations of fair play that are being frustrated, but expectations of future development. This example shows how important it is to precisely define the relevant terms when translating real-world phenomena into the starkly schematic scenarios of game theory.

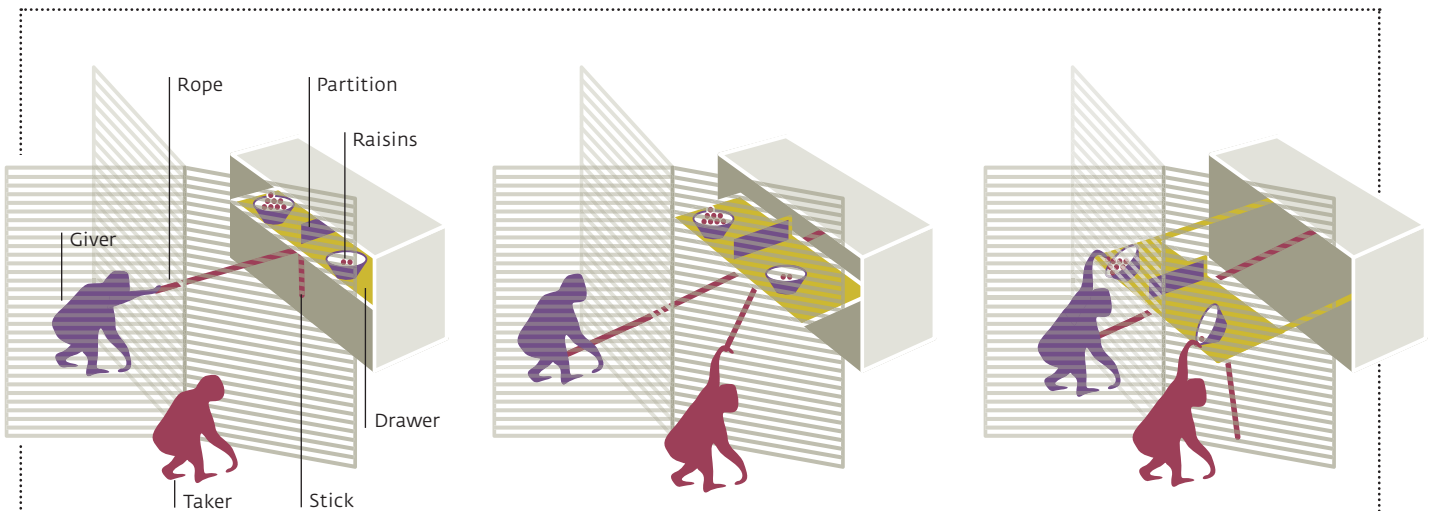
Furthermore, unlike the situation in the natural sciences, external validity is generally a problem in social science experiments. “It is only through experience in the social sciences that we

have become aware that external validity is even an issue to be taken into consideration.” This is the view of philosopher Francesco Guala, who has written a book on the issues of science theory associated with laboratory experiments in the social sciences. In his opinion, experiments especially in economics are best understood as “mediators” between the real world and the theories, models and hypotheses they are intended to explain.

This would explain why the numerous publications on game theory experiments do not adequately represent the scientific progress that has been made. It is more a question of the practical experience and implicit knowledge gathered by the scientists. Güth finds

that not very surprising: Why should researchers be any different than managers who are paid primarily for the knowledge and experience they can call on when there are important decisions to be made?

Güth also believes that “rational models” are empirically far less meaningful than experimental economics: “Conventional economics has completely ignored the fact that interaction between individuals also has a role to play.” In the case of competition, for example, the view has been taken that, in typical markets, there are sufficiently many participants competing with one another for the behavior of each individual to be of no importance to the others. Either that or the focus right



PLAYING THE ULTIMATUM GAME WITH CHIMPANZEES

Researchers at the Max Planck Institute for Evolutionary Anthropology have been playing a simplified version of the ultimatum game with our closest living relatives, chimpanzees.

In this game, one chimpanzee may offer another a specific number of raisins. Chimpanzees may not be able to count, but they are quite able to distinguish between quantities. The chimp making the offer can pull a rope to open a drawer containing two bowls. But it can’t get at its bowl until the other chimp accepts the offer and opens the drawer wide enough for both to be able to take out the raisins. In different versions of this mini-ultimatum game, the chimp making the offer was able to be either generous (two raisins for itself and eight for the other chimp), fair (five raisins each) or unfair (eight raisins

for itself and two for the other chimp). If the other chimpanzee does not accept the offer, both are left empty-handed. In contrast to humans, however, chimpanzees accept every offer – fair or unfair. There is, however, one exception: the option of ten to nothing, in which the chimp on the receiving end gets no raisins, was always rejected. In other words, chimpanzees tend to behave more like self-centered economists than social reciprocators – the latter being concerned to consider both themselves and others when deciding how to act.

from the start has been on monopolistic situations in which there were no opposing players.

Game theory, which first found its way into the field of economics as a mathematical instrument with the appearance of John von Neumann's and Oskar Morgenstern's book *Games and Economic Behavior* in 1944, has addressed this shortcoming. But even game theory is nonetheless a rational model. A company bidding in response to an invitation to tender, for example, is aware of its cost situation. However, it also knows that its competitors harbor diffuse expectations in the matter. "So the company has to imagine itself in every possible situation and calculate what it would do if its costs were quite different than what they actually are," Güth explains.

WHAT WE EXPECT OF OTHERS

In other words: its behavior is motivated by the convictions of others, as well as its own true cost situation. Thus, in order to act correctly, one must consider not only one's own costs, but also what others think about them. In this way, typical game theory thinking produces a complex mirror image of mutual expectations and considerations.

However, Güth is insistent that this mirroring quickly overtaxes real-world players. Real-world considerations and decision-making are generally more complex than game theory experiments. But in the view of Güth's long-time co-author Hartmut Kliemt, it must be acknowledged that "Everything that has been done in the field of social research on the subject of mutual interactive behavior can be translated into the language of game theory." Therefore, game theory is a kind of lingua franca that has become the

official language of social theory. "Game theory forces us to be precise. It's like a fitness studio that hones the art of thinking," Kliemt explains.

Despite his skepticism, Werner Güth is in remarkably good form when it comes to this kind of mental gymnastics. No matter what the question, he instantly sketches out a decision tree complete with formulas. Take marriage, for example – a classic strategy problem. The man takes the woman as his wife when she is young and pretty. She, on the other hand, must rely on her husband not leaving her later on, when he has reached the pinnacle of his career, while her attractiveness has faded. Other issues that lend themselves to similar, if progressively more complex, consideration range from the minimum wage to theological problems, like Pascal's wager on the existence of God, to disarmament policy. Werner Güth, together with various co-authors, has addressed all of these issues in past years – from a game theory perspective, of course.

However, the goal he has really set himself is to develop "something constructively different": a restricted rationality model. In composing this extensive theory, he is making equal use of the tools of economics and evolution theory. "The hammer with which economists turn everything in the world into a nail," says Güth, "is the shadow of the future": they calculate the consequences of their own actions rationally. "The hammer wielded by evolution theorists is the shadow of the past": they explain present behavior as a product of past selection. In a new approach, Güth proposes to counter these two perspectives with a theory of anticipatory consideration. It should be based on knowledge gained through experience and should respect our cognitive limitations.

Güth has in mind a theory that describes human behavior in a way that is also compatible with how the actor perceives himself or herself. Many attempts to explain or predict behavior amount to "as if" theories: they explain behavior as if the actors were following specific programs, whereby it is entirely irrelevant whether these programs are psychologically realistic (see *MAXPLANCKRESEARCH*, 2/2006, p. 64 ff.). Werner Güth does not consider such "as if" explanations satisfactory.

A NEW EXPLANATION OF HUMAN BEHAVIOR

A psychological realism of the kind he envisages should ultimately serve to define what might be termed internal standards for what we humans actually consider to be reasonable or right. Formulating such standards would in turn provide a basis on which to criticize wrong decisions. "We are looking for a program that can offer decision-making assistance based on an understanding of how people actually make decisions," says Güth, who has otherwise been known to brusquely reject questions of practical applicability as "naïve."

How is that likely to work? Let's say a person is considering how much money they should set aside for old age. They can choose to invest in real estate, equities or fixed-interest securities. Or in their own education. How should they decide? Güth's suggestion is as follows: First, define the scenarios you want to hedge against. What provision do you want to make, for example, in the event that you live a long life but have high healthcare costs to pay? Or for the event that you die young but your partner lives to a ripe old age? Or if neither of you live for very long?



Werner Güth is one of Germany's most highly esteemed economists. Here, he has sketched a decision tree on the board, complete with formulas, and is explaining decision-making behavior in specific game situations.

"I am not looking at the totality of possible life scenarios, I am concentrating on the few that are relevant – without specifying the probabilities of any of them occurring," explains Güth. "And for each of them I then define a 'level of aspiration'." The task now is to determine an action, an investment decision, that satisfies all of these aspiration levels. You might perhaps use simulations to test how possible share price movements affect the success of a given strategy. But it is just as important to adapt one's own aspirations to the given circumstances. "If you have moderate aspirations, there may be a wide variety of options – so you could set your sights a little higher," Güth continues. "On the other hand, if you still want to park your Porsche outside the nursing home, you may have to make some compromises."

Whether thinking in terms of aspiration levels matches the way we actually make decisions is something that Werner Güth has recently been testing – in the game laboratory. Instead of being paid, as in other experiments, simply for their immediate success in the game, participants in this case are also rewarded for how well they fulfill their aspiration level. If the end result corresponds with the aspiration level formulated at the beginning, the corresponding sum is paid out. But if the result falls short, he or she goes away empty-handed.

The conclusion from these experiments: 95 percent of all decisions are aspiration-fulfilling and therefore, from the actor's perspective, satisfactory. Which indicates that, at least in terms of results, the attempt to reconstruct strategic action as the fulfillment of

aspirations is plausible. But there is room for improvement. Players unnecessarily set a quarter of all aspiration levels for various scenarios either too low or too high. They could, in fact, change these aspirations without having to reduce their aspirations for alternative scenarios.

Moreover, 5 percent of payments are forfeited because the participants did not calculate their profits with sufficient accuracy. A trite summary of the study might thus be "could do better." These are good prospects for a theory of game playing and decision making founded in behavioral theory, for example when being taught in business schools and used in economic practice and consulting. ◀