

Institutions Affect Fairness: Experimental Investigations

by

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Fairness is not an absolute value independent of social conditions but depends on the reigning institutions. Conducting experiments with ultimatum, dictator and prisoner's dilemma games it is demonstrated that the extent of fairness systematically depends on three types of institutions: property rights which define the basic fairness norms; the extent of interaction between the players (anonymity, identification or talk) which determines how far these norms are activated, and the players' opportunity set which affects the extent to which the players can actively influence the game outcome. It is a plea for the fruitfulness of "institutional experiments." (JEL: A 13, C 70, C 90)

Fairness is not an absolute value existing and being pursued independently of social conditions. Rather, the extent of fairness exhibited systematically depends on institutions shaping the perceptions and possibilities of behaviour. Drawing on experimental evidence, we are able to show that, in the context of ultimatum, dictator and prisoner's dilemma games, there are three important types of institutions affecting fairness: The underlying property rights which define the basic norms of fairness; the extent of interaction between the players in the game (anonymity, identification or talk) which determines how far these norms are activated; and the players' opportunity set which affects the extent to which the players can actively influence the game outcome. Our analysis is thus a plea for a stronger emphasis on "institutional experiments" in which institutions are systematically varied in order to study the effects on human behaviour.

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1. *Fairness in Theory and Empirical Research*

For a long time, fairness has been considered to be a purely philosophical or ethical concept without relevance for economic analysis. Economists may have sensed that fairness plays a role in daily life (and have behaved accordingly) but they have shied away from introducing fairness into their models because the concept seems ill-defined and spurious. As SEN [1987, 7] writes: "If one examines the balance of emphases in the publications in modern economics, it is hard not to notice [...] the neglect of the influence of ethical considerations in the characterization of actual behavior." Nevertheless, Anglo-Saxon moral science especially has had some effect on welfare theory. RAWLS' [1971] concept of "Justice" or "Fairness" has been discussed by philosophically minded economists such as BUCHANAN [1976], BAUMOL [1986] and SEN [1987]. In other parts of economics, traces of fairness or closely related concepts have always been present, examples being "altruism" (which e.g. plays a role in BECKER's [1981] *Treatise on the Family*), and more generally social norms (see e.g. OPP [1983], ELSTER [1989], COLEMAN [1990] and especially for the role of cognitive dissonance SCHLICHT [1984]).

Empirical studies on fairness have been even rarer than theoretical investigations. Indeed, until quite recently, economists have made no effort at all to identify empirically what "fairness" might be. Interestingly enough, the first studies were prompted in the context of the literature on "behavioural anomalies" (see THALER [1992], FREY and EICHENBERGER [1989]). To act "fairly" is taken to be non-rational if rationality is defined (as most economists would do) in terms of selfish behaviour. It is even less compatible with WILLIAMSON's [1985] "opportunism" where individuals are assumed to actively exploit all possibilities to raise their own utility even at other persons' cost.

From the very beginning, studies of "empirical fairness" have used experiments. Two types of experimental approaches can be distinguished: natural experiments and laboratory experiments.

- (1) In *natural experiments*, scholars have made an effort to put the subjects into as realistic situations as possible using representative samples of the population. The first such study was undertaken by KAHNEMAN, KNETSCH and THALER [1986a], appropriately called "Fairness as a Constraint on Profit Seeking." In a telephone survey in the metropolitan areas of Toronto and Vancouver, 107 persons were tested about their reaction to a situation where the price for a good (snow shovels) was increased in a well-defined excess demand situation. It turned out that not less than 82 percent considered the price rise to be unfair.

This study was replicated by FREY and POMMERHNE [1993] for the metropolitan areas of Zurich and Berlin. Among the 215 persons responding to a written survey presenting the same excess demand situation, 83 percent considered the rise in price unfair. When the same situation, but a

different good (water), was put before the persons, 78 percent thought the price rise to be unfair ($N = 452$). The institutional setting was also varied by comparing the price rise to an allocation using other decision-making procedures. The result was that a somewhat lower share (73%) of the respondents found a price rise to be unfair, but that an allocation by "tradition" (the principle of "first come, first served") was considered by many less people (24%) to be unfair. Even an allocation by administrative procedures (by the local authorities) was taken to be less unfair (57% of respondents) than pricing. A similar study was undertaken in the context of evaluating the acceptability of procedures for siting a noxious facility (a medium- and low level nuclear waste repository in Switzerland) (OBERHOLZER, FREY, HART and POMMEREHNE [1995]). Among the 900 persons interviewed, the following ranking was established:

Table 1
Acceptability of Various Procedures

Procedure	Share of persons finding the procedure acceptable
Negotiations	72 %
Referenda	39 %
Expert decision	34 %
Lottery	32 %
Willingness to accept	20 %
Willingness to pay	4 %

Source: OBERHOLZER, FREY, HART and POMMEREHNE [1995].

Both the price system, in the form of the willingness to accept or to pay, as well as the random procedure (lottery), turned out to have a low degree of acceptability, while negotiations and referenda fared much better. A more detailed analysis revealed that "acceptability" consists of three components: "security," "local influence" and "fairness." It transpired that the ranking in terms of "fairness" exactly mirrored the above ranking in terms of acceptability. The two survey experiments thus yielded quite similar results.

- (2) The second type of experiments dealing with fairness is undertaken in the *laboratory*. In the social sciences, laboratory experiments were first used in psychology but are now rapidly gaining recognition in economics.¹ Most recent examples are FEHR and KIRCHSTEIGER [1994], who analyze fairness in labour markets, or RABIN [1993] who strongly argues for the inclusion of

¹ While strongholds are now also in the United States, see ROTH [1988], PLOTT [1990], SMITH [1990], [1994], important precursors were in Frankfurt, see SAUERMAN and SELTEN [1959], SELTEN [1960], SAUERMAN [1967].

fairness into game theory and economics in general. One of the most pointed approaches has been undertaken by KAHNEMAN, KNETSCH and THALER [1986b] in the *Dictator Game* (DG), where one player (the allocator) receives a given sum of money and may distribute either nothing, some of it, or all of it to a second person (the recipient). The authors restricted the allocator's choice set to only two possibilities. Of the \$ 20 received, allocators could either keep \$ 18 for themselves and give \$ 2 to the recipients or divide equally, i.e. \$ 10 to each. The results were astonishing: 76% of the subjects divided the \$ 20 evenly (N = 161). That considerations of fairness play an important though not decisive role in individual decision-making is supported by further experiments concerning Dictator Games. Even though the modal offer is the equilibrium offer at which the allocator keeps everything for himself, a high concentration of offers at equal division can be observed in one period games (FORSYTHE, HOROWITZ, SAVIN and SEFTON [1994]) as well as in two period games (BOLTON [1991]).

This paper intends to discuss and reveal the underlying *institutional* assumptions in fairness experiments. These aspects are rarely spelled out clearly but often remain hidden. We argue that the way in which the institutions are introduced and modelled crucially determines the experimental outcomes, and that they therefore must be brought into the open. We consider institutional variations in three different dimensions. In section 2 we analyze *property rights variations* which determine to a large extent the relevant norms of fairness. Section 3 deals with the institutions which structure the *interaction* between the persons (players). The institutions structuring the *opportunity set* available to the players are the subject of section 4, which leads us to consider Ultimatum Games and Step-Level Prisoner's Dilemma Games. The experimental outcomes arising by the three institutional dimensions are summarized, and conclusions are offered in the final section 5.

Throughout the analysis we draw on fairness experiments run at the University of Zurich in the fall of 1993. We find that institutional variations have a *dramatic* effect on game outcomes, a relationship which is insufficiently, or not at all, appreciated in experimental work. A major reason for this shortcoming may be that experimenters are strongly influenced by psychological models. Due to their different research goals, psychologists tend to focus on processes where institutions are absent. In economic terminology, they deal with preferences (or values) and leave constraints aside. We argue that the combination of institutional economics and experiments yields important and novel insights, and we thus call for "*institutional experiments*."

2. *Property Rights Variations*

The Dictator Game contains an implicit assumption with respect to the property rights. The sum which the allocator receives to distribute can best be

regarded as a *gift*. As a consequence, the proposal that something (larger than or equal to zero) is passed on to another person is quite natural. Indeed, in this case fairness suggests that half is given to the other person because the allocator has no special "right" to the sum of money. The property right situation is quite different if the allocator has earned the sum of money by hard work. In this case, the norm of fairness does not imply that anything is given to another person. Empirical evidence suggests that only a small share of earned income is given away. UK data on "charitable donations and subscriptions" in 1974 shows that on average people give away less than 1 percent of their income (COLLARD [1978, 93]). For the U.S. a somewhat higher percentage share of disposable income contributed is reported: In the sixties and the seventies Americans donated on average 3% of their income (VICKREY [1975, 154]).

Property rights may be classified according to the extent to which they induce fairness norms²:

- (1) Undefined property rights: When the allocator receives goods whose proprietor cannot be specified, the norm to share equally with the recipient is strong. An example would be a person who finds an object on the beach, perhaps from some far away and unknown ship.
- (2) Property rights defined by luck: When the allocator receives a good by fortune, the norm of fairness clearly is that a substantial share is passed on to the other person. An example of this is provided by gambling casinos, where the winners often give rather large tips to the croupiers.
- (3) Property rights defined by a gift: A gift received – which is the case in the Dictator Game – is accompanied by a fairness norm suggesting a transfer of some positive amount of money to the recipient.
- (4) Earned property rights: When the sum of money has been acquired by an expense of effort, it is considered to be fair for the allocator to keep most of it. The exact share which, according to the fairness norm, may be kept depends on further aspects. The "normative right" to keep a large share is, e.g., larger when the allocator has expended the effort himself or herself rather than, say, inherited it from the parents. Similarly, the normative share is larger when the sum has been acquired by putting in labour rather than by deriving income from capital.

The norms induced by property rights can be related to "equity theory" (see WALSTER, WALSTER and BERSCHIED [1977]). The larger an individual's input into obtaining a good, the more equitable (or the fairer) is it for them to keep

² Compare the approach by BINMORE and SAMUELSON [1994], who argue that the *inducement of norms depends on whether decisions in the laboratory are taken in the "short term,"* where individuals use a social norm acquired in real life, or in the "long run" where learning by laboratory experience may create new norms. All experiments discussed here are one-shot situations with inexperienced subjects where real life norms should be active. The issue of property rights inducing social norms is also discussed e.g. in HUME [1978] and SUDGEN [1986].

a large share of the benefits derived. These institutional characteristics of the fairness norm are crucial for the outcome of Dictator Games but have been neglected in much of the literature. First steps to experimentally test for the relevance of property rights have been undertaken by HOFFMAN and SPITZER [1985]. In their experiments, allocators were asked to choose between a division which gave them \$ 12 and the recipients nothing or an outcome where \$ 14 were to be divided but where the division had to be decided upon by the two players. As expected, the players agreed on dividing the bigger stake. The division chosen, however, was not the one rationally expected but an equal division of \$ 7 each. Property rights variations show that this result is not stable but depends on the extent to which the "allocative right" is assigned to one person. The authors distinguish four treatment conditions: Allocators are determined by the flip of a coin and told that they are now designated as allocators (i) or that they had now earned the right to be the allocator (ii); allocators are determined by winning a simple game and told that now they were designated as allocators (iii) or that now they had earned the right to be the allocator (iv). No significant difference could be observed between simple luck (flip of the coin) and luck accompanied by some small amount of effort (game). Allocators who were told that they *earned* their position, however, kept significantly more money for themselves than individuals who were *designated by chance* as allocators. Further experiments (HOFFMAN, MCCABE, SHACHAT and SMITH [1992]) support these results. The stronger the property rights that are assigned, the less likely is an equal division, i.e. the less money is passed on to the recipient.

The outcome of the Dictator Game (and, as we shall show below, of any Fairness Game), however, depends not only on property rights but also on the extent of social interaction.

3. *Interaction Between Participants*

The more people interact, the higher is the probability that fairness norms are activated because social sanctions become a restriction on individuals' actions. Three institutional characteristics of interactions may be distinguished:

- (1) In an *anonymous* setting where the allocator and the recipient do not know each other, the fairness norms remain in the background. They are only relevant in so far as the allocator has a purely intrinsic motivation³ to behave fairly. This is the situation of perfect competition, and is also appropriate in many other situations where a large number of people interact. It corresponds to the "classic" fairness experiments.
- (2) When the allocator and the recipient *identify* each other, in the sense that they know the other person but are unable to speak to one another (non-

³ For the concept of intrinsic motivation see e.g. DECI [1971], STAW [1976].

verbal communication), the fairness norm is activated. The price or cost of acting selfishly is thereby raised. Many cases come to mind where this situation is practically relevant. One is free riding in railways or tramways where the threat of identification is certainly a relevant motive for many riders to pay their fare. Other examples are charity collections where the organizers make an effort to identify the donors by e.g. passing around a list of signatures with the amount given.

- (3) When the allocators and receivers *may talk* to each other, we expect that the fairness norms will be strongly activated. The price of acting selfishly is significant. In the case of the Dictator Game, the recipient has a strong interest in making clear to the allocator what the norm of fairness is. Verbal communication is of great importance in all areas of the economy beyond perfect competition. Under monopolistic competition, the buyers and sellers haggle about the price and, as Adam Smith had already pointed out, there is a strong incentive to talk about ways to restrict markets. Beyond economic transactions, talk may be even more important. In politics, for instance, discourse is most prominent; hierarchies (bureaucracies) are almost defined by an endless stream of sessions and meetings, and bargaining essentially consists of talk. In all these cases, the verbal communication gives the opportunity to activate norms of fairness.⁴

Our experiments strongly support the importance of this institutional variation. The experiments were undertaken with 340 students at the University of Zurich in November, 1993. The subjects were economics students at the very beginning of their studies (their second week). As the University of Zurich is rather large (more than 20,000 students), the subjects were in general not acquainted with each other, and an effort was made to separate students who might have known each other prior to taking up their studies. There is a positive, but not very large, chance that the subjects would have significant personal interactions with each other in the future. The experiments were conducted during lecture time and were not announced beforehand; participation was nevertheless voluntary. Less than five percent of the prospective participants chose to opt out. The procedure of the Dictator Game was explained in a written text and also verbally, and thereafter the test persons could ask questions of clarification. We then formed groups of two persons (one the allocator, one the recipient) by using a random mechanism. The allocator was given CHF 13.00 to choose the division he or she preferred. The money was given in chips of CHF 0.50 pieces of game money (which corresponded to 50 cent or Rappen pieces of Swiss currency). In order to make the experiment realistic, the allocator had to put the money given to the recipient in an envelope

⁴ The (anonymous) referee rightly pointed out that the structure of interaction between the players is also connected with social groups. The theory of self-categorization indicates that the formation of social groups is interrelated with the emergence of different fairness norms (see TURNER [1987]).

so that the recipient actually received money. The allocators' decision was secret, i.e. could not be observed by other test persons nor by the experimenters. "Fairness" was defined to be the percentage share of norm fulfillment. If e.g. the fairness norm is equal division (CHF 6.50 for each), and the allocator were to pass on 3.25, fairness equals 50%.

The theoretical prediction of game theory based on selfish individuals is straightforward: The allocator keeps the whole amount for him- or herself, i.e. $F^* = 0\%$. It should be noted that this game theoretic prediction is independent of whether the group members are anonymous, identified or can talk to each other, because communication should have no effect as long as no binding contracts can be formed.⁵ The result of the experiment was quite different. In an *anonymous* setting, on average the allocators in the 39 groups (N) passed on CHF 3.38 of the money initially received which corresponds to 52% of the fairness norm of equal division. This amount differs from the game theoretic prediction and we conclude that there exists an intrinsic motivation to follow fairness norms, but that this motivation is not sufficiently strong to meet the fairness norm of equal distribution completely.

Identification of allocator and recipient was achieved in the experiment by making them stand up but preventing verbal communication. Our prediction based on the effect of the activation of the fairness norm is borne out. On average (N = 28), the allocator handed half of the initial sum to the recipient, i.e. met precisely the fairness norm relevant in the case of a gift ($F = 100\%$). The final institutional variation was to give the two persons of each group the possibility to verbally communicate with each other in private for ten minutes. The norm-activating effect again took place. On average, the 17 allocators passed on CHF 6.25 of their initial gift ($F = 96\%$).

As interaction proves to strongly influence fairness, we wondered if subjects themselves exhibited a demand for this institutional possibility. We therefore ran another Dictator game with 56 subjects where the students could choose if they prefer to play the game anonymously or to talk with the other person before the actual decision took place. Eighty-six percent of the recipients and 75 percent of the allocators chose communication. The freely communicating allocators passed on CHF 5.70 ($F = 88\%$) of their initial gift which is slightly less than in the forced communication setting (where CHF 6.25 were given to the recipient).⁶

⁵ The concept of "cheap talk" is discussed in FARRELL [1987], CRAWFORD [1990], and JOHNSON [1993].

⁶ Further experiments where the price of communication was varied ($p = \text{CHF } 0.00$, reported above; $p = \text{CHF } 3.00$ with 44 subjects, $F = 103\%$; $p = \text{CHF } 5.00$ with 32 subjects, $F = 100\%$) revealed a relative price effect, i.e. the more expensive communication is, the less subjects choose this option. They confirmed, however, that communication induces the allocators to converge to the norm of equal division. These supplementary experiments were partly conducted with non-economics students of higher semesters. For more details see BOHNET and FREY [1994].

Even though the results support the importance of norm activation, we tried to find out if the subjects participating in the experiments also attributed their behaviour to norms. At the end of the experiment we therefore handed out a questionnaire asking if the final decision was influenced by communicating with the other person and if so why. The following questions were asked:

- (1) Was your decision influenced by one or both of the following two statements?
 - I had already *known* the other person before the experiment.
 - I *liked* the other person.
- (2) What did you achieve by communicating with the other person?
 - It helped to *understand* the problem.
 - I felt more *comfortable* deciding after having spoken to the other person.
 - I learned about the other person's *attitude*.
 - We *agreed* on a specific distribution.
 - I felt like making a *binding* contract.
 - I *improved* my position.

While the first set of questions has the character of control variables ("*known*" and "*likeable*"), the second part of the questions was inspired by differing communication theories. It is often argued (SIEGENTHALER [1993]) that the main function of communication is to clarify and structure the problem ("*understand*") thereby reducing uncertainty and psychic decision-making cost ("*comfort*"). The variable "*attitude*" draws on the idea that people may be distinguished according to their preferences and that communication helps to learn the "beliefs" and "wants" of the other person (SCHOFIELD [1985]). "*Agree*" and "*binding*" represent the norm activation effect. We argue that it is one clearly defined distribution of the CHF 13.00 which under the given circumstances is relevant for decision-making, and that this distribution of the cake represents a binding norm. "*Improve*" tests for the communication effect ascribed by information economics, viz., that more information increases the quality of the decision and thereby an allocator's position (STIGLITZ [1984]). The answers of the communicating allocators are reported below.

Table 2
The Role of Communication in the Dictator Game

Variable	"Yes"-answers of respondents (percent)	number of observations
<i>Known</i>	10.9	92
<i>Likeable</i>	31.0	84
<i>Understand</i>	21.7	83
<i>Comfort</i>	34.4	90
<i>Attitude</i>	67.8	90
<i>Agree</i>	80.7	88
<i>Binding</i>	67.8	90
<i>Improve</i>	43.5	92

According to the survey, communication mainly serves to learn about the recipient's *attitude* and to make *binding agreements*. The modal offer where subjects agreed is an equal split in all communication experiments and, as the high fairness scores show, has been "binding." Allocators also seem interested in recipients' attitudes towards the problem at hand. Further testing is needed to distinguish which attitudes are positively sanctioned and which induce allocators to be less fair. Communication is not used to clarify the task since solving distributional questions might not be something unusual. Sharing is an everyday activity and subjects orient themselves by relying on everyday sharing "rules."

4. *The Opportunity Set of Players*

In the context of two person games on fairness, two institutional variations bearing on the players' opportunity set can be distinguished.

- (1) The allocator decides unilaterally; the recipient has no power to act. This is the *Dictator Game* (DG) considered so far.
- (2) The recipient can reject the allocator's division. If he or she rejects the share received, neither of the two receives anything. If the recipient accepts the division, then each gets the respective share. This is the *Ultimatum Game* (UG).⁷ Compared to the Dictator Game, the allocator has a reduced (expected) opportunity set because he or she must reckon with a rejection by a dissatisfied or vengeful recipient. In the language of biologists, such insistence on fairness norms (even if all individuals will suffer) is called "moralistic aggression" (see TRIVERS [1971]). The allocator will therefore tend to pass on more than in the DG in order to induce the recipient to accept. Game theory based on the assumption of selfish players predicts that a rational allocator offers ϵ , the smallest possible unit (in our experiments 50 cents) because the recipient is better off if they accept this share than they are in receiving nothing in the case of rejection.

If fairness norms are taken seriously, the prediction depends on the property rights situation as discussed in section 2. In the case of an Ultimatum Game in which the allocator receives the sum of money as a gift from the experimenter, the underlying fairness norm is equal division. The allocator must take into account that the recipient sticks to this norm and rejects any division which violates it. Thus, the amount of fairness in the Ultimatum Game may be expected to be larger than that in the Dictator Game. The extent of social interaction (anonymity, identification, communication) should not exhibit any

⁷ The Ultimatum Game is due to GÜTH, SCHMITTBERGER and SCHWARZE [1982]. Further experiments with the UG have been undertaken by e.g. BINMORE, SHAKED and SUTTON [1985]. Surveys of the experimental designs and results are given by THALER [1988], GÜTH and TIETZ [1990], GÜTH, WÄRNERUD and LEA [1992] present a collection of major articles.

significant effect on fairness as long as property rights are clearly defined and as long divergence can effectively be sanctioned.

The results of our experiments are consistent with this theoretical prediction. Indeed, the fairness norm of equal division ($F^*_{UG} = 100\%$) is reached in all experiments. In anonymity 101% ($N = 28$) is passed on, under non-verbal communication 100% ($N = 11$) and when talk is allowed 100% ($N = 27$). The restriction of the allocator's opportunity set by the fear of rejection is so effective that the fairness norm is always achieved even when the subjects are not able to communicate with each other. In Dictator Games, on the other hand, fairness of 100% is only achieved if the players are either identified or may talk to one another. Fairness under anonymous conditions is significantly lower in the Dictator Game ($F_{DG} = 52\%$) than in the Ultimatum Game ($F_{UG} = 101\%$, with $p < 0.001$; $F = 31.60$).

This strategic difference between Ultimatum Games and Dictator Games has also been observed by FORSYTHE, HOROWITZ, SAVIN and SEFTON [1994] and BOLTON [1991]. While these authors interpret the difference in offers as a rejection of the "fairness hypothesis," we argue that the modal offer of equal division in the Ultimatum Game cannot be explained without recurring to fairness norms. There is no other good reason why the share chosen should be an exactly even split of the cake. Interestingly, the possibility to "punish" the allocator has an equally strong effect on converging to the fairness norm as does communication (when no such punishment exists). Two sanctioning mechanisms seem to be relevant: social sanctions activated by identification or talk in the DG, and monetary sanctions enabled by the rejection possibility in the UG.

The importance of both social sanctions (interaction effect) and monetary sanctions (opportunity set effect) for increasing fairness is stressed by a multiple regression analysis (OLS) drawing on data from the questionnaire. As we had enlarged our sample by non-economics students of higher semesters, we asked all subjects to report on several personal characteristics: economics major or not (*ecomajor*); first semester or not (*firstsem*); sex (*sex*) and religion (*religion*); as well as whether they had any prior knowledge of the game (*knowledge*) and whether they felt any social pressure while deciding (*socpress*). The results are shown in table 3.

The results strongly support the relevance of interaction (*comm-used* equals identification plus talk) and of the opportunity set (*game-type*). Interestingly it also matters whether a student studies economics or not (*ecomajor*). Fairness increases if allocators may communicate with the recipients, if they play an Ultimatum Game and if they are not economics majors.

The effect of social sanctions on fairness has so far not been systematically analyzed for the Dictator Game or the Ultimatum Game (see ROTH [1993]). The importance of communication, however, has been demonstrated for the Ultimatum Game by considering rejection frequencies (RADNER and SCHOTTER [1989]). When comparing anonymous bargaining, bargaining by computer

Table 3

Determinants of Fairness in Dictator and Ultimatum Games (OLS Estimate)

Variable	Parameter	t-value
<i>Constant</i>	5.53	12.22
<i>Comm-used</i>	1.52	4.42
<i>Game-type</i>	0.83	2.10
<i>Sex</i>	-0.41	-1.08
<i>Ecomajor</i>	-1.12	-2.85
<i>Firstsem</i>	0.13	0.35
<i>Religion</i>	0.89	1.65
<i>Knowledge</i>	-0.79	-1.10
<i>Socpress</i>	-0.49	-1.15

(N = 295, $\bar{R}^2 = 35.7\%$)

communication and face-to-face bargaining, the authors report that face-to-face communication exerts a significant negative effect on the probability of an offer being rejected by the recipient.

The Ultimatum Game has a similar structure as a *Step-Level Prisoner's Dilemma* (SLPD) with respect to the player's opportunity set. While in the UG an implicit norm determines the point at which an offer will be accepted (i.e. where acceptance is provided), in the SLPD an explicit threshold or provision point establishes when the public good will be provided. Empirical evidence suggests that, knowing this point, individuals contribute more than in a (normal) Prisoner's Dilemma (PD)⁸ where each player has a strong incentive to free ride and where the dominant strategy⁹ clearly is not to cooperate. In a game with provision points, however, there exist many non-cooperative equilibria, each of which may be optimal but none of which is dominant. We hypothesize that, similar to the UG, subjects choose a solution which reflects the *socially dominant* fairness norm of equal division of the cost of providing the step-level public good ($C^* = 100\%$).

The contribution in a normal PD, on the other hand, is expected to depend again on the extent of interaction between the players: In anonymity the contribution will be lower than when identification takes place because in the latter case the norm of contributing fairly is activated. An even higher extent of contribution is predicted when the players can speak to each other. Not only does verbal interaction activate the fairness norm, but talk also enables the participants to coordinate their actions by agreeing on a common strategy. The game theoretic prediction for a one-step PD based on selfish behaviour is complete free-riding, i.e. no player at all is prepared to contribute to the cost of provision ($C^* = 0\%$).

⁸ For experimental evidence see the review in LEDYARD [1993, ch. 3.1].

⁹ A strategy is dominant in a game theoretic sense if it maximizes the return to an individual no matter what other players do.

We ran a step-level public good experiment in April 1994, again with students of the University of Zurich.¹⁰ Equal division of the cost of the public good (CHF 4500, the copyright for copying the manuscript of a not yet published book) would have been about CHF 20–25, depending on the exact number of potential contributions (around 200 persons) which the players envisaged. The result of the experiment was an average contribution of CHF 21.60 which is consistent with our prediction. A corresponding (normal) PD experiment yielded a much lower rate of contribution, namely only CHF 3.80, or 15 to 20% of the norm of equal division.

This result is supported by a Prisoner's Dilemma Game conducted in the context of our experiments run in October, 1993. For the purpose of experimentation, a specific four person game¹¹ was chosen. Each of the four players had to decide between X and Y. These choices were not identified normatively with "cooperation" and "defection," respectively, on purpose. The *collective outcome*, however, was best if all four chose X, and worst if all chose Y. Choosing Y instead of X lead to a gain for the respective player of CHF 6.50 and produced a cost of CHF 3.00 for everybody else. The decision to cooperate, on the other hand, cost a subject CHF 9.50 and created benefits for all players (including the cooperators) amounting to CHF 3.00. The pay-off structure thus strongly "punished" individual cooperators (X), and gave a strong individual incentive to defect (Y).

When the PD game was played completely anonymously, the share of cooperating players was 12% (N = 43). When non-verbal communication through identification was allowed, the fairness norms¹² were indeed activated as now 23% (N = 16) chose the cooperative strategy. When the four players could talk to each other, cooperation rose to 78% (N = 26). The outcomes of both types of interaction differ significantly from the result achieved in an anonymous setting (with identification: $p = 0.033$; $F = 4.60$, and with talk $p < 0.001$; $F = 207.61$). Our experimental results echo previous research where verbal communication between players was admitted in PD games. DAWES, MCTAVISH and SHAKLEE [1977] and DAWES [1980] report that in their eight-person games cooperation rose from 31% to 72% when talk was allowed (for similar outcomes see e.g. ORBELL, VAN DE KRAGT and DAWES [1988], ISAAC and WALKER [1988] or CALVERT [1993]).

¹⁰ For an exact description of the design and full results see OBERHOLZER, EICHENBERGER, BOHNET and FREY [1994], see also SCHNEIDER and POMMEREHNE [1981].

¹¹ It corresponds to the experiment designed by DAWES, MCTAVISH and SHAKLEE [1977] but has been reduced from 8 to 4 players per group in order to increase the size of the sample for the different experimental variations. The structure of the pay-offs, however, is unaltered. The experimental design is fully presented in BOHNET and FREY [1994].

¹² For the role of fairness norms in prisoners' dilemmas see the formal approach by HOLLÄNDER [1990].

5. Conclusions

We have theoretically analyzed the effects of various institutional variations on fairness and have presented supporting experimental evidence on our propositions. Institutions were systematically varied along three dimensions:

- (1) The *property rights* to the sum of money to be distributed. They define the underlying *norm of fairness*. Our own experiments assumed (in line with the overwhelming share of the literature) that the initial sum of money was a *gift* from the experimenter, and that the fairness norm in that case is equal division among the participants. In the case of fairness games (Dictator and Ultimatum Game), this means that the allocator passes on half of his or her endowment to the recipient ($F = 100\%$); in the Prisoner's Dilemma the fairness norm implies that the cost of providing the public good is equally shared and that all players participate (i.e. choose the cooperative strategy; $C = 100\%$).
- (2) The *interaction between the participants* varies the institutional possibilities to act in an anonymous setting, to be identified, or to talk to each other, which in increasing order *activates the underlying norms of fairness*. In the case of the Prisoner's Dilemma, talk also enables the actors to *coordinate* their behaviour for their mutual benefit.
- (3) The *actors' opportunity set* is determined by the existence of a provision point which establishes when an offer is accepted (Ultimatum Game among Fairness Games) or when a public good is supplied (Step-Level variant among Prisoner's Dilemma Games).

The results of the institutional variations in our experiments for the case of a particular property rights structure (gift) are presented in the table below.

Table 4
Institutional Variations and Experimental Outcomes

	Opportunity Set of Players			
	Provision Point		No Provision Point	
	Ultimatum Game F	Step-Level Prisoner's Dilemma C	Prisoner's Dilemma C	Dictator Game F
<i>Institutions for Social Interaction</i>				
- Anonymity	101 %	100 %	12 %	52 %
- Identification	100 %		23 %	100 %
- Talk	100 %		78 %	96 %

Source: Our experiments.

The experimental outcomes suggest that institutional variations have a *systematic* and *major* effect on fairness behaviour. We find that institutional conditions determining a specific provision point induce fair behaviour as defined by the underlying property rights structure. In both the Ultimatum and the Step-Level Prisoner's Dilemma Game the outcome fully corresponds to the fairness norm, which in the case of the gift considered is equal division. When the opportunity set of the individuals is not restricted by a provision point, the second institutional dimension, social interaction, comes into play. As can be seen, the extent to which the fairness norm is followed is dramatically lower under anonymous conditions than when non-verbal and verbal communication are permitted. This holds both for the Prisoner's Dilemma setting (where cooperation rises from 12% under anonymity to 78% when talk is allowed) and the Dictator Game where fairness correspondingly increases from 52% to 96%.

The results of our experiments show that an exact specification of the *institutional conditions* of the experiments is of crucial importance. Presently, many experiments treat this aspect lightly or disregard it altogether. A major reason for this neglect is that experiments in the social sciences have originated in psychology which stresses mental processes and the corresponding values (or preferences), while the constraints and therewith institutions play little or no role. One of the major advantages of economists entering the field and undertaking experiments may be their closer connection with institutions. In particular, economists can draw on a well-developed comparative analysis of institutions built upon the rational choice approach. We thus appeal for a closer integration of institutions and experiments and believe that institutional and experimental economics may profit greatly from each other, opening up new insights for the understanding of social reality.

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