Ethical altruism and redistribution: an experimental approach[*]

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Abstract

The focus of this paper is on altruism and coordination among agents with different income levels. A special form of altruism (ethical altruism) is investigated by means of experiments. The definition of altruism here used takes the hint by the A. Sen's concept of *obligation*, i.e. behaviours that produce advantage to someone whose welfare is not important at all for the agent's wellbeing. In this sense this paper investigate on altruism *without reciprocity*. A second hypothesis here investigated is that the degree of extent of the ethical altruism is influenced by gender and by income differences within the population.

1. Introduction: ethical altruism, fairness and income redistribution

This paper follows a previous one (Mittone, 2002) which was aimed to investigate on the spontaneous arise of altruistic behaviours within small groups of people. The focus of Mittone 2002 was centred on a specific definition of altruism: the one suggested by Sen (1986). Sen looking to the nature of the supportive behaviours distinguishes between those generated by a feeling of sympathy and those caused by a moral duty. Both concepts apply whenever an economic agent consciously makes a choice which raises the level of well-being of other agents without the latter (the beneficiaries) having to recognize – either consciously or unconsciously – any return favour to the agent that has benefited them.

Following Sen, an action of the type just described is produced by sympathy when the increase in the beneficiary's level of well-being positively influences the level of well-being of the agent, who reflexively enjoys the improvement in the other's circumstances. Instead, an action is motivated by obligation when the agent operates according to a moral principle exogenous to the mechanisms that determine the levels of individual well-being. In other words, when the agent feels sympathy for another person, suffers and feels pleasure with him/her, then the agent's actions undertaken to help or harm the other person are ultimately egoistic, because they are intended to improve the agent's own well-being through modification of the other's well-being. Again following Sen, behaviour can be called non-egoistic only when the agent operates in favour of another agent because s/he believes that one must necessarily behave thus in principle.

Unfortunately, the concept of obligation is much more difficult to specify than that of sympathy. This is because the element of obligatoriness that generates behaviour favourable to other agents should be ideally 'net' of the psychological costs caused by the sense of remorse. When an agent feels obliged to help another person because if not s/he would incur a psychological cost that would alter her/his level of well-being, then this type of behaviour becomes indistinguishable from that prompted by sympathy. Consequently, Sen concludes, one can talk correctly of obligation, and therefore of non-egoistic choices, only when an agent chooses from two possible actions the one that s/he believes to be right even though it yields him less well-being than the alternative. It also follows that this kind of commitment is closely related to a more general concept of fairness. One could in fact argue that the Sen's concept of moral obligation is something very close to a feeling of what is fair to do and what is not.

Sen's discussion of the concepts of altruism and obligation involves subtle distinctions between what is perceived as well-being at the moment when the choice of action is made and what may yield well-being in the long period. Put otherwise, it could be argued that a choice prompted by obligation does not generate well-being at the moment when it is made, and indeed is perceived by the agent as costly in terms of immediate well-being, but nevertheless presages well-being in the long period. An example of this situation is provided by a worker who produces greater work effort than that agreed with the firm – and which is obviously a cost in terms of well-being at the moment when it is produced – not because s/he believes it to be *right* on the basis of some ethical principle – for example that one should always give of one's best in every aspect of life regardless of contracts and formal rules – but simply with a view to an improvement in her/his future well-being brought about by improving her/his career prospects. To clarify this kind of situation, Sen examines how his definitions of sympathy and obligation fare in a context of intertemporal choice. His discussion of the problem will not be treated here for reasons of space, and because it adds nothing relevant for the topic here treated.

W It is important to underline that when the Sen's definition of altruism (I shall call it "ethical altruism" from now on) is transferred to the context of the mechanisms within society or within organizations that generate spontaneously 'altruistic' behaviour – that is, personal sacrifice for the society and other individuals – the distinction between sympathy and obligation is important – from a normative point of view – only when the sense of obligation is in some way relatable to an ethical system which in turn is in some way determined by the social context in which it has developed. In the absence of a three-way linkage among ethical system, social context and obligation mechanisms, it is pointless to distinguish between obligation and sympathy because it would be anyway impossible to implement a strategy designed to set off the virtuous circle by means of appropriate institutional choices.

The special form of altruism in the Sen's sense is also important as a justification for income redistribution policies. To implement a policy aimed to reduce the income disparities means in fact to ask to the richer ones to reduce their wealth in favour of other people, for whom none feeling of sympathy – always using this word in the meaning given by Sen – can be reasonably felt because they are totally unknown to the affluent. The reasons that push the richer part of the population to accept the sacrifice imposed by a policy of income redistribution are several and oscillate from strictly selfish motives – like the fear of a revolution fuelled by the sentiment of injustice felt by the poor people – to the psychological

need of "self-absolution" generated by the feeling to be luckier than other people. In spite of the wide range of the determinants that justify the redistribution policies a special place is surely occupied by the ethical altruism because is the one which is internally more coherent with the tools of the institutional engineering.

When a society or an organization wants to generate spontaneous virtuous mechanisms, aimed to produce a better cooperation and solidarity among its members, obviously it can only act on obligation-related motivations. In fact all the spurs founded on sympathy or on other selfish grounds (like the just mentioned fear of a violent insurrection) pertain to the purely psychological and personal domain and therefore should require individually designed incentives. On the other hand, if the intention is to trigger the onset of an incentivising mechanism based on obligation, this must in some way be relatable to a known context, that is, to an ethical system whose connection with a given social system is known. There are two social contexts that construct the individual ethical system: the one internal to the groups in which the agents operate (family, firm, other organisations, etc.), and the society at large. Here the attention is mainly concentrated on organisations and on the society, while we shall not consider at all other kind of small groups contexts like the family.

To operate changes aimed to modify the ethical system at the organization level suffers of the obvious limit that the organisation can only intervene in its own. On the other hand one could think that the most efficient level of intervention on the ethical system is the one represented by the society as a whole, but the problem with a so generalised level is that the society is a very complex environment, a context where many different ethical systems co-exist and therefore is almost impossible to implement tools aimed to modify such systems in the same direction.

Considering practical examples of relational models which are intended somehow to produce an ethic of commitment, one finds that many of them are referred to firms and rely on the reciprocity mechanism. A classic example of this type of reciprocation mechanism is described in Akerlof's celebrated article (1982) on 'cash posters', in which he discusses a case reported by George Homans (1953, 1954) and relative to a services firm. In the business studied by Homans, a group of women workers engaged in purely routine tasks displayed a propensity to produce individual levels of work effort that were higher (sometimes much higher) than that contractually required. Akerlof explains this apparently irrational behaviour as resulting from a 'gift exchange' relation between the female workers and the firm. Because of this relation, the workers produced more than they were

contractually obliged to, and they received in return a wage which was slightly above the market rate and – perhaps – greater tolerance of cases of (usually temporary) failure to produce the minimum contractual level of effort. In other words, a reciprocity mechanism had been created of the type: "I the worker produce more that I have to, in return I receive from you a wage above the market rate and the assurance that I will not be dismissed if (for a limited but not rigidly defined period of time) I produce less than the contractual minimum".

The reciprocity relation established between firm and workers in the case described by Homans and discussed by Akerlof means that the virtuous behaviour of the workers depended on the firm's respect for the pact, so that it was potentially unstable. This point is crucial for my discussion because it helps clarify the difference between behaviour dictated by obligation in Sen's sense, and which is strictly ethical, and behaviour which is instead solely the result of a reciprocation mechanism and has little to do with the ethical dimension of human action. Note that the onset of reciprocation mechanisms has the same effect on altruism as that produced by the sentiment of sympathy in Sen's discussion. A costly action which produces an advantage for another agent, but which is chosen under the logic of reciprocity, is in fact intended to yield a subsequent gain in terms of well-being just as is the action of an agent who acts out of sympathy and ultimately, and again in Sen's set-up, seeks an improvement in her/his well-being.

When non-egoist behaviour is caused by reciprocity mechanisms, not only is it no longer definable as altruistic in Sen's sense, but also, and especially, it cannot be related to the ethical dimension, because it depends on a strictly consequentialist process of causation. The ethical dimension, in fact, can only be observed in cases of non-contingent behaviour; or in other words, behaviour which is not actuated by reactions similar to those produced by a cause/effect calculation specific to the context in which it is performed. Actions decided on the basis of a cause/effect calculation of the type implicit to reciprocation mechanisms are typically related to the standard process of maximization of individual utility, and therefore cannot simultaneously pertain to the sphere of ethical choices. In fact, using the well-known distinction between ethical preferences and subjective preferences propounded by Harsanyi (1955), one can imagine that agents construct a double system of preference ordering: the system of ethical preferences on the one side, that of subjective preferences on the other.

In Harsanyi's theory, agents order their ethical preferences according to an impersonal representation of a 'fair' society, while they structure their subjective preferences solely in function of their own well-being, so that they are contingent. From this it follows that

decisions are the result of the intersection of the two preference systems. In other words, actions are decided by a meta-system of preferences structures along a continuum with decisions caused by purely ethical preferences at the left extreme, and purely subjective choices at the right one.

Distinguishing between behaviours dictated by purely ethical reasons and actions instead produced by reciprocation mechanisms – note that reciprocation-based choices lie close to the left extreme of the Harsanyi's meta-preferences system – is important once more thinking from a normative point of view – either looking to organisations and to society – because it can thus single out two strategies with which to actuate non-formalised incentives that differ but are at the same time potentially interconnected or interconnectable. The first strategy is the creation of social conditions such that agents find themselves embedded in a network of reciprocity relations. The second is to trigger virtuous processes by injecting 'altruistic values vectors' into the organisation or into the society.

Creating a network of reciprocity relations within an organization requires, for example, organizing workers into teams, introducing shared incentive mechanisms (for instance a bonus shared equally by the members of a team), or by rotating workers among jobs so that each of them learns to perform different functions. One among the many possible ways to increase the strength of the reciprocity relationships in the society is to focus the welfare policies on the family instead than on the individual.

The injection of altruistic vectors in an organisation consists in importing an adequate number of altruism bearing elements from the outside world, or society at large. Altruism bearing elements may be conveyed into the organization through persons ethically committed to altruism – for instance, voluntary workers in non-profit organizations which produce social services – or they may in some way be included among the organization's institutional goals. A typical example of the inclusion of ethical goals in an organization's ends is provided by the for-profit enterprise which decides to allocate some of its profits to socially useful activities, for example by financing medical research.

More difficult is to import altruistic bearers in the society at large because in this case there is nothing as an "outside world" to look at. On the other hand a society can promote – e.g. through the fiscal policy – individual or group initiatives inspired by altruistic aims, like non-profit organisations or philanthropic programmes.

Note that the introduction of altruistic goals among an organization's objectives is the only instrument that has a bearing on the question of the relation between ethical system and social context. It will be remembered that in discussing Sen's concept of altruism we

assumed that the existence of a causal link between social system and ethical system was the precondition for altruism somehow to promote commitment in organizations. If it is true that the ethical values system of an organization's members are influenced – that is, shaped – by the social context in which they operate, then it is evident that the purpose of an organization's costly choice of sacrificing part of its profits to finance purely social activities is to establish a social system within its walls that is, at least partly, inspired by principles of pure altruism. Conversely, this assumption is entirely irrelevant if the organization opts for the first of the two strategies just outlined, namely that of self-injecting altruism by introducing altruistic agents. In this case, the process by which the altruistic agents have become such is of little importance; what matters is that they are altruistic by virtue of a moral principle, not because of an emotional state (sympathy) or a utilitarian calculation (reciprocation).

Reflecting on the injection of altruistic bearers raises the question as to how these elements can spread, or in other words, how the virtuous processes of commitment discussed thus far can be set in motion. Thus reaffirmed is the importance of the reciprocation mechanisms mentioned earlier, because it is likely that in order to activate a 'virtuous' reciprocity cycle, or to break a vicious one of reciprocal harm, it is necessary to reach a minimum threshold of agents willing to behave in a manner that is individually costly but collectively beneficial, albeit one not driven by non-ethical ends. If this minimum threshold is not reached, reciprocation may collapse into a Nash stable, but simultaneously Pareto inefficient, equilibrium. In other words, pure free-riding behaviour may prevail, so that the entire social system is frozen in a sort of irreversible lock-in process of productive and Paretian inefficiency. In this situation, the injection of bearers of pure altruism – that is, agents indifferent to the reciprocation mechanism and who always and invariably behave altruistically – may break the cycle of negative reciprocation. It may likewise prove useful in situations where the reciprocation mechanism is highly unstable, that is, in the presence of unstable internal equilibria.

With regard to the dynamic between bearers of pure altruism and non-altruistic agents we may once again usefully draw on Harsanyi (1977, 1999) and his discussion of a particular type of social cost which arises in situations of interpersonal interaction based on reciprocation mechanisms not sustained by a parallel system of punishment – that is, ones based solely on a system of promises among agents unconstrained by mechanisms of coercion or reciprocal punishability. It is well known, in fact, that interaction models based on reciprocation – as described by games theory for example – which do not comprise the

possibility to 'punish' defectors (those who do not behave cooperatively) will not lead to Pareto-efficient solutions. The classic example is the prisoner's dilemma, which in its one-shot version collapses onto a non-cooperation equilibrium which is Pareto-dominated by the cooperative equilibrium. On the other hand, the cooperative solution can be 'spontaneously' obtained when one moves to the repeated version of the game where the players are able to activate appropriate mechanisms of reciprocal reward and punishment.

To sum up, if the cooperative behaviour triggered by reciprocation is to function, it requires both a system of punishments and rewards and, when a relatively large number of people are involved, an adequate number of agents oriented towards cooperation. Note also that this system of rewards and punishments sustained by the reciprocation mechanism is very similar to the concept of 'social rule' described by Elster (1989), who explicitly includes reciprocity in his taxonomy of social rules. It should be emphasised that the social rules defined by Elster are explicitly different from ethical rules in that they are often backed by reinforcement mechanisms based on self-interest.

Investigation of the role of altruistic agents in reciprocation contexts requires clarification of the relations among reciprocating behaviour, free riding, altruism and imitation. The most interesting field for study of these relations is, I believe, that of experimental economics. However, as we shall shortly see, the emergence of altruistic behaviour has been little investigated in the experimental literature.

2. Reciprocating behaviour and altruism

There is a large body of literature on the onset of cooperative behaviour in the absence of incentives, and it has examined the phenomenon from three main points of view: the voluntary supply of public goods (e.g. Keser 1996; Andreoni 1988, 1995; Fishbacher, Gächter, Fehr 2001), complete information games (e.g. Kreps, Milgrom, Roberts and Wilson 1982; Eckel, Grossman 1996; Hoffman, McCabe, Smith 1996), and the alteration of market mechanisms by reciprocation processes (Güth and Tietz 1990; Roth 1995; Camerer and Thaler 1995).

These three strands in the literature provide different yet often overlapping explanations for individually costly cooperative behaviour in the absence of incentives for cooperation. The two most relevant to my purposes here are those of reciprocation and of error (discovered preferences). The feature shared both by explanations based on erroneous

choices and by those based on reciprocation is that they derive from theoretical models which prescribe pure 'egoistic' behaviour in contexts where the players (the experimental subjects) are able to punish what they deem to be unfair behaviour. In parallel – and consequently – they also share the shortcoming that the context selected almost never permits investigation of the existence of pure altruism.

A classic example of this type of 'conditioned' cooperation situation is provided by the repeated prisoner's dilemma. Here the players' ability to punish uncooperative behaviour takes the form of reprisal mechanisms – the best known of them being the tit-for-tat strategy (Axelrod, 1984) – so that it is impossible to distinguish the onset of altruistic behaviour from cooperative behaviour 'forced' by the fear of a reprisal. On the other hand, also experiments based on games which apparently enable assessment of altruistic behaviour, like the 'ultimatum game' (Stahl, 1972), are in fact conditioned by the operation of the reprisal effect.

The 'ultimatum game' describes a situation of the following type. Consider the case of two players, A and B. A is given a sum of money (say 100 euro) on one condition, namely that s/he give player B a part of it, ranging from 1 euro to the entire sum. B cannot communicate with A and can only accept or reject A's offer. If s/he rejects it, both players lose the entire sum. If A decides to offer more than the minimum to B (and this situation arises very frequently in experimental contexts: see e.g. Güth et al. 1982, or Roth et al. 1991), one may suppose that this is a case of altruistic behaviour. However, even in this case it may be that A's decision is conditioned by the risk of reprisal by B. In fact, B may decide to 'punish' A for an offer which s/he deems too low, rejecting the offer and inflicting damage on A (who would lose the entire sum) much greater than s/he would suffer. Put otherwise, the opportunity cost of punishing A's egoistic behaviour is less for B than the psychological pleasure that s/he derives from the punishment inflicted.

The only games that seem able to isolate the phenomenon of pure altruism unconstrained by the fear of reprisal are the 'dictator game' and the 'impunity game', which are both variants of the 'ultimatum game'. In the dictator game, the player who is given the sum of money and must decide how much to give to her/his partner does not risk losing anything because the other player cannot refuse. Note that considering the dictator game to be a 'game' is misleading because it involves a purely individual choice problem: one, that is to say, without complications of a strategic nature due to interaction with other agents. The impunity game (Bolton, Katok, Zwick, 1998) is very similar to the dictator game with two differences. The first is that the dictator must choose between two possible ways to split the

prize: keep most of it but leave a substantial part for the partner, or divide it into two equal parts. The second difference with respect to the dictator game is that in the impunity game the dictator's partner may decide to reject the offer even if this option – as in the dictator game – does not have consequences for the dictator, who in any case collects her/his prize.

A survey of the main results from experiments using the dictator and the impunity games is contained in the already cited study by Bolton, Katok and Zwick (1998), to which the reader is referred for details. Here I shall merely point out some of the features and shortcomings shared by experiments which have used these games.

The main feature shared by experiments based on the dictator game is that they look for explanations of behaviour 'unforeseen' by the theory – which predicts that the dictator will keep as much of the money as possible – solely by examining the role played by anonymity. In fact, anonymity as a potential determinant of purely egoistic behaviour (and therefore coherent with the theory) has been tested both with reference to the players alone – i.e. by ensuring that the dictator does not know who her/his partner is and vice versa (Forsythe, Horowitz, Savin and Sefton, 1994) – and by extending anonymity to the experimenters as well – i.e. by ensuring that not even the experimenters were able the reconstruct the identities of the subjects of the experiment (Hoffman, McCabe, Shachat and Vernon Smith, 1994; Bolton and Zwick, 1995). The idea behind the hypothesis that anonymity is important is that the experimental subjects (obviously when they perform the role of dictator) are loath to appear greedy, either to the partner or to the experimenter, for fear of acquiring a bad reputation and also for purely psychological reasons of self-representation.

The differences between the experiments just mentioned consist of various devices introduced into the experimental design: for example, the contextualization of the game in a market (Hoffman, McCabe, Shachat and Vernon Smith). The two shortcomings shared by these experiments were, first, the use of game that might have been already known to the players – although this was a very remote possibility, at least for the first experiments – and second the static nature of both the dictator and the impunity game. A number of experimenters have sought to remedy this second shortcoming, for example Bolton and Zwick, who repeated the game ten times but with experimental subjects who never met more than once.

The results of experiments using the ultimatum game are rather contradictory, except for the fact that they almost entirely confirm the existence of behaviour inconsistent with the hypothesis of pure selfishness. The existence of such behaviour, however, varies greatly in the dimension of the spontaneous contribution. That is, the sums above the minimum

threshold fixed for the game which the dictator foregoes are highly variable, and so too are the percentages of non-egoists in the total of dictators reported by the experiments**.**

The main conclusion to be drawn from the experimental literature on the dictator game is that the impossibility of designing a truly dynamic version of the game, combined with the lack of real strategic interactions among the players, prevent the transfer of the results from these experiments to contexts – such as the one examined here, namely organizations – typically characterized both by the repetition of choices over time and by strategic interaction among players. That said, it is also interesting to note that some authors emphasise the importance of using ethical factors in explanation of the not perfectly egoistic behaviour found by the experiments. For example Hoffman at el., with reference to over-contribution behaviour by dictators, stress:

"At the very minimum, these results suggest that other-regarding preferences may have an overwhekming social, what-do-others-know, component, and therefore should be *derived* formally from more elementary expectational considerations."

Bolton et al. assert something similar in the conclusions to their study:

"Our procedure suggests that dictators giving arises from a concern for fair distribution on the part of dictators. This is not to say that dictators give in order to improve the welfare of others. In our procedure, concerns for a fair distribution originate from personal and social rules that effectively constrain self-interested behavior – although within these constraints dictators *do* behave in a self-interested manner (they act first to secure what they consider to be their own fair share)."

The second of these statements is particularly interesting because it is the one that best fits Sen's definition of non-egoism discussed in the first section.

One type of altruism that is explicitly 'impure', in that it springs from the fear of reprisal, is what has been called "altruistic punishment" (Fehr and Gächter, 2002). Experiments on altruistic punishment have investigated the particular type of behaviour observed when an experimental subject decides to assume a personal cost in order to enforce a cooperation rule which operates in favour of the group to which s/he belongs. The context typically described by these experiments is one in which the subjects can decide to cooperate or to defect in the production of a public good. Free-riding behaviour, moreover, can be punished by mechanisms which are costly to the person who inflicts the punishment. In other words, one or more subjects may decide to assume the task and the cost of punishing another subject

who has chosen a purely opportunistic strategy. This type of behaviour is called 'altruistic punishment' or 'altruistic reciprocation' because it is believed that the decision to assume for oneself the cost of enforcing the cooperation rule is contrary to a strictly egoistic logic of maximizing individual utility.

An example of an experiment of this type is described by the already-cited Fehr and Gächter (2002), who used groups consisting of four players who at the beginning of the experiment received 20 monetary units which they could use to finance a common project (investing from 0 to 20 units). The subjects could keep the units that they did not spend on the shared project. For each monetary unit invested in the project, the entire group received 1.6 units in return, and each of the group's members received 0.4 units regardless of her/his contribution to the project. Because the minimum investment was 1 monetary unit, while the individual return was 0.4, no individual economic convenience derived from investing in the project- Choices were made simultaneously and anonymously. At the end of the round, the players were told about the choices that the others had made (although identities were still not revealed), and they could punish the other players by assigning a punishment score which ranged from 0 to 10 points. Each point received cost the punishee 3 monetary units and the punisher 1 monetary unit.

It will be seen that the punitive altruism described by Fehr and Gächter is difficult to fit with the definition of altruism discussed here because it certainly involves some form of psychological interaction between the subject that inflicts the punishment and the subject that receives it. More specifically, in the case of punitive punishment we have a phenomenon which is mirror like to Sen's sympathy. It is likely that the subject who decides to assume the cost of the punishment will feel some form of 'resentment' or antipathy towards the subject that s/he decides to punish. It should be borne in mind, in fact, that the design of the experiment allowed damage to be caused which was more than proportional to the cost of the punishment. This enabled the punisher to obtain a psychological advantage in terms of revenge on the free rider because the relative cost of the punishment was significantly less for the punisher than for the punished. The context was therefore one that could be related to a calculation of subjective utility, but not to strictly ethical choices.

The second explanation of individually costly cooperative behaviour mentioned above is that of error or decline in the level of spontaneous over-contribution in experiments on repeated public goods. This phenomenon was identified in the early 1990s (Ledyard, 1995; Plott, 1995), and it is typically associated with experiments in which the subjects must make a series of spontaneous choices concerning a public good over time. It has been found that

the initial levels of spontaneous over-contribution tend to diminish as the experiment proceeds.

The main reason put forward in explanation of this phenomenon is that the subjects initially make a mistake in fixing their levels of contribution and learn with time to correct this error. The interesting feature of these experiments is that this error-correction process never entirely resolves the phenomenon of over-contribution, which consequently is not entirely eliminated. The persistence of behaviour inconsistent with convergence on the Nash equilibrium therefore seems to indicate the existence of some factor besides error. However, the structure of these experiments, which were constructed in order to leave room in any case for the onset of reciprocating behaviour, does not permit one to establish with certainty whether the over-contribution stems form ethical factors or from something else.

A final consideration concerns an aspect somehow implicit in many of the experiments examined thus far but which was not explicitly discussed in any of them. I refer to the role performed by imitative mechanisms in cooperative choices like the ones described. It is likely that strictly individual motivations for costly cooperation are flanked by processes of a conformist nature; that is to say, behaviour which consists in simple adaptation to the choices prevalent in the group. The phenomena of conformism and imitation of the group's predominant choice may partly explain behaviour which appears to be altruistic but is in fact motivated by pure imitation.

Discriminating between subjects induced to cooperate by an ethical motivation and those who instead adjust passively to the preponderance of altruistic or egoistic behaviour is a very complex undertaking, and probably impossible. As we shall shortly see, the experiment described here is unable to shed light on this aspect, although its results suggest that this type of phenomenon was present in the behaviour observed.

3. The experiments

Starting from the theoretical premises set out in the previous section, it was decided to design an experiment which enabled the study of altruistic behaviour triggered by ethical motives. Specifically, we conducted six experimental sessions with the same design but the following differences:

Exp1Ba[1] –   Base experiment (20 subjects);

Exp2An –   Base experiment with total anonymity (24 subjects);

Exp3Dif –   Experiment with differences in the starting money endowment and total anonymity (24 subjects);

Exp4Dif(a-b) –   Experiment with two rounds – (a) and (b) – carried out by using the same sample of subjects (12 subjects) to test two settings: round (a) the same of Exp2An; round (b) the same of Exp3Dif1;

Exp5Wo –   Experiment with total anonymity but using only women as experimental subjects (24 subjects)

Exp6Me –   Experiment with total anonymity but using only men as experimental subjects (24 subjects).

The sole difference between the first two experiments concerned the degree of anonymity. In Exp1Ba the subject that decides to cooperate knows that none of the other participants will know anything on her/his 'sacrifice' because none information is given through the computer screen on her/his choices. In Exp2An the condition of anonymity is stricter because we used a stringent "double anonymity" procedure[2] that assures the subjects that their choices are totally hidden also to the experimenters. In other words a given subject of Exp2An that decides to cooperate knows that nobody will know anything on her/his 'sacrifice', that in this way is a strictly private matter. The reason for this strengthening of the anonymity condition is to totally eliminate any form of selfish motivation – even those of psychological nature – that could be produced by the desire to appear "a nice altruistic person" to the eyes of the researchers.

The essential anonymity condition of Exp1Ba is aimed to remove the component of direct reciprocity in the form of both reward and risk of punishment. When individually costly cooperative behaviour is directed towards subjects whose identities are unknown, and when it is undertaken without reward or in the absence of the risk of being punished, it is likely to be altruistic behaviour in Sen's sense of the term. The high anonymity condition of Exp2An is intended to improve the degree of "cleanliness" of the observed behaviours, i.e. to be sure that those who decide to cooperate are totally unaffected either by feelings of reciprocity and by the wish to promote their image to the eyes of the experimenters.

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[1] The results from this experiment have been utilised also in Mittone 2002.
[2] The double blind (or double blind) procedure here adopted has some similarities with the procedures developed in Hoffman *et al.* (1994) and is described in the appendix within the instruction.

The third and fourth experiments are structured exactly like the second one, therefore with total anonymity, but it has been introduced a differentiation in the money endowment at the beginning of the experiment. In both Exp3Dif1 and Exp4Dif2 the experimental subjects have been divided into two groups: the first group received an extra money reward – 10 euros – for the participation to the experiment, while the second group received only the standard payment. To belong to the first or to the second group is a matter of luck because the subjects are separated using a random procedure. The difference of the starting endowment has been introduced to simulate a situation of income disparity among the micro-society of the participants to the experiment. The idea is that differences in the individual income level work as a stimulus for cooperation and solidarity, i.e. the awareness of the existence of income disparities should interact with the ethical system of the experimental subjects, promoting altruism by the "richer" ones. The difference between Exp3Dif and Exp4Dif(a-b) is that in Exp4Dif(a-b) the same subjects played the game twice: the first time without any income differentiation and the second time with the extra money given to half of them.

Finally the fifth and fourth experiments were once more identical to the second one (Exp2An) but the sample of experimental subjects used consisted respectively only of women and of men – while in all the other experiments the samples were made by women and men together –. The hypothesis behind the fourth experiment is that women are more oriented towards social cooperation (selfless), due to ethical motivations, compared to males (selfish). The idea that women are less egoistic than men is not new at all and has been investigated from many perspectives of analysis. In particular the differences between the behaviours of women and men have been analysed by using experiments, more precisely using the same kind of games already mentioned here in the previous paragraph. Among the researches carried out using the experimental approach I limit myself to quote Eckel and Grossman (1998) that did ten experimental sessions based on the dictator game, using sample of subjects respectively made only by women and by men. The results emerged from these experiments seemed to show that on average women donate twice what men donate.

The discovering that women are more generous than men in the dictator game context is important for our experiments because the setting of this game is very similar to the one here used. Either the double-anonymous dictator game and the experiments here reported share the common characteristics of removing risk, gender-related subject interactions, and the experimenter effect. As we have already mentioned the main difference between the two approaches is that the dictator game regards a one shot decision, while the puzzle game here

used requires to perform a long sequence of decisions and therefore allows to observe the emergence of systematic behaviours.

It is important to underline that in spite of the design differences the main and common purpose of all five experiments is to eliminate the component of direct reciprocity in the form of both reward and risk of punishment. When individually costly cooperative behaviour is directed towards subjects whose identities are unknown, and when it is undertaken without reward or in the absence of the risk of being punished, it is likely to be altruistic behaviour in Sen's sense of the term. The experiments described here made it possible to isolate a situation based on anonymity, costly cooperation, and absence of direct punishment.

The altruistic behaviour studied by means of the experiments discussed here is particularly important for analysis of organizational formulas and more in general for the design of income redistribution policies.

4. The experimental design of the puzzle experiment

The experiment analysed in what follows involved the construction of a puzzle by four players who took turns to place the pieces in position. The players have to place just one piece in each round of the game, and they have to comply with rule that the puzzle is to be completed by starting from the central triangles and working anticlockwise towards the outer parts of the design. The pattern of the puzzle is shown in Figure 4.1.

The experiment continues until the entire puzzle has been completed. Different quantities of the various kinds of pieces are distributed among the players, so that it could happen that a player is unable to contribute to the puzzle when it is his/her turn to make a move. Failure to make a move causes a delay in completion of the game and affects the monetary prize (122 €) which is distributed in equal parts among all the players at the end of the experiment. More specifically, every missed turn reduces the amount of the final prize by a fixed sum (2.06 €). Because the rule on the division of the final prize states that the loss is to be equally divided among all the players, it follows that the individual damage caused by failure to insert a piece is one-quarter of the sum subtracted from the collective prize (about half euro, more precisely 0.515 €).

The experiment is conducted using computers. Each player sees the pattern of the puzzle and the pieces in his/her possession on the screen but does not know the number and

composition of the pieces possessed by his/her partners. For each round, the software shows the space in the puzzle pattern to be filled, and the player whose turn it is had to indicate with the mouse pointer the piece in his/her possession to be inserted in the pattern. If the player does not have the piece required, s/he clicks a button which tells the other players that s/he would have to miss his/her turn. The next player can insert one of his/her pieces instead of the missing one, and in this way the final reward is not reduced. However, the player who inserts a piece when it is not his/her turn incurred a penalty (1.03 €). Thus, by inserting an optional piece the 'altruist' player suffers more damage to his/her individual return than s/he obtained from the sharing of the common prize without the reduction due to the lost piece (to be precise, s/he lost 0.52 €). It should also be pointed out that it is impossible to determine whether the choice of behaving altruistically for the whole duration of the experiment would not prove less advantageous – individually – than non-cooperative behaviour, not even in the case in which a situation of close cooperation – choice of altruistic moves – arose among all players. In fact, not knowing what pieces are possessed by the other players means that there is a risk of being called upon to cooperate much more frequently than the others, thus generating a result which is collectively better but individually worse than that obtainable by opportunistic behaviour.

Fig. 4.1. The design of the puzzle
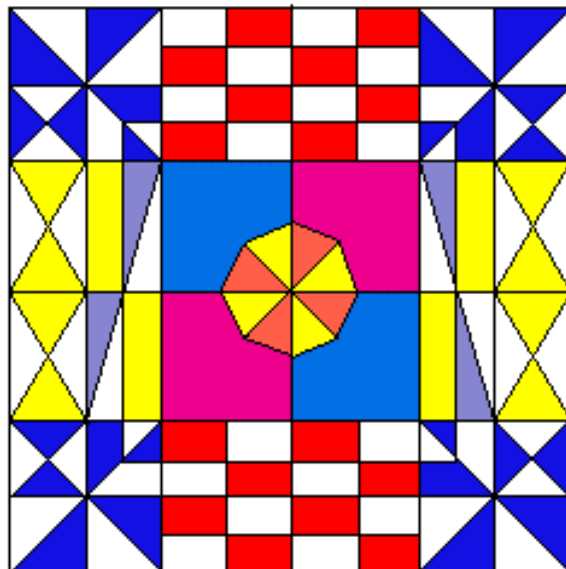
The four players sit at an equal number of computer screens together with other experimental subjects (depending from the session the number of people in the computer room could vary from 12 to 20), so that no player can know exactly who s/he is playing with

and can count on remaining anonymous. Because of anonymity and the fact that nobody knows what pieces the other players possessed, it is not possible to enforce cooperative behaviour by punishing free riders. Likewise, if a player decides to cooperate by inserting his/her piece in the place of another player, s/he knows that s/he would incur a cost without being able to count on any form of reciprocity, because s/he does not know the distribution of the pieces among the players. Furthermore, a player who chooses to cooperate cannot hope to obtain some form of solidaristic recompense for his/her sacrifice from the group as a whole because none (including the experimenters for Exp2An, Exp3Dif1, Exp4Dif2, Exp5Wo and Exp6Me) will never know that s/he had cooperated.

The experiment thus made it possible to observe the onset of altruistic behaviour in the absence of both the fear of being punished for non-cooperation and of sympathy for the other players, who remained strictly anonymous.

5. Analysis of the results

The subjects for the experiments were recruited by means of posters put up on the bulletin boards of the Faculty of Economics of the University of Trento. At the beginning of the experiment the subjects are given the list of instruction (see Appendix). The instructions are also read out by a researcher at the beginning of each experimental session. The hypotheses underlying each change to the experimental design are the following:

H1 – Exp2An stricter anonymity = lower frequency of altruistic moves: control on Exp1Ba

H2 – Exp3Dif1 and Exp4Dif2(b) differences in the starting endowment = feeling of disparities = greater frequency of altruistic moves by the "richer" subjects: control respectively on Exp2An and on Exp4dif2(a)

H3 – Exp5Wo use of only women as experimental subjects = greater frequency of altruistic moves: control on Exp2An and Exp6Me

Results from the experiment are given in Table 5.1, which shows the frequency of the costly cooperation choices made by the participants in each experiment. More specifically, for each experiment the identities of the players are given in the rows, while the figures in the columns refer to the groups of four players which made up each experimental sample. The values are expressed in percentages: that is, each figure expresses the number of times that a player i in group j decided to help one of the other players, obviously if s/he was able to do so.

Table 5.1. Percentage frequencies of cooperative moves

Exp1Ba

Player	Grp1.1	Player	Grp2.1	Player	Grp3.1	Player	Grp4.1	Player	Grp5.1		
G1.1.1	89	G1.2.1	100	G1.3.1	100	G1.4.1	78	G1.5.1	0		
G2.1.1	44	G2.2.1	0	G2.3.1	33	G2.4.1	0	G2.5.1	0		
G3.1.1	10	G3.2.1	20	G3.3.1	100	G3.4.1	90	G3.5.1	100		
G4.1.1	0	G4.2.1	0	G4.3.1	78	G4.4.1	11	G4.5.1	56		
Grp. Avrgs.	**35.75**		**30**		**77.75**		**44.75**		**39**		
Tot. Avrg.	**45.45**										

Exp2An

Player	Grp1.2	Player	Grp2.2	Player	Grp3.2	Player	Grp4.2	Player	Grp5.2	Player	Grp6.2
G1.1.2	44	G1.2.2	11	G1.3.2	67	G1.4.2	0	G1.5.2	0	G1.6.2	0
G2.1.2	33	G2.2.2	100	G2.3.2	0	G2.4.2	44	G2.5.2	67	G2.6.2	100
G3.1.2	10	G3.2.2	0	G3.3.2	0	G3.4.2	10	G3.5.2	80	G3.6.2	50
G4.1.2	33	G4.2.2	78	G4.3.2	33	G4.4.2	100	G4.5.2	56	G4.6.2	89
Grp. Avrgs.	**30**		**47.25**		**25**		**38.5**		**50.75**		**59.75**
Tot. Avrg.	**41.87**										

Exp3Dif

Player	Grp1.3	Player	Grp2.3	Player	Grp3.3	Player	Grp4.3	Player	Grp5.3	Player	Grp6.3
G1.1.3(**R**)	100	G1.2.3(**R**)	100	G1.3.3(**R**)	100	G1.4.3(**R**)	11	G1.5.3(**P**)	33	G1.6.3(**R**)	0
G2.1.3(**P**)	56	G2.2.3(**P**)	100	G2.3.3(**R**)	100	G2.4.3(**P**)	11	G2.5.3(**P**)	0	G2.6.3(**P**)	44
G3.1.3(**R**)	80	G3.2.3(**P**)	50	G3.3.3(**P**)	70	G3.4.3(**P**)	100	G3.5.3(**R**)	100	G3.6.3(**P**)	60
G4.1.3(**P**)	56	G4.2.3(**R**)	22	G4.3.3(**P**)	10	G4.4.3(**R**)	100	G4.5.3(**R**)	33	G4.6.3(**R**)	100
Grp. Averg.	**73**		**68**		**92,5**		**55,5**		**41,5**		**51**
Tot. Avrg.	**63,58**										

R = player with extra reward   **P** = player without extra reward

Exp4Dif(a)

Player	Grp1.4a	Player	Grp2.4a	Player	Grp3.4a						
G1.1.4a	100	G1.2.4a	22	G1.3.4a	33						
G2.1.4a	40	G2.2.4a	78	G2.3.4a	22						
G3.1.4a	100	G3.2.4a	100	G3.3.4a	100						
G4.1.4a	0	G4.2.4a	100	G4.3.4a	100						
Grp. Avrgs.	**60**		**75**		**63.75**						
Tot. Avrg.	**66.25**										

Exp4Dif(b)

Player	Grp1.4b	Player	Grp2.4b	Player	Grp3.4b						
G1.1.4b(**R**)	100	G1.2.4b(**R**)	0	G1.3.4b(**R**)	22						
G2.1.4b(**P**)	22	G2.2.4b(**P**)	78	G2.3.4b(**P**)	0						
G3.1.4b(**P**)	90	G3.2.4b(**P**)	100	G3.3.4b(**P**)	100						
G4.1.4b(**R**)	11	G4.2.4b(**R**)	100	G4.3.4b(**R**)	100						
Grp. Avrgs.	**55.75**		**69.5**		**55.5**						
Tot. Avrg.	**60.25**										

R = player with extra reward   **P** = player without extra reward

Exp5Wo

Player	Grp1.5	Player	Grp2.5	Player	Grp3.5	Player	Grp4.5	Player	Grp5.5	Player	Grp6.5
G1.1.5	78	G1.2.5	78	G1.3.5	100	G1.4.5	56	G1.5.5	89	G1.6.5	100
G2.1.5	67	G2.2.5	11	G2.3.5	78	G2.4.5	0	G2.5.5	56	G2.6.5	0
G3.1.5	70	G3.2.5	90	G3.3.5	50	G3.4.5	90	G3.5.5	70	G3.6.5	40
G4.1.5	89	G4.2.5	100	G4.3.5	78	G4.4.5	56	G4.5.5	56	G4.6.5	33
Grp. Avrgs.	**76**		**69.75**		**76.5**		**50.5**		**67.75**		**43.25**
Tot. Avrg.	**63.96**										

Exp6Me

Player	Grp1.6	Player	Grp2.6	Player	Grp3.6	Player	Grp4.6	Player	Grp5.6	Player	Grp6.6
G1.1.6	67	G1.2.6	100	G1.3.6	100	G1.4.6	56	G1.5.6	100	G1.6.6	100
G2.1.6	100	G2.2.6	100	G2.3.6	67	G2.4.6	100	G2.5.6	11	G2.6.6	56
G3.1.6	40	G3.2.6	20	G3.3.6	90	G3.4.6	30	G3.5.6	40	G3.6.6	70
G4.1.6	100	G4.2.6	100	G4.3.6	10	G4.4.6	11	G4.5.6	100	G4.6.6	44
Grp. Avrgs.	**76,75**		**80**		**89,25**		**49,25**		**62,75**		**67,5**
Tot. Avrg.	**70,92**										

The general average of altruistic moves in Exp1Ba is 45.45, while the same average calculated for Exp2An is 41.87. The difference between the two experimental sessions seemed therefore quite small. A possible way to check if the difference between the

averages of the two samples of subjects is statistically significant is to compute a normal distribution test.

The test here used is based on the assumption that the subject's decision to cooperate or to defect is independent from the choices done by the other participants because of the anonymity condition. We then assume that each individual choice – help; non help – is a Bernoullian with parameter θ. Therefore the experimental subjects' decisions have the following distribution:

$$f(x) = \theta^x (1-\theta)^{1-x} \qquad \theta \in (0, 1) \qquad x \in \{0, 1\} \qquad [5.1]$$

From [5.1] it follows that each experimental session is a random sample with **n** samplings from a Bernoullian. Therefore the maximum likelihood estimator is given by:

$$\hat{\theta} = \frac{\sum_{i=1}^{n} x_i}{n} \qquad [5.2]$$

The maximum likelihood estimator of a Bernoullian random variable, of parameter θ, ha a distribution which can be approximated by a normal distribution. Therefore the difference between the parameters computed for different groups has the following distribution:

$$\hat{\theta}_1 - \hat{\theta}_2 \xrightarrow{n \to \infty} N\left(\theta_1 - \theta_2 \frac{\theta_1(1-\theta_1)}{n_1} + \frac{\theta_2(1-\theta_2)}{n_2}\right) \qquad [5.3]$$

From [5.3] is possible to compute the 95% confidence interval:

$$\lambda_{1,2} = \left(\hat{\theta}_1 - \hat{\theta}_2\right) \pm 1.96 \times \sqrt{Var\left(\hat{\theta}_1 - \hat{\theta}_2\right)} \qquad [5.4]$$

In the interval defined by the [5.4] fall the 95% of the values of the difference between the estimators, therefore if this interval does not include the zero one can state that the attitude towards cooperation within each couple of groups is different with 95% significance. This means to define an acceptance-rejection zone for the following system of hypotheses:

$$\begin{cases} H_0 : \theta_1 = \theta_2 \\ H_1 : \theta_1 \neq \theta_2 \end{cases}$$

Which means that the null hypothesis is rejected if $0 \notin (\lambda_1; \lambda_2)$.

The θ values for Exp1Ba and for Exp2An are: $\theta_{Exp1Ba} = 0.459459$; $\theta_{Exp2An} = 0.414414$, these values define an acceptance interval with $\lambda_1 = 0.05168$ and $\lambda_2 = -0.14177$; therefore there is not a statistically significance difference between the results from the two experimental sessions, which means that an increase in the anonymity conditions does not change in an important way the behaviours of the subjects.

It is also worth remembering that in both Exp1Ba and Exp2An to cooperate means to decide to pay a charge without any possibility to obtain some form of reciprocal aid, not only from the subject directly helped but neither from the group as a whole, because none players would never know if and who had helped. In spite of this quite severe contextualisation almost half of the possible altruistic moves have been actually performed by the subjects in both the experiments. The attitude towards ethical altruism – i.e. altruism without reciprocation – seemed therefore quite strong.

The average frequency of altruistic moves recorded in Exp3Dif is 63.58, which seemingly confirms the first part of hypothesis H2: in fact, it is 21.7 points higher than the average calculated for experiment Exp2An. On the contrary the average frequency of cooperative moves done by the experimental subjects of Exp4Dif(a) is lower than the average reported in the second round of this experimental session, i.e. the round with a different initial endowment – Exp4Dif(b) –.

This apparent incoherency between the results of the two experimental sessions with different initial endowment – Exp3Dif and Exp4Dif2(a-b) – is a consequence of the decision to use the same sample of subjects in Exp4Dif(a-b). Using the same sample of subjects, and assigning them the higher initial money endowment at random, expose to the risk to give the extra money to the subjects that in the first round demonstrated to be the more altruistic. Giving more money to those that had already chosen to always cooperate means to reduce the possibility to test the role played by income disparities, as an incentive in favour of altruism. In fact looking to table 5.1 one can easily notice that in Exp4Dif(b) on a total of 6 "rich" subjects 3 of them had always cooperated in Exp4Dif(a) and therefore could not improve their degree of altruism. On the contrary other 3 subjects that had already always

cooperated in the first round were not chosen for the extra money in the second round. It follows that the average number of altruistic moves decreased in the second round because half of the "rich" ones could not improve their degree of altruism while all the "poor" ones could reduce – as in fact the 50% of them did – their level of cooperation.

For the sake of precision one should also notice that two "rich" subjects – that produced a low level of cooperation in Exp4Dif(a) – decided to even reduce their effort in the second round, in spite of the fact that they received the extra money.

The average percentage of altruistic moves, respectively for the "rich" and for the "poor" subjects of Exp3Dif, are 70,5 and 56,67; values which are coherent with the hypotheses here assumed. Furthermore the difference is significant. In fact the θ values for the two sub-samples – the sub-sample of the "rich" ones and the sub-sample of the "poor" ones – of Exp3Dif are: $\theta_{Exp3Difpoor} = 0.571429$ and $\theta_{Exp3Difrich} = 0.709091$. These values of the thetas give an acceptance interval with $\lambda_1 = -0.26257$ and $\lambda_2 = -0.01274$ which means that the difference between the propensities of the poor ones and of the rich ones to cooperate is statistically significant. An analogous result is obtained also from the comparison between the values of λ computed respectively for the whole sample of subjects that participated to Exp3Dif and for the sample of subjects of Exp2An. More precisely the θ values are: $\theta_{Exp2An} = 0.414414$ and $\theta_{Exp3Dif} = 0.63964$ that define an acceptance interval between $\lambda_1 = -0.31571$ and $\lambda_2 = -0.13473$, therefore also in this case the difference between the averages is statistically significant.

It is worth to underline that in spite of the fact that the experimental subjects seemed to be influenced by the initial money endowment this does not eliminate completely the altruistic behaviours from the poor ones group. Looking to table 5.1 – Exp3Dif and Exp4Dif(b) – one can notice that 12 participants that had not received the initial money endowment on a total of 16 cooperated in more than the 50% of the moves and 5 of them have always cooperated. The existence of cooperative behaviours among the sub-sample of the disadvantaged subjects confirms the "ethical" nature of the altruistic behaviour here observed. When a participant, in spite of the fact that s/he has been negatively discriminated, still decide to cooperate this means that s/he is behaving in accordance of some psychological-ethical "built-in" mechanism which is context independent.

To check for differences in the attitude towards altruism between women and men is necessary to compare the results from Exp5Wo and Exp6Me. From a first analysis to table 5.1 it seemed that women are less altruistic then men because the percentage of cooperative moves of the women sample is 63.96 while the same average computed for the sample made

by men is 70.92. More in general it seemed that the samples made by subjects of the same sex display an higher solidaristic attitude than the mixed samples. This impression is confirmed by computing the θ values respectively for Exp5Wo and Exp2An which are: $\theta_{Exp2An} = 0.414414$ and $\theta_{Exp5Wo} = 0.63964$ these values define the interval with $\lambda_1 = -0.31571$ and $\lambda_2 = -0.13473$. Given the lambda values there is a statistically significant difference (95%) in the propensities towards cooperation comparing the sample made only by women with the mixed sample. Women do 22% more altruistic moves than the subjects belonging to the mixed sample do.

Similarly also the theta values computed for Exp6Me and Exp2An ($\theta_{Exp6Me} = 0.702702$; $\theta_{Exp2An} = 0.414414$) and the corresponding acceptance interval $\lambda_1 - \lambda_2$ allow to conclude that the difference between the average propensity towards altruistic moves are statistically significant while. On the opposite, the differences between Exp5Wo and Exp6Me are not statistically significant which could take to the conclusion that what matter is not the difference between sexes but the fact that the subjects of the sample are of the same sex.

Summarising it seemed that some form of solidarity would emerge within groups made by subjects of the same sex. On the other hand women, when compared with men within a mixed group show an higher propensity in favour of cooperation. In fact analysing the results of experiment Exp1Ba (which is the only mixed experiment with low anonymity and therefore the only one that allows to identify the sex of the players) one discovers that the female participants cooperate on average in the 58% of moves while the male participants choose to cooperate only in the 41,27% of the total moves. Computing the theta values respectively for the females and for the males we have: $\theta_{Exp1BaFe} = 0.586956$ and $\theta_{Exp1BaMa} = 0.417266$ that define a confidence interval with $\lambda_1 = 0.3339062$ and $\lambda_2 = 0.005473781$. The difference is therefore statistically significant.

More in general, and looking only to the experiments directly comparable – i.e. excluding Exp4Dif which had a too limited number of subjects and was the only one that used the same subjects to test two experimental settings –, one notes that the average frequency of altruistic moves made in the various experimental sessions is consistent with the hypotheses incorporated into the experimental designs. The highest values have been reported in the experiments with subjects of the same sex and without starting income differentiation, closely followed by the experiment that introduced income differentiation. It is also worth noticing that the number of subjects that have decided to always cooperate is quite high (28 on a total of 116 participants excluding Exp4Dif for the reasons just mentioned) and

therefore allows to conclude that the general thesis here sustained is true: i.e. altruism without reciprocation does exist also not only in a one-shot setting (like the one used by the dictator game) but also in a repeated choices context.

The awareness of the existence of inequalities in the individual initial endowments pushed 7 "rich" subjects – plus another one that cooperated in the 80% of the moves –, on a total of 12, to always cooperate, while only 2 of the "poor" ones decided to always cooperate. These differences (which are statistically significant) seemed demonstrate that should be easier to implement an income redistribution policy – and less politically "expensive" – when there is a strong awareness among people of the existence of inequalities in society.

Analogously the same feeling should work as an incentive towards cooperation within organisations. The consciousness that some of the members of the organisation are disadvantaged – for example because they suffer of some form of physical or mental handicap – can produce a positive feeling of solidarity pushing the other members towards altruistic behaviours. It is worth underling that this consideration is based on a repeated choices experiment that allows to state that the altruistic behaviour can be "stable" i.e. is not circumscribed to a one shot decision.

5. The opinions of the experimental subjects

The results from the experiments discussed in the previous section seemingly show the existence of individually costly cooperative behaviour sustained, not by reciprocation mechanisms but by some form of psychological-ethical mechanism. In other words, they seem to prove the existence of 'pure altruists', or of non-egoistic behaviour in Sen's sense.

The importance of ethical motives in determining altruistic behaviour is confirmed by another empirical finding, based on the opinions of the participants to the experiments.

In order to facilitate interpretation of the results of the experiments, after each session the participants were asked to complete a questionnaire intended to gather their opinions. The questionnaire consisted of a small set of questions mainly focused in the problem of reciprocity: that is, it was designed to verify whether the participants thought they could have somehow punish free-riding behaviour. At the end of the four experiments, 60% of the participants thought it was impossible to punish free-riding behaviour even in the case that they would be informed about the identity of the subject that decided not to cooperate.

Consequently, the majority of them were convinced of the substantial unpunishability of egoistic behaviour even in the case that the anonymity condition would be totally relaxed. It should also be stressed that practically none of the subjects who thought that free riders could be punished was able to explain how this could be accomplished in practice. Moreover, the overwhelming majority of them also said that the punishment would in any case affect the other players.

Looking to the specific motivations reported by the subjects that participated to Exp3Dif the majority (58%) of the "poor" ones declared that their decision to cooperate has been influenced by the feeling to be disadvantaged comparing with the other ones. On the other hand the subjects of the sub-sample of the "rich" ones are equally distributed between those that declared to have not been pushed towards an higher cooperation by the feeling to be luckier that their mates and those that declared to feel in some way encouraged towards cooperation by their higher initial endowment.

The wide majority (83%) of Exp5Wo declared that the fact to belong to a group made only by women did not affect at all their attitude towards cooperation. The same answer has been given also by the majority (79%) of the men who participated to Exp6Me. The opinions expressed by the participants of both the experimental session with only one sex contrast with the observed behaviours. The more plausible reason for this discrepancy is that people do not like to appear influenced by sex differences, because there is a sort of generalised cultural agreement that sex discrimination is "bad".

In the majority of cases the opinions gathered by the questionnaires seemed support in the conclusions arising from the experiments, and in particular they support the hypothesis that altruistic choices were not influenced by the fear of being punished or by any positive return from the other participants.

6. Conclusions

Summarising the results emerged from the puzzle experiment we can say altruism without reciprocation is a quite common behaviour, not only for the one shot decisions games (like the dictator game) but also in a repeated choices context. The extent of the effects produced by the ethical altruism can be influenced by some socio-economic variables like income inequalities and gender. Disparities in income seemed to generate an higher altruistic response by the richest ones and a lower cooperation by the poor ones. This means

that the solidarity propensity due to altruism – without reciprocation – is influenced by some broad form of psychological sensitivity towards fairness in wealth distribution. It is worth to underline that in spite of the fact that

The effects played by gender are less clear but two considerations can be made: the first one is that women in mixed groups are more altruistic than men are, the second one is that the awareness to belong to a group made of subjects of the same sex increases cooperation either for women and for men.

The results of the puzzle experiments give normative hints either when they are applied to organisations and when they are referred to the society as a whole. The effects produced by ethical altruism on the degree of efficiency of an organisation are quite obvious. As this determinant of a cooperative behaviour is substantially independent from the specific context this means that it can be "injected" in the organisation without the need of a specific formal contract. To inject altruistic values into an organisation means to look for members – that can be either individuals or other organisations as partners – that pursue ethical aims as their main objective – e.g. volunteers, non profit foundations and organisations, etc. –. To involve partners ethically motivated can increase the level of cooperation within the organisation and at the same time can activate virtuous mechanisms of imitation among the other members. The advantage of the injection of bearers of altruism, when compared with more traditional tools for promoting productivity and efficiency, like money incentives defined though a formal contract, is that these "altruistic holders" are substantially unaffected by the organisational context and therefore are very useful in all those cases where the organisation's milieu is deteriorated.

Similarly at the society level it could be interesting to consider the implications that an education that improves the feelings of solidarity and cooperation could have on the political cost – degree of legitimisation – of the redistributive policies.

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Appendix – Instructions given to the participants

You are about to take part in an experiment intended to study the behaviour of people when they cooperate.

Each of you will belong to a group of 4 players chosen at random by computer. No player will know who the other members of his/her group are. Communication will take place solely via your computer screen.

The experiment consists of completing a puzzle of 120 pieces in as few moves as possible. The pieces divide into 11 types which differ by colour and shape. The number of pieces allocated to each player are shown at the bottom of the screen. The numbers written beneath each piece state how many pieces of that type are available to each player.
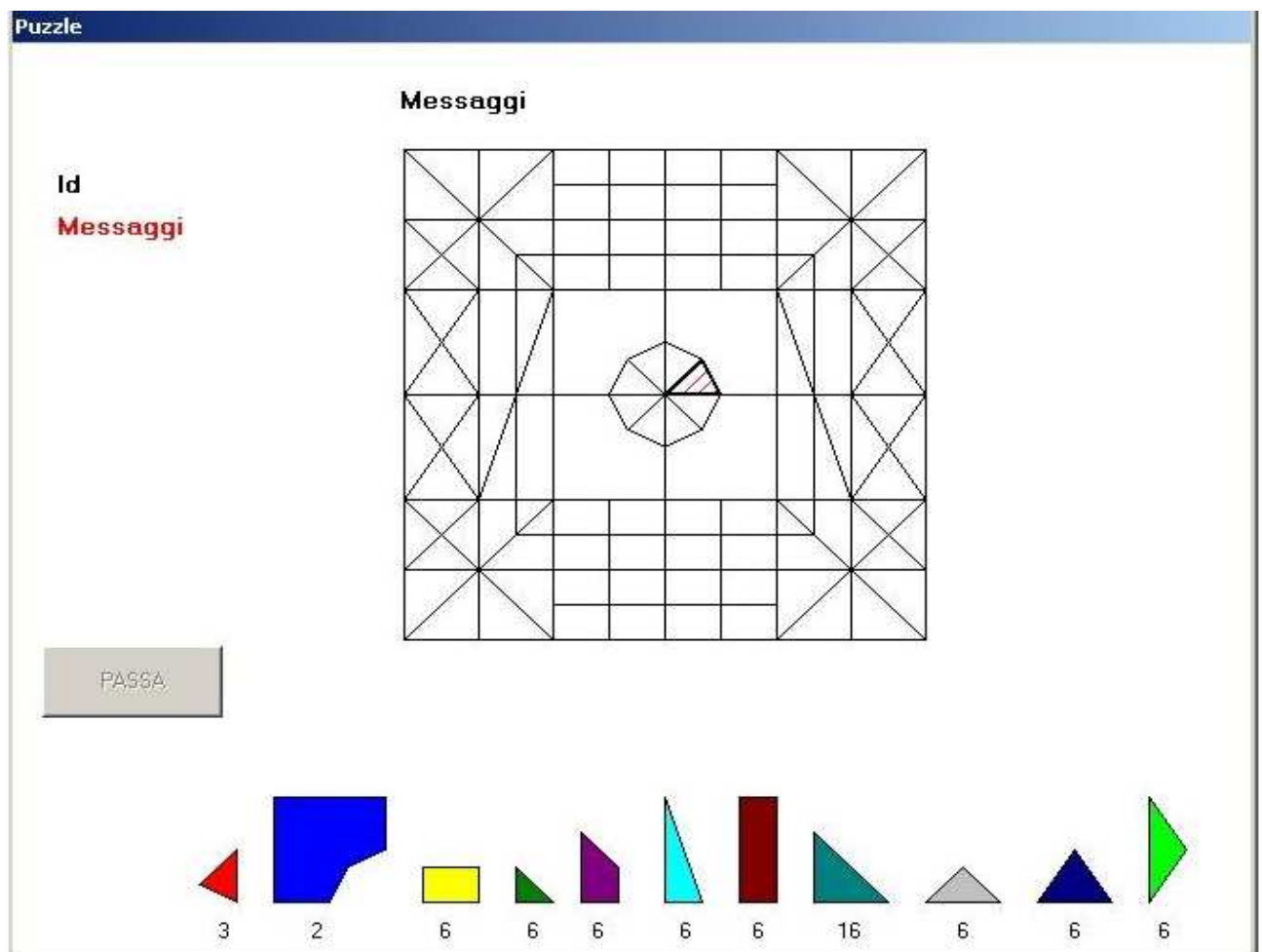
The puzzle must be assembled following a fixed sequence. The puzzle can be divided into 5 sub-puzzles and it must be assembled in the following order:

- the central octagon;

- the square with the octagon at its centre;

- the first frame of the square;

- the frame of the first frame;

- the frame of the second frame.

Each sub-puzzle is assembled anticlockwise by means of the computer.

Each group has an initial account of 120 €. Every move in excess of the minimum of 120 moves necessary to complete the puzzle will entail the deduction of 2 € from the group's account, which will be divided equally among the 4 players at the end of the experiment.

Each player in turn inserts the right piece in the corresponding area of the puzzle grid. If the player does not have this piece, s/he misses his/her turn and the next player receives a request for help. At this point s/he may choose between the two following alternatives:

–   Help the previous player and put the piece in its place on the grid. In this case the person that has helped must pay a penalty of 1 € which will be deduced from his/her final personal reward. This action counts as 1 move, so that the player prevents 2 € being deducted from the group's account.

–   Not help the previous player. In this case the player inserts the requisite piece in the puzzle grid, only when is her/his time to play. This behaviour counts as 2 moves. This means that the minimum number of moves necessary to complete the puzzle increases. 2 € are deducted from the group's account.

It may happen that the next player does not have the requisite piece either. In this case, s/he passes the turn to the next player by clicking on the 'pass' button.

To sum up, the final amount of the group's account is calculating by deducting 2 € from the initial 120 € every time a player does not help the previous player who does not have the piece required. This account is then divided equally among the four players in the group. Deducted from the individual accounts are 1 € for every time that a player has helped the previous player.

Payment rules.

Before beginning the experiment, you should randomly take a scaled envelope in which there are your code and your number to play, that you should put in the boxes and then click on the "begin the experiment" button. In this way the total anonymity is guaranteed also with respect to the experimenters.

You should keep with care your code and number sheet, without showing it anyone.

At the end of the experiment, you will go in a room where there is a number of sealed envelopes equal to the number of participants to experiment, labelled with the code and number of the participants, and containing your rewards.

At this point, each of you will enter alone in the room and take her/his envelope. Then s/he will go back to the common room waiting until all the participants have taken their envelopes.

If someone did not find her/his envelope or if any kind of irregularities would occur, the experimenters will ask you to show your number-code sheet in order to verify if everybody has taken the right envelope.