Communication and Heterogeneity in Intergenerational Commons Dilemmas

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Abstract

This experimental research studies an intergenerational commons dilemma, and assesses to what extend communication of intended decision and heterogeneity of wealth and an interaction between these two factors influences the provision of renewable resources in this dilemma. Based on the vast literature on social dilemmas and commons dilemmas, we make a comparison between the commons dilemma, and the intergenerational commons dilemma, and propose that two factors which are found to affect provision of renewable resources in commons dilemmas, might have the same effect in intergenerational commons dilemmas. We expect heterogeneity of wealth to have a negative effect on the provision of renewable resources, and communication of intended decision a positive effect. Also, we expect that the positive effect of communication will be less strong under the condition of heterogeneity of wealth. 84 students were recruited from the Radboud University, and participated in a modified variant of the Intergenerational Goods Game, initiated by Hauser, Rand, Peysakhovich & Nowak (2014).The results show indeed that heterogeneity of wealth had a negative effect on the provision of renewable resources in an intergenerational commons dilemma. No statistical significant effect was found for the main effect of communication of intended decision and the interaction between heterogeneity of wealth and communication of intended decision.

1. Introduction and research question

Social dilemmas are situations in which, according to classical game-theory, individual rationality leads to collective irrationality, meaning that *"individually reasonable behavior leads to a situation in which everyone is worse off than they might have been otherwise."* (Kollock, 1998, p. 183). Rationality in this sense means maximizing individual or collective (mostly monetary) pay-off. In a social dilemma, a conflict between individual and collective interests occurs. The commons dilemma (hereafter CD) is a specific type of social dilemma, which includes renewable resources, like fish-stocks. Collective irrationality in the CD means complete depletion of the stock at hand. If everyone acts individually rational (fish as much as they can) this complete depletion occurs (Kollock, 1988, p. 184).

Studies point out that overexploitation of renewable resources today has a high cost on the welfare of future others as well (Hauser et al., 2014a; Wade-Benzoni & Tost, 2009). This leads to a different type of dilemma; the intergenerational commons dilemma (hereafter ICD). ICD's are situations in which *"the interests of present decision-makers are in conflict with the interests of future others."* (Wade-Benzoni & Tost, 2009, p. 163). This conflict leads to a dilemma which is structurally different than the CD. In contrast to the CD, in the ICD *"the decision-makers exit the social exchange situation over time and thus do not experience the long-term consequences of their own decisions. The removal of the decision-making actors from the collective following their decision is a critical distinguishing feature between intergenerational and classic social dilemmas."* (Wade-Benzoni & Tost, 2009, p. 166). The ICD is not a social dilemma, as there is no tension between individual and collective interest (the decision-maker is not part of *everyone* in the mentioned definition of the social dilemma).

1.1 Provision of renewable resources

Although the CD and the ICD are different dilemmas, experimental research shows similar behavior of individuals facing these dilemmas; individuals tend to act irrational (according to game-theory) by providing renewable resources for others (in the future), without receiving any extra pay-off (Brooks, 2003; Hauser et al., 2014a; Ledyard, 1995; Tavoni, Dannenberg, Kallis & Löschel, 2011; Yamakawa, Okano & Saijo, 2016). In CD's, this provision of renewable resources is individually irrational, as free-riding on the possible provisions of other group members yields a higher monetary pay-off than providing renewable resources, regardless what others do (Hauser et al., 2014a). Traditional game-theory expects selfish behavior, and as provision of renewable resources leads to lower individual pay-off, provision of renewable resources in CD´s is considered irrational. In the

ICD, provision of renewable resources is also irrational as providing resources for a sequential generation yields zero monetary pay-off for an individual doing so, as the individual is removed from the resulting renewed stock after the dilemma (Wade-Benzoni & Tost, 2009, p. 166).

Theories why this irrational provision of renewable resources happens vary (Croson, 2007; Hauser et al., 2014a), and research into a variety of factors which influence this provision of resources for others, is quite extensive for CD's (Ledyard, 1995; Liebrand, Messick & Wilke; 1992), but not for ICD's, despite the importance of understanding these factors. This understanding is important, as several renewable resources (e.g. forests and fishes) in our world are heavily threatened by depletion (Grafton, Kompas & Hilborn, 2007). More specifically, Myers & Worm (2003) provided an extensive and horrifying picture of the depletion of fish communities in oceans and seas. These real world problems with regard to the sustainability of renewable resources have an intergenerational aspect, as the consequences of extraction of certain renewable resources may appear decennia later, when the decision-makers are removed of the consequences of their decisions (Hauser et al., 2014a; Wade-Benzoni & Tost, 2009). Therefore, identifying factors which influence the provision of renewable resources in ICD's is quite relevant.

In this study, we selected two factors which have been found to influence the provision of renewable resources in CD's, based on the recommendations of Hauser et al. (2014b), and test how these two factors influence the provision of renewable resources in ICD's. As the ICD is a relative new subject in scientific literature, Hauser et al. (2014b) recommends further research into the field of the provision of renewable resources in ICD's (p. 8). More specifically, Hauser et al. (2014b) point out that their experimental research into ICD's simplifies real world dilemmas (p. 7). Therefore they suggest research into the provision of renewable resources in an intergenerational setting under the condition of inequality, as this adds a realistic aspect to the ICD which was not incorporated in their research. To our knowledge, research into the effect of inequality on the provision of renewable resources in an ICD (in contrast to research into inequality in CD's) is not done yet. Further examination of the literature of the effect of inequality in CD's, revealed another factor which interacted with inequality; communication. As we found other studies into CD's (Isaac & Walker, 1988; Tavoni et al., 2011) with both these factors, we include this factor in this study also.

1.2 Inequality and communication

Inequality in the existing literature of CD's is constructed in different ways. Two general constructs of this inequality can be identified; either in the endowment that the individuals have to decide on (for private consumption, or to provide for the rest of the group), and the value of the renewable resource (Anderson, Mellor & Milyo, 2008; Buckley & Croson, 2007). Inequality in endowment means that some individuals in a generation have a relative larger impact on the provision of renewable resources on group-level than others. Inequality in valuation of the renewable resource means that some individuals in a generation value the renewable resource more valuable than others. Both constructs yield a variety of effects on the provision of renewable resources on group-level in experimental research. Some studies found an increase in provision on group-level (Cardenas, 2002; Chan, Mestelman, Moir & Muller, 1999) while other studies found that inequality in endowment or valuation of the renewable resource, tends to reduce the provision of renewable resources on group-level (Anderson et al., 2008; Hofmeyr, Burns & Visser, 2007; Isaac & Walker, 1988; Tavoni et al., 2011). More recently, both mentioned constructs are criticized by Anderson et al. (2008) because these two constructs change the structure of the dilemma in such a way that the effect of inequality itself cannot be isolated: *"Variations in endowments change the feasible set of alternatives to individuals (and are known to influence individual behavior), while changes in the value of the public good might alter the predicted Nash outcome."* (p. 1014). The equilibrium of dominant strategies (strategies in this sense means 'different possibilities in ways to act') of all individuals in a dilemma is called the Nash-equilibrium, or Nash-outcome. This equilibrium indicates the situation where it is irrational for all individuals to deviate from the current behavior. In a CD, by definition, the Nash-equilibrium is the situation in which no-one provides renewable resources. For every individual counts that deviating from that behavior leads to less pay-off, and therefore is irrational. Introducing inequality in valuation of the renewable resource or inequality in endowments changes this Nash-outcome, and thus the complete dilemma (Chan et al., 1999, p. 11). In order to isolate the effect of inequality, Anderson et al. (2008) constructed a third type of inequality: heterogeneity of wealth. Heterogeneity of wealth means that some individuals are richer than other individuals, but not in a way that the richer individuals have larger impact on the provision of renewable resources on group-level. Anderson et al. (2008) found that heterogeneity of wealth had a negative impact on the provision of renewable resources.

Communication in CD's has been researched a lot. Balliet (2010) conducted a meta-analysis of the existing literature on this subject (54 studies), and found a large positive effect of communication on the cooperation of individuals in social dilemmas (p. 46). This cooperation in social dilemmas means provision of renewable resources in CD's. In some of these studies individuals where enabled to talk for a period of time (Dawes, McTavish & Shaklee, 1977; Isaac & Walker, 1988). Other studies constructed communication as only a declaration of intended decision (Chen, 1996; Chen & Komorita, 1994; Kurzban, McCabe, Smith & Wilson, 2001; Tavoni et al., 2011; Wilson & Sell, 1977). A declaration of intended decision means that individuals cannot talk to each other but can only communicate their intended decision by writing this on a paper, or filling this in on a computer. This means there is no interaction or dialogue between individuals.

The possibility to communicate intended decisions (either in an interaction environment, or by communicating only an intended decision) is considered in existing literature to improve provisions in CD's, as it reveals intended cooperation between individuals to maximize collective pay-off instead of individual pay-off (Balliet, 2010; Dawes et al., 1977; Isaac & Walker, 1988; Kurzban et al., 2001; Tavoni et al., 2011; Wilson & Sell, 1977). Communication is considered to stimulate conditional cooperation; research suggests that some individuals will only provide resources if others provide as well; conditional cooperation (Fehr & Schmidt, 1999; Fischbacher, Gächter & Fehr, 2001). However, the positive effect of communication decreases as choice environments become more complex, for example through introducing heterogeneity of wealth (Isaac & Walker, 1988) which indicates that the positive effect of communication is interacted by heterogeneity of wealth.

1.3 Research question

To our knowledge, no research has been done on the interaction between inequality and communication, and the influence of these two factors on the provision of renewable resources of a generation as a whole for the next generation. As the concepts of inequality and communication are quite broad, we narrowed these concepts to more specific factors. In this study, we choose to construct inequality as heterogeneity of wealth, like Anderson et al. (2008) did, as this method isolates the inequality itself, in contrast to the constructs inequality in endowment, and inequality in valuation of the renewable resource. We used declaration of intended decision as the construct for communication. Also, like in most studies into inequality, we investigate the provision of renewable resources in an ICD on group-level, as this captures the effect of inequality on a group as a whole, instead of looking to individuals

which are either rich or poor.

In conclusion: this study tests how the two factors heterogeneity of wealth and communication of intended decision influence the provision of renewable resources of a generation in an ICD. The central question in this study is: To what extent do heterogeneity of wealth, communication of intended decision and the interaction between them influence the provision of renewable resources of a generation of individuals confronted with an intergenerational commons dilemma?

The remainder of this study is structured as follows: Section 2 elaborates on the distinction between CD's and ICD's and on the factors unequal wealth distribution and communication of intended decisions, and we close these sections by hypothesizing the effects of both factors and the interaction between them in an ICD. To empirically test the hypothesis, the study conducts an experiment which is outlined in section 3. Section 4 describes the results. The study closes with a brief discussion and suggestions for further research.

2. Theoretical framework and hypothesis

In this section different characteristics of the CD and the ICD are outlined. Then, unequal wealth distribution and communication of intended decisions are outlined as variables which influence the behavior of individuals within the dilemma in a CD, based on existing theories. Based on this outline, we derive three hypothesizes about the effects of both factors on the provision of renewable resources in an ICD.

2.1.1 Dilemmas

Dilemmas are decision-problems in which someone must make a decision between two or more alternatives which are more or less (un)equal valuable. CD's and ICD's are decision-problems in which an individual is part of a group or generation of other individuals, all facing the same problem. In a CD, the individual faces a conflict between his own individual interest, and the interest of the group he or she is part of (Kollock, 1998). In an ICD, the individual faces a conflict between his individual interest, and the interest of a next generation he is not part of; a sequential generation (Wade-Benzoni & Tost, 2009).

In a CD, individuals must decide how much resources he or she extracts from an existing stock of resources. Every non-extracted resource is considered as a provided resource. Every individual extracted resource leads to individual pay-off, and the provided resources of all individuals in the group indicates, together with the regeneration rate, the

stock of the renewable resource after the dilemma. So, a decision-maker in a CD is tempted with an immediate benefit that produces a cost shared by all (lower stock). If everybody in the group succumb to the temptation, the outcome is a collective disaster (complete depletion of the stock). The costs of this disaster are shared amongst all individuals in the group, so the marginal pay-off of extracting extra resources is higher than the marginal pay-off of providing resources (Kollock, 1998; Liebrand et al., 1992).

The CD assumes that the resulting stock after the dilemma can be consumed freely and equally by all participants. This assumption is crucial to distinct the CD from the ICD; only if this is the case individual rational behavior leads to collective irrationality. If this is not the case, it would be both individual and collective rational to extract all resources. In the ICD, this is the case, as the decision-maker is removed from the outcome of his decision. In this situation the decision-maker in a generation is tempted with an immediate benefit that produces a cost for the sequential generation. If all current generation members succumb to this temptation, the outcome is a collective disaster for future generations, but not for the current generation. In an ICD, individual rationality (according to classical game-theory) will always lead to the maximum extraction, or a provision of zero, as the decision-maker is not part of the impacted generation and cannot consume the resulting stock and therefore will never gain anything monetarily as a result of providing renewable resources.

Although the ICD is not identical to a CD, the similarities between the ICD and the CD are obvious. Both type of dilemmas include the tension between individual pay-off and collective pay-off, and both types of dilemmas are used in literature to analyze behavior in renewable resource dilemmas (Hauser et al., 2014a; Tavoni et al., 2011). The difference between these dilemmas is the removal of the decision-makers from the result of their decision in the dilemma in ICD's.

2.1.2 Provision

Provision of goods in a CD cannot be explained by classical game-theories assuming that individuals maximize individual pay-off, as provision of renewable resources in a CD means irrational individual behavior. However, we know from experimental studies (Ledyard, 1995; Messick & Wilke, 1995) that in CD's, individuals still provide resources for others, despite the incentive to decline this provision. This voluntary provision for others can be explained by theories of altruism and theories of reciprocity (Hofmeyr et al, 2007).

Becker's (1976) theory of altruism predicts that some individuals (altruists) will act to maximize 'social income'. This social income is the product of the individual's own pay-off

and the pay-off of all other group members. In a CD, this means that because of altruism, individuals tend to provide renewable resources for other members of their group as this maximizes social income. Experimental research conducted by Andreoni & Miller (1993) shows that many people are partly altruistic, implying that individuals are willing to provide at least some resources, but not everything they can. Pure altruism in a CD would lead to maximal provision of renewable resources as this behavior would maximize social income.

The theory of reciprocity is suggested by Sugden (1984). The basic idea of this theory is the notion that when certain individuals sacrifice pay-off for the collective interest, other individuals feel morally obliged to reciprocate this behavior, and therefore avoid selfishness and provide renewable resources for others. Sugden (1984) suggests that reciprocating individuals will contribute a 'fair share' of their wealth, compared to others (p. 776).

We expect that provision of renewable resources in ICD's, can be explained by these two theories, like in CD's. Firstly, like in CD's, individuals might provide renewable resources because of altruistic reasons in an ICD as well, because they want to maximize social income rather than individual pay-off. In an ICD, the social income is the product of someone's own pay-off, and the pay-off of future generations. Secondly, reciprocity can also be used to explain provision of common goods in ICD's, although it requires special attention to a specific type of reciprocity. Regular reciprocity is quite problematic, as in and ICD people cannot reciprocate on the behavior of others, as they are not impacted by the decisions others make. Moreover, as individuals can not directly reciprocate on the decisions of previous decision-makers in ICD's, the incentive to 'cheat' (not reciprocate) emerges (Wade-Benzoni & Tost, 2009, p. 174). A specific type of reciprocity is so called *upstream indirect reciprocity.* This upstream indirect reciprocity basically means that a person who has just received help has an (unreasonable) urge to help someone too (Nowak & Roch, 2007). In an ICD this upstream indirect reciprocity would implicate that when individuals know that the previous generation has made a sustainable decision, they would have an urge to help the next generation too. Evidence of voluntary provision of renewable resources for future generations is found by Hauser et al. (2014a).

Although we have indications and evidence from existing literature that individuals provide renewable resources in ICD's, this provision might be less compared to provision in CD's. This is because of intergenerational discounting, which means that "*individuals prefer smaller benefits for themselves now as opposed to larger benefits for others in the future*" (Wade-Benzoni & Tost, 2009, p. 168). When individuals value pay-off for others in the future lower, than pay-off for themselves today, this changes individual altruistic behavior as the product of the individual's own pay-off and the pay-off of all other group members (social income) changes.

Having considered the difference between the CD and the ICD, we continue by reviewing the existing theories with regard to the effect of heterogeneity of wealth and communication of intended decision on the provision of renewable resources within a CD, and draft hypothesis how these factors influence provisions of renewable resources in an ICD.

2.2 Heterogeneity of wealth

Anderson et al. (2008) argue that *heterogeneity of wealth* will have a negative effect on the provisions of groups, based on the theoretical work by Ball, Eckel, Grossman & Zame (2001). They suggest that status differences (poor versus rich) depresses provisions made by low-status (poor) individuals as a means of protest, and depress provisions made by high-status (rich) individuals because they believe themselves to be more deserving and demanding of rewards. Status differences cause feelings of unfairness, which will lead to less reciprocity and less altruistic behavior and therefore less provision. Moreover, when rich and poor individuals reciprocate each other on this behavior, the group provisions decrease further. Anderson et al. (2008) found indeed that this type of inequality in wealth dampens the provision of public goods in a CD: For an individual subject, being in a group with an unequal distribution of wealth, significantly reduces the provisions to a public goal. This heterogeneity of wealth was public, meaning that participants in their experiment were well aware of the richer and poorer participants in their group. As the heterogeneity of wealth in the group influenced all group members, the provision of renewable resources on group-level declined as well. In ICD's with heterogeneity of wealth, these psychological effects and feelings of unfairness can occur as well, as individuals in ICD's are able to compare themselves with others in their own generation. The distinguishing factor between the ICD and the CD (the removal of the decision-maker from the outcome of the dilemma), does not change the cause of these psychological effects and feelings of unfairness.

Fehr & Schmidt (1999) propose that some individuals derive utility not only from their own individual pay-off, but also from their relative position in their group. They call this phenomenon inequality aversion. This inequality aversion predicts that individuals resist inequitable outcomes, and act in such a way to decrease the heterogeneity between themselves and others (Fehr & Schmidt 1999, p. 819). Moreover, Loewenstein, Bazerman & Thompson (1989) found that this inequality aversion counts for both rich and poor individuals, but that individuals suffer more from disadvantages than from advantages (p. 823). Loewenstein et al. (1989) argue that poorer individuals will do relatively more to come on par with others than richer individuals because of this. The result of this difference between behavior of richer individuals and poorer individuals is that the provision of renewable resources on group-level will decline. In ICD's, this 'skewed' inequality aversion will lead to lower provisions on group-level as well. Poorer individuals in an ICD might also tend to level out the differences within their generation more than richer participants. The distinction between the CD and the ICD does not change this difference between inequality averse behavior of poorer participants and inequality averse behavior of richer participants. Because of this difference, the poor will extract more than the rich will provide, leading to lower group-level provisions.

In line with these two arguments we expect heterogeneity of wealth to have a negative effect on the provision of renewable resources in an ICD because of two reasons. Firstly; individuals provide renewable resources for others because of altruism and (upstream indirect) reciprocity. (Hofmeyr et al, 2007). Heterogeneity of wealth causes certain psychological effects and feelings of unfairness, which undermines this altruism and reciprocity in CD's (Ball et al., 2001). Therefore, heterogeneity of wealth undermines the provision of renewable resources in CD's (Anderson et al., 2008). In the ICD, individuals will have the same psychological effects and feelings of unfairness as they have in CD's, as the distinguishing factor between the ICD and the CD (the removal of the decision-maker from the outcome of the dilemma), does not change the cause of these feelings of unfairness. Thus, like in a CD, heterogeneity of wealth will undermine altruism and reciprocity, leading to less provision. Secondly; individuals are found to be inequality averse. Poorer individuals are more inequality averse than richer individuals, and therefore will try to compensate for inequality more than richer individuals do. Therefore, the poorer individual will extract more than the rich individual will provide, leading to lower group-level provisions.

Based on these two arguments, we draft the following hypothesis:

H1: Heterogeneity of wealth has a negative effect on the provision of common goods of a generation of individuals confronted with an ICD.

2.3 Communication of intended decision

Communicating intended decisions in a CD generally appeared to have a positive effect on the provisions of groups (Chen, 1996; Chen & Komorita, 1994; Kurzban et al., 2001; Tavoni et al., 2011; Wilson & Sell, 1977). Chen (1996), Chen & Komorita (1994), Dawes et al. (1977), Isaac & Walker (1988) and Tavoni et al. (2011) give the same explanation for a positive effect of communication of intended decisions in CD's; communication of intended decisions leads to more collective rationality instead of individual rationality, as it helps coordination and cooperation within a group to maximize collective pay-off instead of individual pay-off. More specifically; in a CD, communication of intended decisions reduces free-riding because it helps individuals to understand the ultimate implications of collective free-ride behavior, and it builds credibility to the expected decisions of group members (Isaac & Walker, 1988, p. 602).

A second explanation of a positive effect of communication of intended decision can be found in the theory of conditional cooperation; conditional cooperation means that individuals provide more renewable resources, when others provide also more (Fehr & Schmidt, 1999; Fischbacher, Gächter & Fehr, 2001). We know from experimental research that individuals tend to provide some for others (because of altruism and reciprocity), and because of conditional cooperation, the provisions rises as other individuals react on this altruism, and reciprocating behavior. Evidence for conditional cooperation is found in several studies (Fischbacher, Gächter & Fehr, 2001; Keser & van Winden, 2000). Communication of intended decision is found to increase conditional cooperation (Kurzban et al. 2001; Wilson & Sell, 1977) as individuals are more willing to provide as the expect others to provide as well Andreoni & Miller (1993). Hartig, Irlenbusch & Kölle (2015) found also that communication of intended decisions will lead to more conditional cooperation. They compared this communication of intended decisions per individual with communication of the average provision of all other group-members. Communication of intended decisions per individual led to more conditional cooperation than communication of average provision of others (p. 15).

We expect that the first explanation of the positive effect of communication of intended decision (maximizing collective rationality) will not be applicable to the ICD, as in the situation of an ICD, maximizing collective rationality would still lead to zero provisions. The second explanation (conditional cooperation) may lead to higher provisions in ICD’s, as communication of intended decisions causes conditional cooperators provide renewable

resources. (Fischbacher, Gächter & Fehr, 2001; Hartig, Irlenbusch & Kölle, 2015; Keser & van Winden, 2000). In ICD's, conditional cooperators are individuals who want to provide resources for the next generation only if they expect others do so as well. As communication of intended decisions leads to more conditional cooperation, the provision of renewable resources on group-level will rise.

In line with the theory of conditional cooperation, we expect communication of intended decisions to lead to higher provisions as well because of the following argument: we know that individuals provide resources for others (because of altruism, and reciprocity). Communication of intended decisions enables conditional cooperators (people who provide resources only if someone else provides too) to learn that other individuals are providing resources. As individuals expect others to provide in an ICD, they will start providing as well. As a result, conditional cooperators start providing. Thus, provision of renewable resources on group-level rises. Therefore we draft the following hypothesis:

H2: Communication of intended decisions has a positive effect on the provision of renewable resources of a generation of individuals confronted with an ICD.

2.4 Interaction between heterogeneity of wealth and communication of intended decision

In the two constructs inequality in endowment and inequality in valuation of the renewable resource, communication amplified the effect of inequality. Richer participants had a higher incentive to provide (Chan et al., 1999, p. 11), and communication enabled them to persuade others to provide as well. Tavoni et al. (2011) found evidence of this interaction effect (p. 3). However, in the construct of heterogeneity of wealth (Anderson et al., 2008) richer participants have no higher incentive to provide, as al individuals are equal in endowment, and therefore face the same dilemma. Therefore, this argument cannot be used to predict an interaction effect in this study, as in this study, the incentive to provide is equal among group members, as the construction of inequality is different compared to other studies.

We expect heterogeneity of wealth to dampen the positive effect of communication of intended decision in an ICD. As stated before, we know that individuals provide resources for others. Communication of intended decisions activates conditional cooperators to provide as well (Fischbacher, Gächter & Fehr, 2001; Keser & van Winden, 2000), which therefore leads to an increase in provision. As heterogeneity of wealth leads to less provisions of resources directly, this lower provisions leads also to a decrease in conditional cooperation, as conditional cooperation is dependent on provision of others.

In other words: conditional cooperators provide resources if they expect others do this as well, and heterogeneity of wealth leads to a reduction in provision of others, therefore the positive of effect of communication of intended decisions will be less strong. Thus, the positive effect of communication of intended decision is less strong under the condition of heterogeneity of wealth, as the activation of conditional cooperators is less due to the heterogeneity of wealth. Therefore we draft the following hypothesis:

> *H3: The positive effect of communication of intended decision on the provision of renewable resources of a generation of individuals confronted with an intergenerational commons dilemma is less strong under the condition of heterogeneity of wealth than under the condition of homogeneity of wealth.*

The hypotheses are summarized in figure 1.

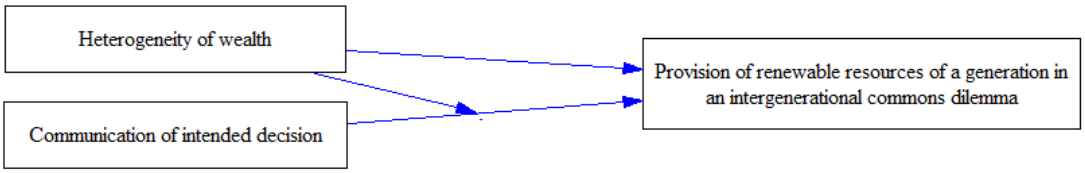

Figure 1 – Conceptual model of hypothesis

To conclude: we conduct an experiment in which we test how heterogeneity in wealth, in line with Anderson et al. (2008) and communication of intended decisions in line with Tavoni et al. (2011) and their interaction the provision of renewable resources on group-level in an intergenerational setting, in line with Hauser et al. (2014a).

3. Method

3.1 Participants

A total of 84 students were recruited from the Radboud University using the Orsee database. This is a database, used by the Radboud University to invite students for experimental research. All individuals within the database got an invitation for the experiment. This invitation mentioned the length of the experimental sessions (approximately 30 minutes) and a reward in a broad sense; the reward was described as 'average student salary'. 50 participants were male, and 34 participants were female. All participants were students of the Radboud University or alumni and aged between 21 and 28. As more participants showed up than needed, we send some participants away without participating.

3.2 Materials

The 84 participants were invited to the Nijmegen Decision Lab at the Radboud University in Nijmegen. This laboratory is specifically designed to conduct experimental research into human decision making. In the lab, 31 personal computers are situated separately. On these computers, the participants could read the instructions of the experiment[1]. Due to the limited size of the lab, the participants were invited at different times of the day, in such a manner that every time 21 participants were present. The present 21 participants were randomly divided into 7 groups consisting of three people. These groups were formed publicly at the beginning of the experiment at random, just before entering the laboratory. Every participant was told in the presence of the other group members which membership number (1, 2 or 3) he or she received. Also every participant received a piece of paper with this membership number. Participants were then guided into the lab, to a personal computer, separated from other computers by wooden cardboards and could begin with the experiment.

3.3 Procedure & design

All groups were presented with a modified variant of the Intergenerational Goods Game (IGG) constructed by Hauser et al. (2014a). This IGG is a laboratory model of an intergenerational dilemma, which builds on previous experimental games, for example Public Good Games and Common Pool Games. *"In these other games, selfishness creates social efficiency losses for the other members of one's group. In contrast, the IGG is designed such that selfishness instead negatively affects subsequent groups."* (Hauser et al., 2014a, p. 220).

[1] See appendix 1 for more details

Therefore, this laboratory model is appropriate to use in experimental research on ICD's. We modified the IGG from Hauser et al. (2014a) by adding the factors heterogeneity of wealth and communication of intended decision.

The IGG in our experiment introduced a dilemma in which the group was endowed with a jar of 30 coins. Every participant was able to extract a maximum of ⅓ of the coins in the jar (10 coins each). Every individual participant had to decide how much coins he or she would extract from the jar. For every coin extracted individually, a participant would receive € 0.50. The participants were told that if enough (half of the jar, or more) coins were provided on group-level (i.e. where not extracted), the jar would be replenished to its original size (30) and a next group would be able to extract coins from the jar. If the group did not provide enough (minimal 16 coins) for the next group, the next group would not be able to extract any coins whatsoever. The individual provisions of participants were accumulated and this aggregate of three individual provisions formed the Aggregated Group Provision (AGP). This AGP is our dependent variable. Basically, the AGP indicates the amount of coins in the jar after every group member had made a decision how much he or she provided. All other variables were categorical; two different treatments (communication, and no-communication) and two different IGG's (heterogeneity of wealth, and homogeneity of wealth)

We operationalized the concept of heterogeneity of wealth by adding a basis-payment dependent on the personal membership number (in line with Anderson et al., 2008). The level and distribution of basis-payments was mentioned during the experiment via the computer screens. Therefore all participants could read their own basis-payment, and the basis-payments of the other group members. In the IGG under the condition of heterogeneity of wealth, participants within a group received different basis-payment; one participant would start the experiment with one coin basis-payment, one participant would start with four coins, and one participant would start with seven coins. In the IGG under the condition of homogeneity of wealth, participants received the same basis-payments; all participants would start the experiment with four coins. In order to isolate the effect of the difference in distribution and avoid an effect of basis-payment relative to the pay-off of the extracted coins, the average basis-payments in both conditions were equal. As the distribution of wealth was either homogeneous, or heterogeneous, distribution of wealth was constructed as dichotomous independent variable.

We operationalized the concept of communication of intended decision by adding a way of communicating a declaration of intended decision between the group members. Groups under the condition of communication were given the instruction to write down their intended decision on a form. The instructors collected these forms, filled the forms with the intended provisions of the other group members and handed the forms back to the participants. This way, every participant under the condition of communication knew what the other group-members intended to provide. Participants were informed that they were allowed to change their decision after they received the form back. Groups without the condition of communication were not given this form and were not informed about the intended decisions of other members of their group. As some groups could communicate, and some could not, communication of intended decision was constructed as dichotomous independent variable.

In order to enlarge the number of responses a mixed factorial design was used. All groups played two IGG's; one under the condition of heterogeneity of wealth, and one under the condition of homogeneity of wealth. We combined a within-subjects design and a between subjects design. Like Anderson et al. (2008), we chose to vary the factor distribution of wealth (and not the factor communication) in the two dilemmas as Anderson et al. (2008) found no carryover effects in their study by doing so. To test for carryover effects we designed the experiment cross-sectional. A univariate ANOVA was conducted on individual level, with the order in which the dilemmas where presented as dependent variable, and the difference in individual provision between both dilemmas as independent variable. No significant effect was found; F (1, 82) = 0.120, p = .730. This implies that the order in which the treatment heterogeneity was given (heterogeneity in the first session, or heterogeneity in the second session) did not have an effect on the AGP.

Half of the groups made their decision first under the condition of homogeneity of wealth, and the second decision under the condition of heterogeneity. The other half of the groups made their decision vice versa. Table 1 summarizes the experimental design.

Table 1 - Cross-sectional mixed subject design

Session	**Treatment**	**Distribution of wealth dilemma 1**	**Distribution of wealth dilemma 2**	**Number of participants**	**Number of groups**
1	Communication	Heterogeneous	Homogeneous	21	7
2	Communication	Homogeneous	Heterogeneous	21	7
3	Unregulated	Heterogeneous	Homogeneous	21	7
4	Unregulated	Homogeneous	Heterogeneous	21	7
Total				**84**	**28**

To test the hypothesis in a stricter way, gender composition of the group was included as control variable, as gender could play a role in the provision of renewable resources. Andreoni & Vesterlund (2001) indicated that differences in gender were found to change altruistic behavior: *"men are more likely to be either perfectly selfish or to maximize total pay-offs of both subjects, while women are more likely to insist on equality*." (p. 301). This gender composition of the group was transformed from individual variable into a group variable by giving the groups a score on group composition on gender. This variable is a categorical variable and has two levels: (1) majority males, (2) majority females. Groups consisted of three participants each, therefore groups with two or more males were categorized as majority males, and groups with two or more females were categorized as majority females.

Furthermore, the data were checked for outliers, normality and homogeneity. No outliers in the data were found using the outlier labeling rule described by Hoaglin, Igleqicz & Tukey (1986). A Shapiro-Wilk's test (Field, 2013) ($p > .05$) and a visual inspection of the histograms and boxplots showed that the scores were approximately normally distributed.

Two repeated measures ANOVA's were conducted with the AGP from a IGG including distribution of wealth as within variable for every group. The between variable (fixed factor) in both repeated measures ANOVA's was the condition whether the groups could communicate or not. One repeated Measures ANOVA was conducted with the control

variable gender composition of the group included, and one repeated measures ANOVA without this control variable. This distinction is based on previously inappropriate use of control variable in repeated measures ANOVA (Gilmore, 2007), and our statistical package SPSS. Gilmore (2007) points out that covariates cannot be used to adjust interaction terms with variables that are repeated measures or within subjects; *"Only the between-subject comparisons are adjusted for the effect of the covariate, the within-subject (split-plot) comparisons will all have adjustments which are numerically equal to zero."* (Winer, 1971, as cited in Gilmore, 2017, p. 1). According to Resolution No. 22133, SPSS is not capable of excluding the covariate from the within-subjects portion of the model, and IBM therefore advises to run the model twice: *"Run the first model with the covariates, but only report the between-subjects portion of that analysis. Run the second model without the covariates, but only report the within-subjects portion of that model."* (IBM-SPSS knowledgebase, 2016, September 7).

A Levene's test of homogeneity of variance for both repeated measure ANOVA's showed that the variances within the groups were equal without gender composition of the group; $F(1, 26) = 0.010$, $p = .921$ for the homogeneous group scores on AGP, and $F(1, 26) = 0.002$, $p = .967$ for the heterogeneous scores on AGP. In the repeated measurements ANOVA with the gender composition of the group as control variable the Levene's tests yielded $F(3, 24) = 0.771$, $p = .522$ for the homogeneous group scores on AGP and $F(3, 24) = 0.840$, $p = .485$ for the heterogeneous group scores on AGP. As our data-matrix includes only two within-subjects responses (two IGG's where played) Mauchly's Test of Sphericity could not be conducted to test for sphericity.

4. Experimental results

Table 2 summarizes the mean AGP, standard deviation and number of participants per treatment, and distribution of wealth. The data suggests that indeed that heterogeneity of wealth leads to less provision, compared to homogeneity of wealth. In both the communication treatment and the no-communication treatment, the AGP is lower. Surprisingly, communication seemingly to lead to less average provision than no-communication, contrary to our expectations. In both the homogeneous and heterogeneous dilemma, the AGP was higher when no-communication was allowed.

Table 2- Mean aggregate group provision (M), standard deviation (SD) and n per treatment, and per distribution of wealth.

Treatment	**Homogeneity of wealth**	**Heterogeneity of wealth**	**Total**
Communication	9.43 (4.42) n = 14	8.00 (4.13) n = 14	8.71 (4.27) n = 28
No-communication	10.71 (4.73) n = 14	9.86 (3.71) n = 14	10.28 (4.19) n = 28
Total	10.07 (4.55) n = 28	8.93 (3.07) n = 28	9.50 (4.27) n = 56

By conducting both repeated measures ANOVA's we found a significant result of distribution of wealth on the AGP; F (1, 26) = 5.027, p = .034, η^2 = .160. Observation of this effect revealed that groups confronted with an ICD including heterogeneity of wealth provided less for the next generation, than groups confronted with an intergenerational commons dilemma including homogeneity of wealth. Therefore, this finding provides evidence for our first hypothesis that heterogeneity of wealth has a negative effect on the provision of renewable resources of a generation of individuals confronted with an ICD. The eta squared revealed that 16 % of the within-subject variance in AGP's could be explained by the variable heterogeneity of wealth.

Secondly, we found no significant effect of communication of intended on the AGP, F (1, 25) = 1.293, p = .266 η^2 = .046. Thus, our second hypothesis that communication of intended decision has a positive effect on the provision of renewable resources of a generation of individuals confronted with an ICD is rejected. The eta squared revealed that 4.6% of the between-subject variance in the AGP's could be explained by the variable communication of intended decisions.

Thirdly, we found no significant interaction effect in our data to support the hypothesis that heterogeneity of wealth interacts the positive effect of communication of intended decision, F (1, 26) = 0.314, p = .580 η^2 = .010. This means that our third hypothesis was rejected as well.

The eta squared revealed that 1.0% of the variance in the AGP's in both IGG's could be explained by the interaction between communication of intended decision and heterogeneity of wealth.

Fourthly, we found that our control variable group composition of gender explained 6.4 % of the between-subject variance F (1, 25) = 1.797, p = .192 η^2 = .064. Table 3 gives an overview of the results from both repeated measures ANOVA's combined.

Table 3 – Repeated Measure ANOVA Within-Subjects results (Group composition of gender excluded)

Source	**SS**	**df**	**MS**	***F***	**Sig.**	η^2
Within Subjects						
Distribution of wealth	18.286	1	18.286	5.027	**.034***	.160
Distribution of wealth * Communication of intended decision	1.143	1	1.143	0.314	.580	.010
Error	94.571	26	3.637			
Between Subjects						
Communication of intended decision	41.18	1	41.180	1.293	.266	.046
Group composition of gender	57.218	1	57.218	1.797	.192	.064
Error	796.21	25	31.848			

* Significant using alpha = .05

5. Conclusion and discussion.

Based on the theoretical outline in section two, we drafted three hypotheses; two hypothesis regarding main effects of (*H1*) heterogeneity of wealth and (*H2*) communication of intended decision, and one hypothesis (*H3*) regarding an interaction effect between these main effects. More specifically; we used a modified variant of the IGG by Hauser et al. (2014a) to test to what extend heterogeneity of wealth, communication of intended decision, and a possible interaction would influence the Average Group Provision of a generation of individuals confronted with an Intergenerational Commons Dilemma.

As shown in the previous section, we only found evidence for our first hypothesis (*H1)*, as our data shows that a heterogeneity of wealth amongst individuals in a generation confronted with an ICD leads to lower provision on group-level. When the generation met an ICD under the condition of heterogeneity, they provided on group-level less resources, than when they met the same ICD under the condition of homogeneity. For the other hypothesis (the main effect of communication of intended decision, and the interaction effect) we found no evidence in our data. Furthermore, both communication of intended decision and the interaction between

communication of intended decision and heterogeneity of wealth did not explain relative much of the variance of the within- and between-subjects variance; respectively 4.6% and 1%. In contrast, the factor distribution of wealth in the repeated measures ANOVA explained 16% of the within-subjects variance.

Based on our collected data, we can conclude that heterogeneity of wealth leads to less provision of renewable resources of a generation of individuals confronted with an intergenerational commons dilemma, while communication of intended decision, and the interaction between heterogeneity of wealth and communication of intended decision are not found to have an effect on the provision of renewable resources of a generation of individuals confronted with an intergenerational commons dilemma.

The unexpected lacking effects of communication of intended decision, and the lack of interaction with heterogeneity of wealth may be due to several reasons. Therefore, we will now provide two limitations of this study, which could explain why we did not find the mentioned effects, and discusses the other findings of this study. Also we will provide one strong part of this study.

Firstly, our method of analyzing on group-level lead to a reduction of responses, as the 84 participants were divided into four groups of seven participants. In order to enlarge our response, we a created a repeated measures design, but ultimately the number of response treatment and condition was 14. Small samples are less representative and are more sensitive for sampling errors, and increase the chance of a type II error (Field, 2013), which would mean that our sample was too small to find a significant effect of communication of intended decision. Unfortunately, the lack of a significant effect of this main effect and of the interaction effect is complicated by the low eta squared (η^2 = .046 for the main effect and η^2 = .010 for the interaction effect), which means that the variance in AGP's between-subjects and within-subjects can hardly be explained by our construct of communication of intended decision. Therefore, we believe our construct of communication of intended decision may have an important limitation.

In our experiment, some individuals could communicate their intended decision, but they were allowed to change their actual behavior after they had communicated their decision, moreover, our experiment included only one round per IGG, and participants did not receive information about the actual behavior of the other group-members. It could be, that participants in our experiment expected that the other participants would lie, and extract everything, contrary to the findings of Andreoni & Miller (1993). Thus, the way we constructed communication of intended decision may have undermined our theoretical expectation, namely

that communication of intended decision may lead to conditional cooperation, and thus more provision. Most experimental designs which included CD's and *communication of intended decision* included repetitive plays; more than one round Tavoni et al., 2011; Wilson & Sell, 1977; Kurzban et al., 2001). This repetition could leads to individuals learning how other group-members behave, and then start to cooperate conditionally (provide resources) based on expectations from the past. This would explain why we did not get a significant main effect of communication of intended decision on group provision, as the theory behind this expected effect is based on the concept of conditional cooperation. As our expected interaction-effect is also based on the concept of conditional cooperation, an inaccurate construction of the communication of intended decision factor (which was expected to increase conditional cooperation) would nullify a significant interaction effect.

Another limitation of this study is the use of a threshold in our experiment. As we modified the existing IGG from Hauser et al. (2014a) and this threshold gives clear indication to the participants what the essence is of the dilemma, we kept it in our design. Thresholds are found to influence behavior in experimental studies as it primes providing participants towards an absolute provision point in which the provision would be 'enough' (Ledyard, 1995). Our data indeed showed that 30 % of the individual scores were exactly the score to provide 'enough' for the next generation (a provision of 5). This behavior could have led to a smaller differences in absolute scores between conditional cooperators, and participants who would extract everything they could. This change in difference could therefore affect the significances of our analysis, as it changes the variance and means of the AGP's, our dependent variable.

Besides these two limitations, our study has the advantage that it made use of a within-subjects design. This design reduces the chance that the variance found in the AGP's could be explained by some personal characteristics, and therefore reduces the chance of a type I error.

To conclude: Our experimental results imply that, like Hauser et al. (2014a) point out, the IGG is an oversimplification of real world problems, with regard to renewable resources. Also, our study provides evidence that heterogeneity of wealth has a negative effect in intergeneration commons dilemmas, while no evidence is found for a positive effect of communication of intended decisions and an interaction between these two factors. Moreover, as the field of research into intergenerational commons dilemmas in quite young, we cannot compare our results to other studies which have tested the same factors in an intergenerational setting. We expect more research on this topic. Especially for a young developing field of study, we believe that the notion that heterogeneity of wealth leads to lower group provisions is relevant for others which will study ICD's in the future.

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Appendix A

This appendix includes the questions of the experimental setup. As our experimental design was cross-over, some wording was slightly different than the screenshots below. I.e., the wording *first case,* or *case 1* was sometimes changed into *second case,* or *case 2*, depended of the order in which the groups received treatments. This also counts for *silver coins* and *gold coins* which referred to the type of distribution of wealth. The researchers used golden coins for heterogeneous distributions of wealth condition, and silver coins for the homogeneous distribution of wealth conditions. These wordings were changed, depend of the order (first heterogeneous, or first homogeneous). Note that because of this, some pages in this appendix are displayed as 'fourth or seventh page' – dependent of the order in which the stimuli where given. Generally speaking the experiment had the following structure: First the participants received a welcome message (page 1) and had to fill in their group number and membership-number (page 2). After that, a detailed explanation followed in page 3. Then IGG 1 was presented at page 4, and an example page (page 5) showed two examples to help the participants understand their possible decisions. Page 6 was the first decision page, in which the participant had to make the decision. After that, the participants would receive IGG 2 on page 7, and page 8 displayed again a decision page. Page 9 closed with an additional questionnaire. Participants were allowed to move between questions forward and backward, but if they had made a decision, they could not go back anymore.

Page 1 (All conditions and treatments)

Welkom bij dit experiment. In dit experiment krijg je twee situaties voorgelegd. In beide situaties moet je een keuze maken over een pot met waardevolle munten. Je kunt in dit experiment echt geld verdienen, maar dat hangt wel af van de keuzes die je maakt. **Tijdens het experiment is spreken verboden. Om het experiment niet te verstoren, vragen we je vriendelijk doch dringend om ook na het experiment niet met anderen hierover te spreken.** Het experiment zal ongeveer 20 minuten duren.

De opbouw van het experiment ziet er als volgt uit:
Er wordt gestart met een algemene uitleg over het experiment. Daarna volgen twee experimentele situaties. Steeds wordt de situatie eerst uitgelegd, waarna je een keuze moet maken. Bij de eerste situatie is een pagina toegevoegd met twee voorbeelden ter verduidelijking.

Je kunt verder naar de volgende pagina door op de rode knop rechtsonderin het scherm te klikken. Mocht deze niet te zien zijn, scroll dan verder naar beneden. Je kunt binnen beide situaties terug naar de situatieomschrijving. Als je eenmaal een keuze hebt gemaakt in een situatie, kun je hier niet meer naar terug.

Als je dringende vragen hebt tijdens het experiment kun je je hand op steken. Wij komen dan naar je toe.

Page 2 (All conditions and treatments)

Vul hieronder je groepsnummer en je lidnummer in die op het blaadje staat die je hebt gekregen.

Groepsnummer

[Selection-menu]

Lidnummer

[Selection-menu]

Page 3 (All conditions and treatments)

Algemene uitleg experiment

Lees onderstaande informatie goed door. Zodra je doorgaat naar situatie 1, kun je niet meer terug naar deze pagina!

Samen met de 2 deelnemers waarmee je bent binnengekomen, vorm je één groep. Ieder lid van jouw groep heeft een lidnummer (lid 1, lid 2 en lid 3). Jouw lidnummer staat op het papier dat je hebt gekregen.

Jouw groep is onderdeel van een reeks van meerdere groepen die elkaar opvolgen. Vóór jouw groep is er dus een groep geweest, en na jouw groep komt een nieuwe groep.

Er zijn twee potten met munten die van groep op groep kunnen worden doorgegeven; er is een pot met gouden munten en een pot met zilveren munten. Zodra een groep over een pot met munten beschikt, kunnen de leden van die groep munten opnemen uit die pot. Als de groep in totaal (dus alle groepsleden gezamenlijk) de helft of minder van de munten uit de pot opneemt, wordt de pot weer bijgevuld en doorgegeven aan de volgende groep. Als de groep in totaal meer dan helft van de munten opneemt, dan wordt deze pot afgepakt en niet meer bijgevuld. De volgende groepen kunnen dan geen munten meer uit die pot opnemen. Dit geldt voor beide potten, zowel die met gouden munten als die met zilveren munten. Afhankelijk van de keuzes van de vorige groep, kan een groep beschikken over twee potten met munten (goud & zilver), één van beide potten met munten (goud óf zilver) of géén van beide potten.

Zojuist heeft de groep voorafgaand aan jouw groep hun keuzes gemaakt. Zij kozen uit beide potten niet meer dan de helft van de munten. Jouw groep beschikt daarom over twee bijgevulde potten met gouden en zilveren munten. Over beide potten maak je één keuze: in de éne situatie een keuze over de pot met gouden munten, en in de andere situatie een keuze over de pot met zilveren munten.

Je kunt geld verdienen in dit experiment. Je start met een basisuitkering voor de pot met gouden en voor de pot met zilveren munten. De basisuitkering staat vermeld op de uitlegpagina van beide situaties. De basisuitkering kan per groepslid verschillen. De hoeveelheid geld die je verdient, is je basisuitkering plus de gouden en zilveren munten die je extra hebt opgenomen. Welk van deze twee muntsoorten telt, wordt willekeurig geselecteerd (kop of munt). Zowel een gouden als een zilveren munt staat gelijk aan € 0,50.

Klik op 'volgende pagina' als je bovenstaande informatie nauwkeurig hebt doorgelezen, om door te gaan naar de eerste situatie.

Page 4 or page 7 (Specific condition; Homogene IGG)

De eerste situatie gaat over de zilveren munten.

Hieronder zie je de basisuitkering zilveren munten per lid:

Lid 1; 4 munten
Lid 2; 4 munten
Lid 3; 4 munten

De pot in deze situatie bestaat uit 30 zilveren munten. Ieder groepslid heeft de keuze om 0 tot en met 10 munten uit de pot op te nemen. Hieronder staan voor ieder lid de verschillende opties:

0	1	2	3	4	5	6	7	8	9	10

Zoals je kunt zien heeft ieder lid binnen een groep dus de mogelijkheid om maximaal ⅓ van de totale pot op te nemen. De hoeveelheid munten die jouw groep in totaal pakt, beïnvloedt de keuzes die de groepen ná jullie kunnen maken:

1. Wanneer jouw groep in totaal 15 munten of minder opneemt, dan vullen wij de pot weer bij tot 30 gouden munten en wordt de pot doorgegeven aan de volgende groep. Zij kunnen dan ook weer munten opnemen.

2. Wanneer jouw groep in totaal 16 munten of meer opneemt, dan vullen wij de pot niet bij en pakken wij de pot af. Alle volgende groepen kunnen dan geen munten meer opnemen en hebben ook géén recht op de basisuitkering. De leden van de volgende groepen kunnen dan dus geen geld meer verdienen door deel te nemen aan het experiment.

Page 4 or page 7 (Specific condition; Hetero IGG)

De eerste *(or second)* situatie gaat over de gouden munten.

Hieronder zie je de basisuitkering gouden munten per lid:

Lid 1; 1 munten
Lid 2; 4 munten
Lid 3; 7 munten

De pot in deze situatie bestaat uit 30 gouden munten. Ieder groepslid heeft de keuze om 0 tot en met 10 munten uit de pot op te nemen. Hieronder staan voor ieder lid de verschillende opties:

0	1	2	3	4	5	6	7	8	9	10

Zoals je kunt zien heeft ieder lid binnen een groep dus de mogelijkheid om maximaal ⅓ van de totale pot op te nemen. De hoeveelheid munten die jouw groep in totaal pakt, beïnvloedt de keuzes die de groepen ná jullie kunnen maken:

1. Wanneer jouw groep in totaal 15 munten of minder opneemt, dan vullen wij de pot weer bij tot 30 gouden munten en wordt de pot doorgegeven aan de volgende groep. Zij kunnen dan ook weer munten opnemen.

2. Wanneer jouw groep in totaal 16 munten of meer opneemt, dan vullen wij de pot niet bij en pakken wij de pot af. Alle volgende groepen kunnen dan geen munten meer opnemen en hebben ook géén recht op de basisuitkering. De leden van de volgende groepen kunnen dan dus geen geld meer verdienen door deel te nemen aan het experiment.

Page 5 (Specific condition; Homogeneous IGG)

Voorbeeld

Ter illustratie volgen hier twee voorbeeldsituaties.

Voorbeeld 1:
De drie leden in groep 3 nemen de volgende zilveren munten op uit de pot:
- Lid 1: 1 munt
- Lid 2: 7 munten
- Lid 3: 4 munten

Samen nemen zij 1 + 7 + 4 = 12 zilveren munten op uit de pot. Dit betekent dat groep 3 in totaal minder dan 15 munten opneemt. Wij vullen daarom de pot weer bij tot 30 zilveren munten. Groep 4 krijgt deze bijgevulde pot van 30 munten ter beschikking en kunnen hier munten uit opnemen.

Voor elk lid geldt dat het aantal muntstukken dat hij heeft opgenomen, samen met zijn persoonlijke basisuitkering bepaalt hoeveel euro's hij verdient.

Lid 1 heeft een basisuitkering van 4 zilveren munten en nam 1 extra zilveren munt uit de pot. In totaal heeft lid 1 dus 5 zilveren munten van € 0,50. Lid 1 verdient daarom € 2,50.

Voorbeeld 2:
De drie leden in groep 4 nemen de volgende zilveren munten op uit de pot:
- Lid 1: 10 munten
- Lid 2: 5 munten
- Lid 3: 5 munten

Samen nemen zij 10 + 5 + 5 = 20 zilveren munten op uit de pot. Dit betekent dat groep 4 in totaal meer dan 15 munten opneemt. Wij pakken de pot daarom permanent af. Groep 5 (en alle daaropvolgende groepen) krijgen dan geen pot met munten, en die groepen kunnen dus geen munten opnemen uit de pot. Ook krijgen zij geen basisuitkering.

Voor elk lid geldt dat het aantal muntstukken dat hij heeft opgenomen, samen met zijn persoonlijke basisuitkering bepaalt hoeveel euro's hij verdient.

Lid 1 heeft een basisuitkering van 4 zilveren munten en nam 10 extra zilveren munten uit de pot. In totaal heeft lid 1 dus 14 zilveren munten van € 0,50. Lid 1 verdient daarom € 7,-.

Page 5 (Specific condition; Heterogeneous IGG)

Voorbeeld

Ter illustratie volgen hier twee voorbeeldsituaties.

Voorbeeld 1:
De drie leden in groep 3 nemen de volgende gouden munten op uit de pot:
- Lid 1: 1 munt
- Lid 2: 7 munten
- Lid 3: 4 munten

Samen nemen zij 1 + 7 + 4 = 12 gouden munten op uit de pot. Dit betekent dat groep 3 in totaal minder dan 15 munten opneemt. Wij vullen daarom de pot weer bij tot 30 gouden munten. Groep 4 krijgt deze bijgevulde pot van 30 munten ter beschikking en kunnen hier munten uit opnemen.

Voor elk lid geldt dat het aantal muntstukken dat hij heeft opgenomen, samen met zijn persoonlijke basisuitkering bepaalt hoeveel euro's hij verdient.

Lid 1 heeft een basisuitkering van 4 gouden munten en nam 1 extra gouden munt uit de pot. In totaal heeft lid 1 dus 5 gouden munten van € 0,50. Lid 1 verdient daarom € 2,50.

Voorbeeld 2:
De drie leden in groep 4 nemen de volgende gouden munten op uit de pot:
- Lid 1: 10 munten
- Lid 2: 5 munten
- Lid 3: 5 munten

Samen nemen zij 10 + 5 + 5 = 20 gouden munten op uit de pot. Dit betekent dat groep 4 in totaal meer dan 15 munten opneemt. Wij pakken de pot daarom permanent af. Groep 5 (en alle daaropvolgende groepen) krijgen dan geen pot met munten, en die groepen kunnen dus geen munten opnemen uit de pot. Ook krijgen zij geen basisuitkering.

Voor elk lid geldt dat het aantal muntstukken dat hij heeft opgenomen, samen met zijn persoonlijke basisuitkering bepaalt hoeveel euro's hij verdient.

Lid 1 heeft een basisuitkering van 4 gouden munten en nam 10 extra gouden munten uit de pot. In totaal heeft lid 1 dus 14 gouden munten van € 0,50. Lid 1 verdient daarom € 7,-.

Page 6 or page 8 (Specific treatment; Communication)

Zojuist heeft de vorige groep hun keuze gemaakt. Zij hebben in totaal 15 of minder zilveren munten opgenomen uit de pot. De pot is bijgevuld tot 30 zilveren munten en doorgegeven aan jouw groep.

Hieronder zie je de basisuitkering zilveren munten per lid nogmaals:

Lid 1; 4 munten
Lid 2; 4 munten
Lid 3; 4 munten

Bovenop deze basisuitkering kunnen jij en de andere groepsleden nu extra munten uit de pot opnemen.

Voordat je beslist, moet je je beslissing kenbaar maken aan de groepsgenoten. Dit moet je doen via het formulier dat naast je computer ligt. Hier moet je opschrijven hoeveel munten je uit de pot wilt halen. Nadat je dit hebt gedaan zullen wij jouw formulier aanvullen met de aantallen munten die de andere groepsgenoten willen pakken**. Let op! Het bedrag wat jij opschrijft op het formulier is niet bindend! Je mag dus meer, minder of evenveel munten uit de pot pakken dan je op hebt geschreven.**

Omcirkel nu hoeveel zilveren munten je zou willen opnemen uit de pot en wacht dan totdat wij het formulier aangevuld hebben met de beslissingen van de andere groepsgenoten. Als je dit aangevulde formulier hebt ontvangen kun je door naar de volgende pagina.

Page 6 or page 8 additional[2] (Specific treatment; Communication)

Je weet nu hoeveel munten de andere leden in jouw groep willen pakken. Selecteer hieronder je keuze hoeveel zilveren munten jij nu daadwerkelijk opneemt:

0	1	2	3	4	5	6	7	8	9	10

[2] This additional section was hidden while the participants where communication so that they couldn't go further until they had received the communication of the other members. This selection table came visible when clicking on the button 'volgende pagina'.

Page 6 or page 8 (Specific treatment; No-communication)

Beslissing situatie 1

Zojuist heeft de vorige groep hun keuze gemaakt. Zij hebben in totaal 15 of minder zilveren munten opgenomen uit de pot. De pot is daarom bijgevuld tot 30 zilveren munten en doorgegeven aan jouw groep.

Alle groepsleden ontvangen een basistuikering. Hieronder zie je nogmaals de basisuitkering zilveren munten per lid:

Lid 1; 4 munten
Lid 2; 4 munten
Lid 3; 4 munten

Bovenop deze basisuitkering kunnen jij en de andere groepsleden nu extra munten uit de pot opnemen.

Selecteer hieronder je keuze hoeveel zilveren munten jij nu daadwerkelijk wilt opnemen:

0	1	2	3	4	5	6	7	8	9	10

Page 9 (All conditions and treatments)
Hieronder volgen een aantal vragen over jouw persoonlijke kenmerken

Wat is je geslacht?
- o Man
- o Vrouw

Wat is je geboortedatum?

Wat is je hoogst voltooide opleiding?
- o Basisschool niet afgemaakt
- o Alleen basisschool afgemaakt
- o LBO, VBO, LEAO, LTS ambachtsschool, huishoudschool, LHNO, VMBO (niveaus 1-3; basisberoepsgericht, kaderberoepsgericht, gemengd) afgemaakt
- o MULO, ULO, MAVO, VMBO (niveau 4; theoretische leerweg); HAVO jaar 3-
- o KMBO, leerlingwezen, MBO niveau 1, MEAO, MTS afgemaakt (duur 2 jaar)
- o HAVO, MMS, MSVM afgemaakt
- o VWO, HBS, atheneum, gymnasium afgemaakt
- o MBO niveau 2 en 3 afgemaakt (duur 2-3 jaar)
- o MBO niveau 4 afgemaakt (duur 4 jaar)
- o MBO-plus voor havisten
- o propedeuse WO, OU-certificaat
- o korte HBO-opleiding einddiploma (2 of 3 jaar), kweekschool, conservatorium, MO-acten
- o Bachelor HBO afgemaakt
- o Bachelor universiteit afgemaakt
- o HBO: Masters degree, tweede fase opleidingen; Post HBO-opleidingen, pre-master onderwijs voor HBO
- o WO/universiteit: Masters degree, tweede fase opleidingen; ingenieur, meester, doctorandus
- o Doctoraat/gepromoveerd

Heeft u een partner, d.w.z. een man of vrouw met wie u getrouwd bent of samenwoont?
- o Ja
- o Nee

Wat is uw burgerlijke staat?
- o ongehuwd
- o gehuwd
- o partnerschap (geregistreerd)
- o gescheiden (na huwelijk)
- o gescheiden (na geregistreerd partnerschap)
- o verweduwd (na huwelijk)
- o verweduwd (na geregistreerd partnerschap)
- o anders, namelijk:

Wat is je woonsituatie?
- o Bij ouders
- o Zelfstandig

- Samenwonend

Uit hoeveel mensen, inclusief uzelf, bestaat het huishouden waar u deel van uitmaakt? (Dit kan ook een studentenhuis zijn)

Vink hieronder aan welke familieleden je op dit moment hebt. Vul indien van toepassing ook het aantal in, in het vak achter de optie.

- Vader(s)
- Moeder(s)
- Opa(s) en of oma(s)
- Broers en of zussen
- Zonen en of dochters.
- Oom(s) of tante (s) van je moeders kant (niet aangetrouwd)
- Oom(s) of tante (s) van je vaders kant (niet aangetrouwd)
- Neven / nichten (Kinderen van ooms en tantes)
- Neefjes / nichtjes (Kinderen van broer of zus)

In hoeverre maak je in je leven plannen voor de toekomst?
- Zeer veel
- Behoorlijk
- Nauwelijks
- Niet

Maak je je zorgen over het veranderende wereldklimaat?
- Ja
- Nee

In hoeverre houd je rekening met het milieu?
- Zeer veel
- Behoorlijk veel
- Nauwelijks
- Niet

In hoeverre steun je goede doelen, d.w.z. geef je donaties of zet je je vrijwillig in voor non-profitorganisaties?
- Zeer veel
- Behoorlijk veel
- Nauwelijks
- Niet

Op 15 maart dit jaar heeft de Tweede Kamerverkiezing plaatsgevonden. Op welke politieke partij heb je toen gestemd?
- VVD
- PvdA
- PVV
- CDA
- D66
- SP

- GroenLinks
- ChristenUnie
- Partij voor de Dieren
- SGP
- overig
- Ik heb niet gestemd
- Volgende pagina