The Impact of the Degree of Responsibility and Mutual Decision Making on Choices under Risk*

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Abstract

We study experimentally how the responsibility for the payoffs of different number of others influences the choices under risk and how choice within group changes these decisions. We find strong support for the blame avoidance hypothesis: subjects who choose for others match the average risk preferences, as if others were choosing for themselves. The effect is not symmetric: subjects are more reluctant to make riskier choices for others. The number of others who are influenced by the decision seems unimportant. Mutual responsibility diffuses blame and encourages subjects to make riskier choices for others than when choosing alone.

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1 Introduction

In daily life, people have to make many important decisions that involve risk. Buying a house, moving to take a new job opportunity and investing family savings are clear examples. In recessionary periods, like those experienced in Europe recently, these choices are often exposed to greater risk. Usually these decisions affect not only the decision maker himself, but also various other people. The examples above have a direct effect on the other people in the household. Moreover, sometimes these decisions are made not by individuals, but by groups of people. For example, in a household husband and wife might make the choices together. Similar decisions are made in firms where managers act on behalf of shareholders. Both *responsibility*, a situation in which the choice of one person affects others to the same degree, and *mutual decision making*, a situation in which several people communicate in order to make choices for themselves and a group of others, are involved. Given the impact of these decisions, it is important to investigate the influence of responsibility and group effects on choices under risk.

In this study we put forward a hypothesis that changes in behavior under responsibility are the result of *blame avoidance*: a change in behavior that is triggered by the desire to preclude others from forming an unfavorable belief about the decision maker when her choice affects them. In case of decision making under risk and responsibility, blame avoidance should result in choices which are consistent with what the person with *average risk preferences* would choose, so that the amount of potential blame is minimized when the outcome of the risky choice becomes known. Moreover, with blame avoidance there should be an *asymmetry* in choices under responsibility between risk loving and risk averse subjects: while the former should choose more cautiously for the group, as compared to the choice they would have made individually, the latter should make riskier choices for the group. There is potentially more blame associated with risky than safe choices. Thus, risk averse people should be more reluctant to choose risky options for the group than risk loving people to choose safer options. In addition, blame avoidance can make decision makers sensitive to the *number* of people their choice affects and whether the choice was made alone or *together* with someone else. Intuitively, in the former case there should be "more" blame when more people are involved and in the latter case blame should diminish since several people are responsible for the decision.

To find out if choices under responsibility are in line with the blame avoidance hypothesis, we conduct an experiment in which we investigate the influence of the *degree* of responsibility and *mutual decision making* on choices under risk. By the degree of responsibility we mean the number of people that are affected by the decision made by a single individual. In particular, we look at choices between lotteries after which the realized outcome is paid to the decision maker and various number of others. By mutual decision making we mean the choice between lotteries made by *two* individuals, who should agree on a choice which would then impact themselves and a group of passive others. With this design we aim at testing the blame avoidance hypothesis as a potential explanation for the responsibility effects. We ask the following questions: How do choices under risk compare when individuals choose just for themselves and when they choose for themselves and others? Does the number of others, who are influenced by the decision, matter? How is mutual decision making different from individual decision making? Blame avoidance hypothesis gives explicit answers to these questions and we try to see if the answers we find are consistent with it.

We are not the first to ask questions about responsibility and decisions under risk. A large literature exists where similar problems were tackled. In general, many studies with between subject designs find that responsibility makes choices under risk more cautious on average (see Section 2). In a recent article, Bolton, Ockenfels, and Stauf (2015) find that risk loving subjects (as measured by the risky choices when only the subject herself is affected) become more cautious when they are responsible for the payoff of one other subject, but they do not find any shifts towards riskier choices under responsibility among risk averse subjects. The authors attribute this behavior to blame avoidance and possibly other effects.

As was described above, if blame avoidance is the driving force behind behavioral changes under responsibility, we should observe not only cautious shift in behavior, as Bolton, Ockenfels, and Stauf (2015) found, but also the *opposite* effect ("cautious shift" and "risky shift," as literature puts it, see Section 2). Blame avoidance would predict both shifts, as subjects should try to choose as average other would have chosen in their place. We try to find out under which conditions cautious and risky shifts are present. In addition, we test a new hypothesis that the increase in the number of people, that are affected by the decision under risk, makes the effect even stronger: the blame is stronger the more people are involved. Finally, we study mutual decision making, where two individuals should come to an agreement on how to choose for themselves and a group of passive others and we hypothesise that in this case both cautious and risky shifts should become equally strong due to the blame diffusion effect between two decision makers. Overall, we postulate that all these hypotheses stem from the desire to avoid blame in the sense of Gurdal, Miller, and Rustichini (2013).

In order to be able to detect both cautious and risky shifts we use a novel completely randomized within subject design, which allows us to see how heterogeneity in subjects' risk preferences leads to differential behavior in responsibility situations. The subjects make choices in four different stages. Each stage is a Holt-Laury task (Holt and Laury, 2002), which involves 10 decisions between two lotteries. The subjects are told that the payoff that they get from each of the four HL tasks is also delivered to 0, 1, or 3 others.[1] Moreover, in one of the four stages the subjects have to make a decision in a HL task together with another subject in the session. Thus, each subject makes choices in 1) *individual choice condition*, where only he is affected by his choice; 2)

[1]This corresponds to the IR and SR+ stages of the Bolton, Ockenfels, and Stauf (2015) experiment. It should be mentioned, however, that we use *different* HL tasks and randomize the order of the stages to avoid fixed sequence effects.

responsibility for one other condition, where the payoff is delivered to the subject who makes the choices and one other subject in the session; 3) *responsibility for three others condition*, where the payoff is delivered to the subject who makes the choices and three others; 4) *mutual responsibility condition*, where the subjects have to agree on the decision in pairs and the payoff is delivered to them and three others. This design allows us to directly observe the changes in choices under risk depending on the four conditions and on individual heterogeneity *within* subject, which is absolutely necessary to detect cautious and risky shifts.

We report the following results. We find *both* cautious and risky shifts with responsibility for one or three others: subjects who are individually relatively (to others in the experiment) risk loving make more cautious choices when responsible for others and subjects who are relatively risk averse make riskier choices when responsible. The effects are not symmetric. Subjects who are relatively risk averse are more reluctant to make riskier choices when others are involved. This is in line with our blame avoidance hypothesis, which would predict that making safer choices evokes little blame, whereas making riskier choices might result in high levels of blame in case of a bad outcome. We find little support for the hypothesis that the number of others that subjects are responsible for matters. The most important finding, however, is that, in the mutual responsibility condition, subjects, who are relatively risk averse, when choosing for others, make much riskier choices and target the average risk preferences in the population. This strongly supports the blame avoidance hypothesis, as with mutual choice the target of the blame is diffused. The final finding is that our subjects, when responsible, try to choose for others in the way consistent with *the average risk preferences in the population*, the actual mean number of safe choices in the HL task in the individual choice condition. The further the individual risk preferences are from the average, the bigger shift the subjects make (especially in the mutual responsibility condition), which is exactly in line with the blame avoidance hypothesis.

2 Related Literature

In this section we overview the literature related to choices with responsibility and choices in groups (mutual responsibility). There exists a wide range of literature on the decision making under risk, with the emphasis on the differences between individual and group risk preferences (when choice is made mutually by the group members). Stoner (1961) laid the foundation with his study in which he concluded that people, as members of a group, took on significantly more risk, compared to the situation in which they chose individually. This change was referred to as a "risky shift." Various other studies, including Gardner and Steinberg (2005), found this choice shift as well.

There are also studies that, at least partly, contrast the above findings. For example, Shupp and Williams (2008), who used choice lotteries to explore differences in choices under risk between individuals and groups, found that groups were significantly more risk averse than individuals in lotteries that involved higher risk. Masclet, Colombier, Denant-Boemont, and Lohéac (2009) and Baker II, Laury, and Williams (2008) also found a "cautious shift:" they observed that groups made safer choices than individuals.

The findings that people in a group are *less* risk averse can be explained with the fact that risk is shared by the group members (Wallach, Kogan, and Bem, 1964). When choosing alone, all the consequences of risky decisions are attributed to the single decision maker. Consequently, in case of non-desirable outcomes, this person is the only one who is seen "responsible" for the outcome. Thus, guilt and shame aversion (aversion to having negative feelings for being responsible for bad outcome not expected by others) force the decision makers to choose more cautiously.[2] This reasoning also holds for the contrary: being solely responsible for successful events results in a higher utility level, compared to achieving the same with a group (Eliaz, Ray, and Razin, 2006). As a result, utility levels of the decision makers have a smaller spread when decisions are made in groups rather than on an individual basis. This implies that individuals who make decisions together in groups are exposed to less risk, which could explain riskier choices.

The papers cited above use various methods to test their hypotheses regarding group versus individual choices. However, none of the papers uses within subjects design and thus, only the averages between conditions are being compared. This does not allow to look at deeper determinants of the changes in risky choices as our design permits. In particular, within subjects design allows us to see how individual risk preferences determine the shifts in choice under responsibility. Given that we hypothesize that both cautious and risky shifts, which work in opposite directions, should occur, only within subjects design makes it possible to detect them: averaging over all subjects, which is the only option in between subject designs, would cancel out both effects. In addition, within subjects we can directly compare the influence of the number of others on the choices and the influence of the mutual decision making, which is, again, not possible with between subjects design.[3] As an additional advantage, in our design mutual decision making involves passive group members for whom the choice is made, which adds an additional dimension never studied before. Thus, with our design, we aim at clarifying the mixed results reported in the studies above.

Some studies concentrate on the dynamics of group decision making. According to Pruitt (1971), leadership theory predicts that the choice shifts towards the most confident group mem-

[2]Many other studies found cautious shift (e.g. Charness and Jackson, 2009; Reynolds, Joseph, and Sherwood, 2009; Pahlke, Strasser, and Vieider, 2012a; Ertac and Gurdal, 2012). It should be mentioned as well that in some studies the concept of loss aversion (Kahneman and Tversky, 1984) is used to explain similar effects, see, for example, Andersson, Holm, Tyran, and Wengström (2014); Pahlke, Strasser, and Vieider (2012b); Rohde and Rohde (2011); Vieider, Villegas-Palacio, Martinsson, and Mejía (2015).

[3]Within subjects designs have their drawbacks. For example, various demand effects can occur as well as wealth and portfolio effects. In our design we tried to minimize these effects as much as possible by 1) randomizing the order of conditions and the lotteries in each condition and 2) not providing information on payoffs between conditions.

ber. Gardner and Steinberg (2005) studied risk preferences of groups of adolescents and found that peer pressure plays an important role in their behavior. In our design subjects in the mutual choice condition can freely chat with each other in order to reach mutual decision for the group. Given that we have subjects also choose for the group individually, we can see the effect mutual responsibility has on choice. In particular, we can detect if blame is "diffused" when the choice is made by several people.

All studies above compared group decision making to individual choice for the group. Differently, it is interesting to compare an individual choosing just for himself and choosing for himself and a group (Davis, 1992; Bolton, Ockenfels, and Stauf, 2015). In this case risk is not shared by several individuals. The decision maker has the formal authority and is, therefore, the only person responsible. Thus, the mechanism that worked for the group decision making cannot play any role here. A possible explanation for being more risk averse when deciding for others, might be that people blame the decision maker for bad outcomes that the decision maker is only partially responsible for (in case of lotteries). Gurdal, Miller, and Rustichini (2013) experimentally show that people blame others for events they are not (technically) responsible for. Thus, people who make decisions with responsibility for others may become more risk averse because they fear punishment in the form of blame.[4]

Most studies found that people who are responsible for others choose more cautiously as compared to the situation where they choose just for themselves. We add to this literature in two different ways. First, we do find both cautious and risky shifts in our data. With our within subject design we can establish how individual choice characteristics lead to either cautious or risky shift. Second, we analyze the responsibility choices for the groups of others of different sizes. This allows us to see how blame is perceived by the decision makers.

Our concept of decision making under risk with mutual responsibility combines two strands of literature discussed above: decision making under risk with responsibility and decision making in a group. Firstly, people who decide are responsible for the outcome delivered to them and passive others, but this responsibility is smaller than in the scenario where they bore sole responsibility. Secondly, if a group of people is mutually responsible for the outcomes obtained, they have to collectively choose among the options. This involves group dynamics, similar to what is observed in groups that have to agree upon making a decision. Our prime interest is how mutual responsibility for others changes the choices for the group and how group dynamics is involved. While many studies investigate the connection between decision making under risk and responsibility, the topic of mutual responsibility for others has been untouched to our knowledge.

[4]We are aware of a study where the decision makers choose in a riskier manner when others are involved (Chakravarty, Harrison, Haruvy, and Rutström, 2011). However, in this study the decision maker is not affected by his own choice for others.

3 Experimental Design

The experiment consist of four stages and a questionnaire. In each of the four stages subjects make choices in a Holt-Laury task, or HL (Holt and Laury, 2002). Namely, in each HL task subjects make 10 choices between two lotteries, A and B. All A (B) lotteries have the same monetary outcomes, but the probabilities of these outcomes vary (Figure 8 in Appendix E illustrates). Subjects make choices in four *different* HL tasks. This means that the monetary outcomes in all HL tasks are different but the probabilities of the outcomes stay fixed across all 10 choices in all tasks (see Table 10 in Appendix A for details). The payoffs were chosen to satisfy two conditions: 1) the expected payoffs from the lotteries across the four HL tasks are approximately the same; 2) assuming the expected utility function $u(x) = x^{1-r}$ the optimal switch from choosing lottery A to lottery B happens at the same place for all four HL tasks for given intervals of r.[5] The main idea of our experiment was to have a complete within subject design with four different conditions but the same kind of task. We could not use one HL task for all four conditions simply because this could create several types of biases in subjects' choices if they were exposed to the same task four times in a row. For example, subjects could ignore the differences in conditions and choose the same switching point, or there could be an experimenter effect: subjects could deliberate on how exactly they are supposed to change their switching point depending on the condition. Thus, the payoffs in the four HL tasks were chosen so that the switching points could be interpreted in the same way independent of the task. To avoid order effects each subject was exposed to a *different* (randomized) sequence of HL tasks. Table 11 in Appendix A shows the exact ordering for each subject.

There are two treatments: Main and Control. In the Control treatment subjects choose *for themselves* in four HL tasks (in randomized order). No information about payoffs was communicated to subjects between HL tasks (see Appendix E for instructions). In the end of the experiment the software chose one of the 10 choices at random in each HL task, "played" the lottery and assigned each subject the payoff equal to the sum of the four payoffs realized from the four chosen lotteries. It should be noted that we could not avoid paying subjects for each of the four tasks since in the Main treatment others must receive the same payoff as the subject. Therefore, it was necessary to pay subjects for each HL task to keep Control treatment as close to Main treatment as possible. Subjects were informed about this procedure and were told that they will see the payoffs they obtained from each task in the end of the experiment.

Paying for all four lotteries might raise concerns about the possibility of the portfolio effect. Harrison and Rutström (2008, pp. 118-119) directly address this issue in the settings where sub-

[5] Holt and Laury (2002), when choosing the payoffs for the lotteries, followed the following procedure. They assumed the constant relative risk aversion expected utility function $u(x) = x^{1-r}$ and chose the payoffs so that the approximately risk neutral utility maximizer with $-0.15 \leq r \leq 0.15$ switches to lottery B after four choices of lottery A. In addition, they wanted the switch to B after six choices of A to happen for r in the interval $[0.41, 0.68]$, which corresponds to the utility function $\sqrt{x}$. We chose the payoffs in the four HL tasks in the same way.

jects choose in several HL tasks one after the other (all draws are uncorrelated). They are paid for all HL tasks and the goal of the experiment is to elicit subjects' risk preferences. They point out that, in this specific case, which is exactly like our Control and Main treatments, portfolio effect is actually helpful in the sense that more information about the risk preferences of the subjects can be obtained. If we think of subjects as choosing portfolios instead of making several individual decisions, then more information about risk preferences can be extracted. For example, when a subject makes 6 safe choices in one HL task and 5 in the other, this means that her CRRA risk coefficient is somewhere in the middle of the interval of coefficients that are consistent with making 5 and 6 safe choices. In addition, Harrison and Rutström (2008) report the results of an experiment where they evaluate risk preferences in this setting but vary the number of HL tasks that are paid (1, 2 or 3). They find no difference in the estimations of risk coefficients. They conclude that in the sequential HL tasks setting portfolio effect does not influence the choices. The same should be true in our experiment.

In the Main treatment we expose subjects to different conditions which vary in degree of responsibility and mutual decision making. In each condition subjects make choices in different HL tasks, as having fixed HL task in each condition could potentially create some undetectable biases. Thus, it was crucial for our design to have four HL tasks in which a subject with some value of r in her utility function would make the same number of safe choices. This would allow us to make inferences about conditions even though subjects made choices in different HL tasks. The purpose of the Control treatment is to ensure that the four HL tasks that we have chosen are suitable for this role.

The Main treatment is the same as the Control treatment but with one difference. The subjects are told that the payoff they obtain in each HL task (as described above) will also be paid to other subject(s). So, if the software generated some payoff x, the same amount x would be paid to some other individual(s) depending on the condition. There are four conditions which correspond to the four HL tasks.

Condition 1 (Individual Choice). Subjects choose just for themselves as in the Control treatment.

Condition 2 (Responsibility for One Other Person). Subjects choose for themselves and *one other subject in the session*. So, the payoff generated by the software goes to the subject who made the choice and someone else in the session. The identity of the other was kept anonymous.

Condition 3 (Responsibility for Three Other People). Subjects choose for themselves and *three other subjects in the session*. So, the payoff generated by the software goes to the subject who made the choice and three other people in the session. The identities of the others were kept anonymous.

Condition 4 (Mutual Responsibility). Subjects are matched in pairs. Each pair of subjects (the negotiators) sees the same HL task and should reach an agreement on how to choose in each of the 10 cases. The subjects can communicate via online chat using natural language. In order to make a mutual choice both subjects should choose on their computer terminals identical choices for all 10 cases and press the "Validate" button. After both subjects pressed the button, the software checked if the choices of both subjects were the same and only then allowed them to proceed. After the mutual choice was made, the payoff that was generated from these choices went to both negotiators and *three others* in the session. This design allows us to make comparisons between the Condition 3, where subjects choose *alone* for themselves and three others and *mutual decision making*.

The conditions were *not* presented to the subjects in a fixed order. In each time period all four conditions were played by some subjects in the session. The order was randomized. Table 13 in Appendix A indicates the exact sequence of conditions for each subject and Table 12 shows how subjects were matched. Thus, in our design, subjects were presented with random sequence of HL tasks and random sequence of conditions.

The questionnaire elicited standard demographic data and two questions related to risk aversion. The subjects answered to these questions on a Likert scale. The first question was "*How risk averse/loving are you?*" on the scale from 1 = "very risk loving" to 7 = "very risk averse." The second question was "*How risk averse/loving are you in comparison with other people?*" on the scale 1 = "most risk loving" to 7 = "most risk averse."

The experiments were conducted at Maastricht University, School of Business and Economics (BEELAB), in April 2014. 24 subjects participated in one session of the Control treatment and 48 subjects in two sessions of the Main treatment. No other data were collected in any form: there were no pilots or discarded sessions. The experiment was programmed in z-Tree (Fischbacher, 2007).

4 Results

4.1 HL Tasks in Control Treatment

Before we get to the main results we would like to ensure that in the four HL tasks the subjects, when deciding only for themselves, choose (mostly) the same switching point. If this is true, then, in the Main treatment, we can interpret the movements of the switching point between HL tasks as the result of the influence of responsibility. We use the data from the Control treatment where subjects were not responsible for anyone and just made choices in four HL tasks choosing for themselves. We look at the *number of safe choices* of an individual, which is defined as the number of safe options (lotteries A) chosen before switching to the risky option (lotteries B). Thus, a high number of safe choices indicates a high degree of risk aversion. For the HL tasks 1, 2, 3 and 4 we define the variables `hl1`, `hl2`, `hl3` and `hl4`, which are equal to the number of safe choices.

Table 1 shows the average number of safe choices in the four HL tasks. Figure 3 in Appendix

	Mean	SE	95% Conf Int	
hl1	5.89	(0.19)	[5.50	6.28]
hl2	5.32	(0.24)	[4.81	5.82]
hl3	5.47	(0.21)	[5.04	5.91]
hl4	5.42	(0.26)	[4.89	5.96]

Table 1: Summary of the number of safe choices in the four HL tasks in the Control treatment

B shows this graphically and Figure 5 (Appendix B) shows the histograms of the number of safe choices in the fout HL tasks. All four tasks produce very close average numbers of safe choices. The mean number of safe choices in HL tasks 2-4 are almost exactly the same. The mean number of safe choices of the first HL is 2 standard errors away from the other three means. This might look problematic, but the difference is rather small (5.89 for the first HL vs. 5.40 for the average of HL tasks 2-4, less than 10%) and, using Fisher's exact test, we cannot reject the null hypothesis that the number of safe choices is the same (exact $p > 0.157$ for all pair-wise comparisons of the four HL tasks). Signed-rank tests give significant difference between HL task 1 and tasks 2 and 3 ($p < 0.045$), but are insignificant for all other pair-wise comparisons ($p > 0.100$). It seems like HL task 1 is different from the other three HL tasks. However, the difference is small and this does not bias our analysis reported below. We analyze the within subject *differences* between the number of safe choices in different conditions and all subjects choose in different HL tasks in each condition. Thus, the possible difference of the first HL task should cancel out as there is approximately the same number of subjects choosing in it in all conditions. Thus, we conclude that we are able to use the choices in the mixture of the four HL tasks in the analysis of the influence of responsibility on lottery choices.

4.2 Descriptive Statistics

Next we provide some summary statistics for the Main treatment. Each subject made choices in four conditions: 1) choice in HL task for yourself only (Condition 1); 2) choice for yourself and one other person (Condition 2); 3) choice for yourself and three others (Condition 3); 4) mutual choice with a partner for three others (Condition 4). In what follows we will denote the number of safe choices in the four conditions as `t1`, `t2`, `t3` and `t4`.

	Mean	SE	95% Conf Int	
t1	5.46	(0.20)	[5.06	5.86]
t2	5.54	(0.18)	[5.18	5.89]
t3	5.49	(0.22)	[5.05	5.92]
t4	5.34	(0.17)	[5.01	5.68]

Table 2: Summary of the number of safe choices in the four conditions of the main treatment.

Table 2 shows the average numbers of safe choices in the four conditions. Figure 4 in Appendix B shows the averages graphically and Figure 6 (Appendix B) shows the histograms. One can easily see that the averages are almost identical. Signed-rank tests show no significant differences between conditions ($p > 0.432$ for all pairwise tests). This does not necessarily mean that there is no influence of responsibility on choices. It is possible that subjects change their numbers of safe choices in different ways that might depend on their risk preferences. In the only study which has the design similar to ours (Bolton, Ockenfels, and Stauf, 2015) the authors find significant overall cautious shift between individual choice condition and choice for one other person. The reason behind it is that in their experiments risk averse subjects on average do not make riskier choices when choosing for the other than when they choose for themselves only, whereas in our experiment they do. Thus, in our data the cautious and risky shifts cancel each other out when the averages are taken and we do not see the difference on average between conditions. In Bolton, Ockenfels, and Stauf (2015), risky shift is not present, so averages show overall cautious shift. This difference in results can possibly stem from Bolton, Ockenfels, and Stauf (2015) using the same HL task for individual and social choices and having individual choice always preceding social one. In the second HL task when subjects choose for one other, they perfectly understand which choices are riskier than their own. This might preclude subjects from choosing in a riskier way. In our design subjects choose in different HL tasks and social choice precedes individual one in around half of the cases. This procedure creates no interdependencies between the two conditions and is, thus, more reliable.

Next we define and summarize the differences in the numbers of safe choices between conditions, which are our main variables of interest. We use the following notation. For each subject, let `tij` denote the difference between the number of safe choices between conditions `i` and `j`, or, in other words, `ti - tj`. Thus, for each subject, `t21`, for example, is the difference between the number of safe choices in Condition 2 and Condition 1 (`t2` – `t1`).

	From HL ≤ 5				**From HL ≥ 6**				**All Data**			
	Mean	**SE**	**95% Conf Int**		**Mean**	**SE**	**95% Conf Int**		**Mean**	**SE**	**95% Conf Int**	
`t21`	0.68	(0.27)	[0.13	1.24]	−0.45	(0.18)	[−0.83	−0.07]	0.07	(0.18)	[−0.29	0.43]
`t32`	0.20	(0.21)	[−0.25	0.65]	−0.29	(0.29)	[−0.90	0.33]	−0.05	(0.18)	[−0.42	0.32]
`t43`	0.55	(0.29)	[−0.05	1.15]	−0.81	(0.25)	[−1.34	−0.28]	−0.15	(0.22)	[−0.58	0.29]

Table 3: Summary of the differences in the number of safe choices between four conditions in the Main treatment. **From HL ≤ 5** means that the mean was taken over subjects who chose the number of safe choices less or equal to 5 in Condition 1, 2 or 3 (for `t21`, `t32` and `t43` respectively).

Table 3 shows the averages of differences in numbers of safe choices between Conditions 2-1, 3-2 and 4-3 for subgroups of subjects who chose the number of safe choices less or equal (greater or equal) than 5 (6) in conditions 1, 2 and 3 respectively (e.g., for `t32` we divide subjects into two groups according to their choices in Condition 2). We can see that for `t21` risk loving subjects (with the number of safe choices in Individual Condition 1 less than or equal to 5) choose on average more safely when they are responsible for one other person and risk averse subjects (greater or equal to 6 in Individual Condition 1) choose on average riskier options when responsible for one other. We see that average `t32` is essentially zero for both groups of subjects. Thus, it looks like responsibility for one or three people does not change the choices at all. Finally, we see that communication in Condition 4 makes risk averse subjects choose in riskier way on average and risk loving subjects choose more cautiously. Finally, it should be mentioned, that average differences for all data are not different from zero. This is the case because of the opposite direction of shifts of risk loving and risk averse subjects between conditions.

	t-test	**One-Sample Signed-Rank**
From HL ≤ 5		
$H : \texttt{t21} > 0$	$p = 0.0095$	$p = 0.0141$
$H : \texttt{t32} > 0$	$p = 0.1795$	$p = 0.2214$
$H : \texttt{t43} > 0$	$p = 0.0345$	$p = 0.0390$
From HL ≥ 6		
$H : \texttt{t21} < 0$	$p = 0.0107$	$p = 0.0141$
$H : \texttt{t32} < 0$	$p = 0.1713$	$p = 0.2610$
$H : \texttt{t43} < 0$	$p = 0.0024$	$p = 0.0018$

Table 4: T-tests and one sample signed-rank tests for null hypotheses that the differences in numbers of safe choices are zero. All p-values are one-tailed.

To support our conclusions we test the hypotheses that the averages are equal to zero. Table 4 shows p values for t-test and one-sample signed-rank test. One can see that our conclusions are supported by these tests: we find that `t21` and `t43` are significantly different from zero (in the right direction) for both risk averse and risk loving subjects.

4.3 Responsibility for One Other

We have established that in our data the effect of responsibility for one other person depends on the individual risk aversion. Next we would like to quantitatively estimate the size of this effect as dependent on the individual risk preferences. We run two OLS regressions reported in Table 5. The independent variables are `t1`, the number of safe choices in Individual Condition 1; `geq61`, indicator variable equal to one for subjects who chose the number of safe choices in Condition 1 greater or equal to 6; and the interaction of `t1` and `geq61`. Dependent variable is `t21`, the difference between the number of safe choices in Condition 2 (responsible for one other person) and Condition 1 (individual choice).

To understand what these regressions imply we illustrate the predicted values of `t21` on Figure 1. The model in Column 1 of Table 5 (left graph of Figure 1) is in line with the non-parametric tests reported above: subjects with low individual number of safe choices (3, 4, or 5) choose with more caution when responsible for one other person (`t21` is positive) and subjects with high individual number of safe choices (6, 7, or 8) choose in a riskier way (`t21` is negative). However,

t21	1	2
	β/se	β/se
t1	–0.505***	–0.901***
	(0.140)	(0.194)
geq61		–6.366**
		(2.459)
geq61·t1		1.109**
		(0.405)
cons	2.830***	4.573***
	(0.772)	(0.872)
geq61 + geq61·t1		0.207
		(0.355)
N	41	41
R^2	.31	.41

Table 5: OLS regressions of the change in risk choices due to the responsibility for one other person (t21) as dependent on individual risk preferences. Errors are robust. * – $p < 0.1$; ** – $p < 0.05$; *** – $p < 0.01$.

the model in Column 2, which takes into account the low risk aversion and the high risk aversion groups (geq61 indicates the risk averse group with individual number of safe choices greater or equal to 6), demonstrates that the effect for the risk averse group has different nature than the effect for the risk loving group. Notice that in the risk loving group subjects tend to choose *more* cautiously the *more* risk loving they are: for example, subjects with individual number of safe choices of 3 switch in the responsibility condition on average two lotteries higher and those with individual number of safe choices of 4 switch on average one lottery higher (those with 5 choose the same number of safe choices). This points toward an interesting effect: subjects in the risk loving group seem to target on average the same number of safe choices of 5 when deciding for themselves and one other. This suggests that they try to choose in a way the average subject would have chosen. Indeed, the average individual number of safe choices lies in between 5 and 6 (see Figure 3 in Appendix B). For the risk averse group this effect does not emerge (the sum of coefficients geq61 + geq61·t1 is insignificant, see Table 5). As we have seen in the previous section, risk averse subjects still tend to choose on average in a riskier way in the responsibility condition, however, it seems that they do not try to target the number of safe choices of 5.

We find both "cautious" and "risky" shifts in our data, though cautious shift seems stronger than the risky one. This is exactly in line with the blame avoidance hypothesis which predicts that bad outcomes from the risky choice are blamed more than the outcomes from safe choices. These results are in line with the behavior reported in Bolton, Ockenfels, and Stauf (2015).[6] The authors find an effect similar to ours as reported on the right Figure 1. Namely, they find significant cautious shift but no significant risky shift. The only difference with our results is that we do find significant risky shift on average, though it does not seem to be targeted at a

[6]We did not know about the design of Bolton, Ockenfels, and Stauf (2015) when developing our experiment, so this is coincidental. Though, the fact that we were able to replicate their results suggests the robustness of the effect.

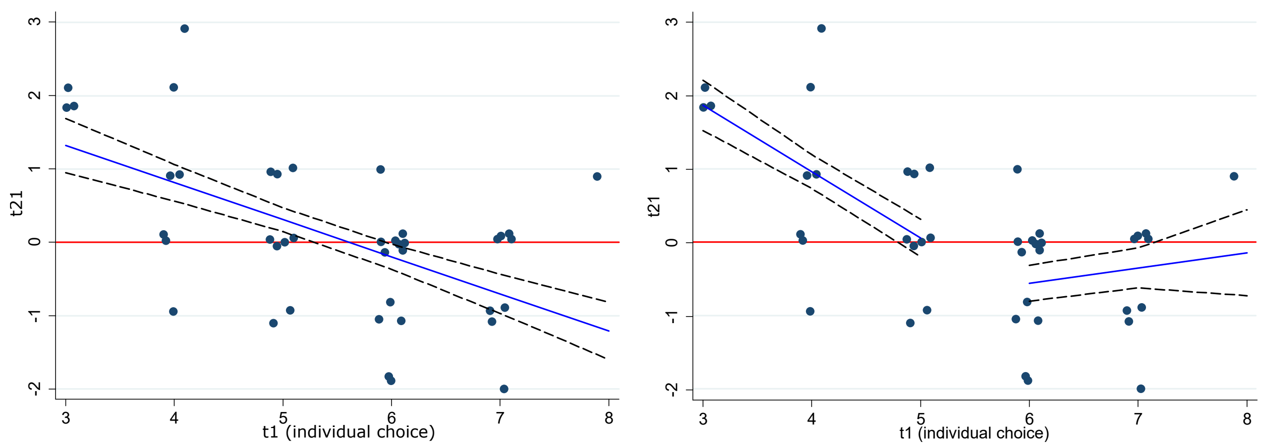

Figure 1: Fitted values of the regressions in Table 5. The dashed lines are ±1 SE. The data points are jittered.

particular number of safe choices as cautious shift is.

In Appendix D.1 we also report some results on the connection between the subjects' beliefs about their *relative* risk aversion and the shift in choices between Conditions 1 and 2. For the risk loving subjects beliefs do not matter, however, for the risk averse subjects we find that beliefs about relative risk aversion affect the magnitude of the move towards risky option between Conditions 1 and 2. The more relatively risk loving the subjects think they are the riskier options they choose when responsible for others.

4.4 Regression to the Mean

It might seem that our results in the previous sections can simply be explained by the regression to the mean effect. In this section we will provide arguments and evidence to the contrary. The first thing to notice is that we are *not* dealing with the data to which the regression to the mean argument can be easily applied. Under the common assumption that risk preferences are *heterogeneous*, what we are dealing with is the set of observations which come from the subjects who have different risk preferences, which is reflected in different number of safe choices made in Condition 1. In this case, following the logic of the regression to the mean, it should be more probable for each subject to choose the number of safe choices in accordance with her true risk preferences than choosing the number of safe choices away from it. For example, if subject's true risk preferences are revealed by 7 safe choices and she chooses 6, then *it is more likely that she chooses 7 than 5*, which means that, in our case, regression to the mean will not necessarily push the choices towards the population average.

The finding that risk loving subjects choose in riskier way when responsible and that they, on average, target the number of safe choices of 5 under responsibility cannot be reconciled with the regression to the mean under heterogeneity argument explained above. The only way that this effect can be attributed to the regression to the mean is if we assume that *all* subjects have *the same* (or extremely similar) risk preferences which are revealed by making 5 safe choices in Individual Condition (all other choices should be considered mistakes). We do not think that such an assumption can be supported empirically. Moreover, as the right Figure 1 shows, risk averse subjects do not target 5 safe choices when responsible for one other as their risk loving counterparts do. This is also inconsistent with the regression to the mean hypothesis as, in case it were true, risk averse subjects should have demonstrated the same pattern as risk loving subjects have.

To substantiate our claims we conduct additional analysis on the data from the Control treatment, where subjects were choosing only for themselves in the four HL tasks. In Section 4.1 we denoted by `hl1`, `hl2`, `hl3` and `hl4` the numbers of safe choices in the four HL tasks. Now, analogously to the Main treatment, we define the differences in the number of safe choices between any two HL tasks as $\texttt{hlij} = \texttt{hli} - \texttt{hlj}$ for HL tasks `i` and `j`.

	From HL ≤ 5				**From HL ≥ 6**			
	Mean	**SE**	**95% Conf Int**		**Mean**	**SE**	**95% Conf Int**	
`hl21`	−0.14	(0.26)	[−0.78	0.50]	−0.83	(0.39)	[−1.68	0.02]
`hl31`	0.14	(0.40)	[−0.85	1.13]	−0.75	(0.18)	[−1.14	−0.36]
`hl41`	0.14	(0.40)	[−0.85	1.13]	−0.83	(0.37)	[−1.64	−0.03]
`hl12`	1.10	(0.41)	[0.18	2.02]	0.00	(0.24)	[−0.54	0.54]
`hl32`	0.80	(0.39)	[−0.08	1.68]	−0.56	(0.18)	[−0.96	−0.15]
`hl42`	0.40	(0.31)	[−0.29	1.09]	−0.22	(0.22)	[−0.73	0.29]
`hl13`	0.78	(0.22)	[0.27	1.29]	0.10	(0.31)	[−0.61	0.81]
`hl23`	0.33	(0.24)	[−0.21	0.88]	−0.60	(0.43)	[−1.57	0.37]
`hl43`	0.56	(0.18)	[0.15	0.96]	−0.60	(0.40)	[−1.50	0.30]
`hl14`	1.22	(0.43)	[0.22	2.22]	−0.20	(0.25)	[−0.76	0.36]
`hl24`	0.22	(0.28)	[−0.42	0.86]	−0.40	(0.27)	[−1.00	0.20]
`hl34`	0.67	(0.41)	[−0.27	1.61]	−0.50	(0.22)	[−1.01	0.01]

Table 6: Summary of the differences in the number of safe choices in all combinations of the four HL tasks in the Control treatment. Here `hlij` is equal to `hli - hlj`. **From HL** ≤ 5 means that the mean was taken over subjects who chose the number of safe choices less or equal to 5 in HL task `j` (`hlj`).

Table 6 shows the descriptive statistics for all possible differences. Here we also divide the sample into risk averse and risk loving groups separately for each difference `hlij`: we divide the sample according to the choices in HL task `j`. The majority of the differences are not significantly different from zero (with exception of four differences for risk loving subjects and three differences for risk averse subjects). In case regression to the mean were taking place we should have observed much more significance. It is apparent that the general direction of the movement of the number of choices *is* consistent with the regression to the mean argument. This, though, in our opinion, is natural as it is true that extreme choices are less probable than moderate ones after all. In addition to these statistics, we report in Table 16 (Appendix D.2) the regression analysis similar to the right regression in Table 5. The results are similar: there are some significant coefficients for some differences, but the majority of the regressions do not show any trend at all. The analysis of the data from the Control treatment, thus, provides weak evidence if any of the existence of the regression to the mean (in case we assume that risk preferences are the same in the population).

4.5 Responsibility for Three Others

We perform the same analysis as in Section 4.3 only between Conditions 2 and 3. We would like to see if there is an effect of increasing the number of people that the subjects are responsible for. In principle, according to the blame hypothesis we should see the strengthening of the effect of responsibility. To test this prediction we look at the regression similar to that in Table 5. We define new independent variable `geq62`, which is equal to 1 for subjects who chose the number of safe choices greater or equal to 6 *in Condition 2* where subjects are responsible for one other person.

t32	1	2
	β/se	β/se
t2	–0.305*	–0.206
	(0.171)	(0.329)
geq62		1.699
		(2.442)
geq62·t2		–0.281
		(0.461)
cons	1.641*	1.147
	(0.891)	(1.515)
geq62 + geq62·t2		–0.487
		(0.322)
N	41	41
R^2	.09	.10

Table 7: OLS regressions of the change in risk choices between the responsibility for one other and three others (`t32`) as dependent on the choices in Condition 2. Errors are robust. * – $p < 0.1$; ** – $p < 0.05$; *** – $p < 0.01$.

Table 7 reports the resulting regressions. We see no significant effect or at best a weak effect of the number of others on the choices of our subjects. Figure 7 in Appendix D.3 illustrates the fitted regressions from Table 7. This looks similar to the difference between Conditions 1 and 2, only the effect is small. Overall we conclude that the number of others does not have much effect on the choices. Blame avoidance hypothesis would predict that the more people are influenced by the decision, the more blame this could potentially generate. However, we cannot provide an empirical support for this claim. It might be that blame avoidance is insensitive to the number of people or that increasing the number of others might make the effect significant.

4.6 Mutual Responsibility

Lastly, we analyse the change in behavior when subjects are able to chat with a partner about how to choose for themselves and three others. We are interested in how the communication influences the final choice for the group in comparison with Condition 3, where subjects choose alone for themselves and three others. Again we run the regressions similar to those in Section 4.3.

t43	1	2
	β/se	β/se
t3	–0.709***	–0.883***
	(0.108)	(0.251)
geq63		0.865
		(2.363)
geq63·t3		–0.040
		(0.406)
cons	3.746***	4.392***
	(0.608)	(1.068)
geq63 + geq63·t3		–0.923***
		(0.319)
N	41	41
R^2	.50	.52

Table 8: OLS regressions of the change in risk choices between the responsibility for three others and mutual responsibility (t43) as dependent on the choices in Condition 3. Errors are robust. * – $p < 0.1$; ** – $p < 0.05$; *** – $p < 0.01$.

Table 8 reports the results. Here variable geq63 is an indicator for the subjects who chose numbers of safe choices greater or equal to 6 in Condition 3. We see that the direction of the effect is the same as in the analysis of Conditions 2 and 1 in Section 4.3. However, there is an important difference. Now in column 2 of Table 8 the coefficients on all variables related to the group identity (geq63) are insignificant. This implies that mutual responsibility makes it simpler for risk averse subjects to make riskier choices for the group.

Figure 2 shows that with mutual responsibility the subjects in the risk averse group (according to Condition 3) now easily make much riskier choices for the group. Moreover, one can notice that those with the number of safe choices of 8 switch on average 2 lotteries lower, thus choosing risk level of the number of safe choices of 6 for the group (the right graph). Those with the number of safe choices of 7 switch on average one lottery lower thus also choosing the number of safe choices of 6 for the group and those with the number of safe choices of 6 do not switch much. This points again towards the idea that subjects try to target some average risk aversion in the population, in this case the number of safe choices of 6 and with mutual responsibility they are much more willing to do it. The same effect holds for the risk loving group, only their target number of safe choices is 5 instead of 6.

Interestingly, when we run the same regressions with the same dependent variable t43 but

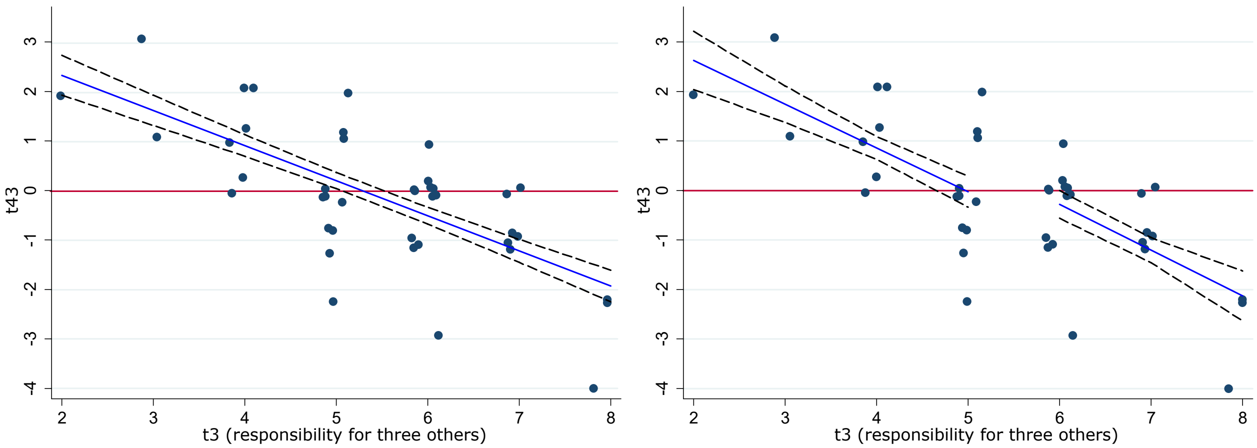

Figure 2: Fitted values of the regressions in Table 8. The dashed lines are ±1 SE.

using independent variables `t1`, or individual risk aversion, and `geq61`, we find no significant coefficients anywhere. This suggests that our subjects, when deciding mutually with a partner, do take into account their choices *for the three others* and not their personal risk preferences.

Finally, we analyze the influence that the choices of the two partners in Condition 3 have on the number of safe choices they end up agreeing on. The question is, given the number of safe choices of the two negotiators, which number of safe choices do they end up choosing? To analyse this we look at three groups of pairs: 1) pairs where both individual numbers of safe choices in Condition 3 are above 5.5; 2) pairs with both individual numbers of safe choices in Condition 3 lower than 5.5; 3) pairs with one number of safe choices in Condition 3 above and one lower than 5.5. We observe that in case 1 all pairs but one choose a number of safe choices in between their `t3` choices and the one pair that does not do it chooses the number of safe choices of 5, or *below* both `t3`'s. In case 2 all pairs but one choose in between their `t3`'s and the one pair that chooses otherwise chooses the number of safe choices of 6, *above* both `t3`'s. In case 3 all pairs but two choose in between their `t3`'s and those two which do not, choose lower number of safe choices than both `t3`'s. This simple analysis suggests that the negotiators mostly choose a number of safe choices which lies in between their own number of safe choices in case of individual responsibility for three others (80% of the data) with a tendency towards the average number of safe choices or lower in case they choose outside the interval of their `t3`'s.

We support this analysis by a regression. The dependent variable is the agreed number of safe choices of each pair (`t4`). Independent variables are `lowt3` and `hight3`, which denote the highest and lowest `t3` in the pair. For example, if in Condition 3 one partner in a pair chose 4 safe choices and another, say, 7, then `lowt3` is equal to 4 and `hight3` is equal to 7. We would like to know how does the choice of the pair depends on the partners' choices when they choose alone.

Table 9 reports the results. Notice that the coefficients add up to 0.9, which is very close to 1.

t4	
	β/se
lowt3	0.311*
	(0.173)
hight3	0.607***
	(0.138)
N pairs	21
R^2	.97

Table 9: OLS regression of the choice under mutual responsibility as dependent on the pair of negotiators' highest and lowest number of safe choices in Condition 3. Errors are robust. * – $p < 0.1$; ** – $p < 0.05$; *** – $p < 0.01$.

This implies that the negotiators in the pair in most cases (80% of the data) agree on a number of safe choices that lies in between their number of safe choices in Condition 3. Moreover, this choice is closer to the more cautious negotiator (around 60% weight). This means that it is "simpler" for the risk loving subjects to choose more cautiously for the group than for the risk averse subjects to choose riskier options. However, it should be mentioned that mutual responsibility makes the choices of risk averse subjects much more riskier: on average risk averse subjects choose 0.81 safe choices less than in Condition 3 (Table 3). All these results are in line with the blame hypothesis: it is easier to make risky choices for the group when there are two people to blame and not one.

5 Conclusion

Our results can be summarized as follows. People do behave differently in the uncertain environments when responsible for others. Subjects who are relatively risk loving, as measured by the individual HL task, make more cautious choices when choosing for themselves and other(s) as compared to the case when they choose just for themselves. Moreover, they, on average, target the objective average choice made by others, which supports the hypothesis that they try to choose as they think others would have chosen in their place. It should be mentioned though that we cannot claim that our subjects know the average risk preferences in the population, so other explanations of targeting five safe choices are possible (for example subjects might just target the middle of the 0 - 10 interval). Subjects who are relatively risk averse do, in general, make riskier choices when responsible, which supports the blame hypothesis, but this effect is weaker. We explain this by the idea that the blame for bad outcomes of risky choices outweighs potential blame for the outcomes of the cautious choices (Gurdal, Miller, and Rustichini, 2013).

We find little evidence that people choose differently for others when a different number of others is involved (one versus three). This suggests that intuitive hypothesis that there is "more" blame when there are more people affected by the choice of the decision maker does not have empirical support. Alternatively, the absence of an effect might be due to the small difference in the number of others (it is possible that when choosing for, say, 10 others the results could change) or due to actual indifference of our subjects to how many people they are responsible for.

Finally we find a striking effect of mutual responsibility on the choices for others. When two subjects are paired in order to make a joint decision for a group, they do choose as if targeting the average choice that others would have made. This means that relatively risk loving subjects choose more cautiously and relatively risk averse subjects choose significantly riskier option as compared to the case when they choose for others alone. Moreover, subjects' own preferences on how to choose for others become important. The majority of subjects end up choosing the risk level that is in between their individual own risk attitudes (in case of the choice for others), though the tendency to match the average remains.

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Appendix (for online publication)

A Details of the Design

A.1 The Payoffs in HL Tasks

	LOTTERY A		LOTTERY B	
	Payoff A1	**Payoff A2**	**Payoff B1**	**Payoff B2**
HL task 1	2.00	1.60	3.85	0.10
HL task 2	1.85	1.40	3.45	0.10
HL task 3	2.30	1.60	4.00	0.20
HL task 4	2.45	1.20	3.55	0.30

Table 10: The payoffs used in the four HL tasks. Probabilities were fixed and went from 0.1 to 1 with 0.1 increment for outcomes A1 and B1 and from 0.9 to 0 for outcomes A2 and B2.

A.2 The Order of HL Tasks

Subject	Period 1	Period 2	Period 3	Period 4
1	1	2	3	4
2	4	2	1	3
3	2	1	3	4
4	1	3	4	2
5	2	4	1	3
6	1	4	2	3
7	4	3	1	2
8	2	4	1	3
9	1	3	4	2
10	2	4	3	1
11	3	1	2	4
12	4	1	3	2
13	2	4	3	1
14	3	1	4	2
15	3	2	4	1
16	4	2	3	1
17	4	3	2	1
18	1	3	2	4
19	2	3	1	4
20	2	4	3	1
21	4	2	1	3
22	4	3	2	1
23	3	2	1	4
24	3	4	1	2

Table 11: The time sequence of the four HL tasks that were presented to each of the 24 subjects in a session for their four choices.

A.3 The Matching of Subjects

Subject	1other	3others-1	3others-2	3others-3	Mutual-1	Mutual-2	Mutual-3
1	2	3	4	5	22	23	24
2	3	4	5	6	10	11	12
3	4	5	6	7	22	23	24
4	5	6	7	8	7	8	9
5	6	7	8	9	13	14	15
6	7	8	9	10	13	14	15
7	8	9	10	11	1	2	3
8	9	10	11	12	10	11	12
9	10	11	12	13	1	2	3
10	11	12	13	14	4	5	6
11	12	13	14	15	16	17	18
12	13	14	15	16	16	17	18
13	14	15	16	17	1	2	3
14	15	16	17	18	7	8	9
15	16	17	18	19	1	2	3
16	17	18	19	20	4	5	6
17	18	19	20	21	19	20	21
18	19	20	21	22	19	20	21
19	20	21	22	23	4	5	6
20	21	22	23	24	4	5	6
21	22	23	24	1	7	8	9
22	23	24	1	2	7	8	9
23	24	1	2	3	10	11	12
24	1	2	3	4	10	11	12

Table 12: The matching of the recipients of payoffs for the 24 subjects in the session. The entries in the table represent the subjects' assigned numbers.

A.4 The Order of Conditions

Subject	Period 1	Period 2	Period 3	Period 4
1	1	2	3	4
2	1	2	4	3
3	1	3	2	5
4	1	3	6	2
5	1	4	2	3
6	1	5	3	2
7	2	1	3	6
8	2	1	5	3
9	2	3	1	7
10	2	3	8	1
11	2	6	1	3
12	2	7	3	1
13	3	1	2	8
14	3	1	7	2
15	3	2	1	9
16	3	2	9	1
17	3	8	1	2
18	3	9	2	1
19	4	1	2	3
20	5	1	3	2
21	6	2	3	1
22	7	2	3	1
23	8	3	1	2
24	9	3	2	1

Table 13: The time sequence of conditions presented to each of the 24 subjects in the session. Here 1, 2, and 3 mean Conditions 1, 2, and 3. For mutual responsibility condition the pairs of negotiators are $(4,5)$, $(6,7)$ and $(8,9)$.

B Additional Graphs

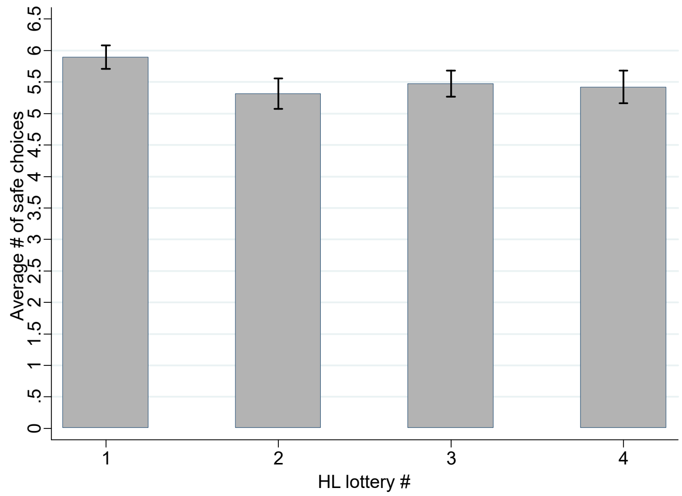

Figure 3: Average number of safe choices for the four HL tasks used in the experiment. The spikes are ±1 SE.

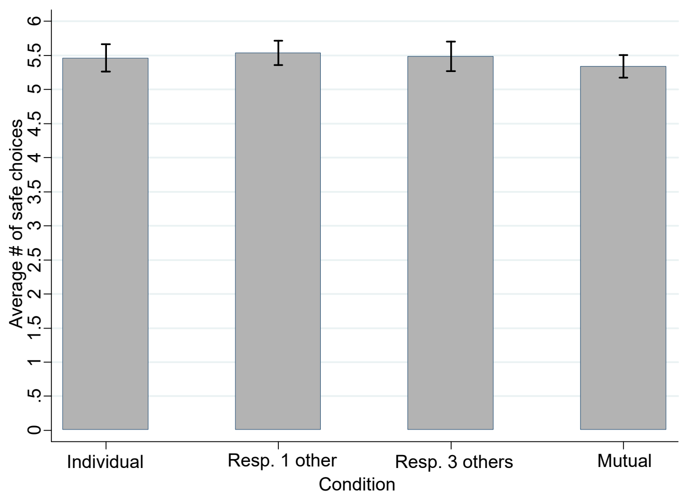

Figure 4: Average number of safe choices for the four conditions in the Main treatment. The spikes are ±1 SE.

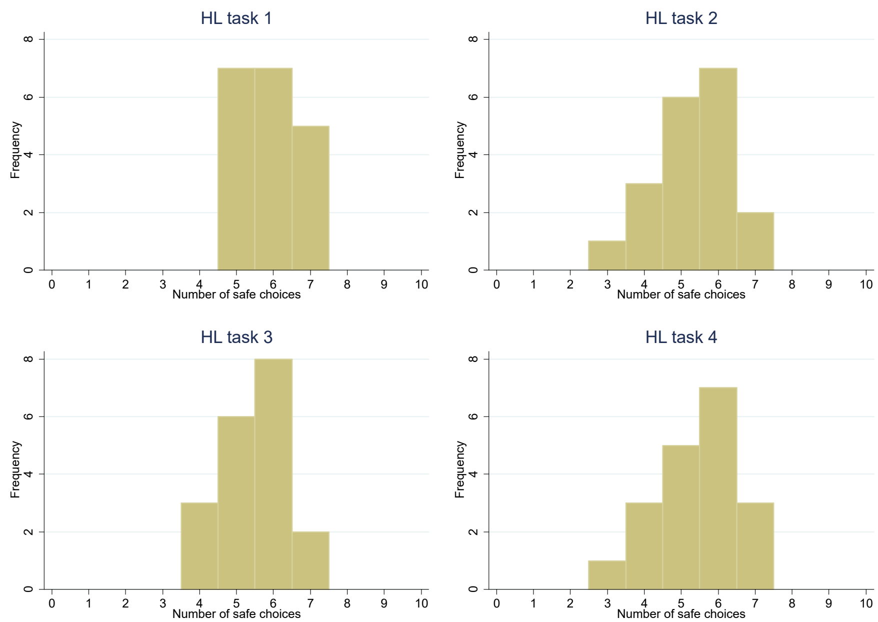

Figure 5: The histograms of the number of safe choices in four HL tasks in the Control treatment.

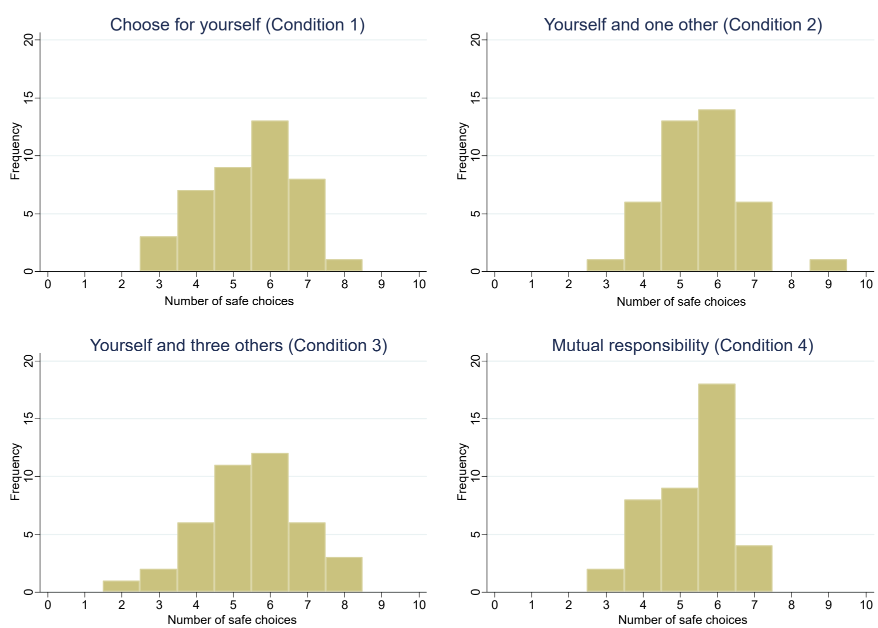

Figure 6: The histograms of the number of safe choices in four conditions of the Main treatment.

C Regression Variables

Variable	Range	Definition
hl1-4	$\{0, ..., 10\}$	The number of safe choices in four HL tasks in the Control treatment
t1-4	$\{0, ..., 10\}$	The number of safe choices in the HL tasks in Conditions 1-4 in the Main treatment
hlij	$\{-10, ..., 10\}$	Equals hli - hlj, where *i* and *j* are the numbers of HL tasks in the Control treatment. The difference in the numbers of safe choices between HL tasks for each subject
tij	$\{-10, ..., 10\}$	Equals ti - tj, where *i* and *j* are the numbers of Conditions in the Main treatment. The difference in the numbers of safe choices for each subject
geq6i	0/1	The dummy that is one if a subject chose the number of safe choices greater or equal to 6 in Condition i and 0 otherwise
lowt3	$\{1, ..., 10\}$	In Condition 4 (mutual responsibility), the lowest threshold of the two negotiators
hight3	$\{1, ..., 10\}$	In Condition 4 (mutual responsibility), the highest threshold of the two negotiators
rbeliefs	$\{1, ..., 7\}$	The Likert scale response to a question "How risk averse/loving are you in comparison with other people?" 1 = "most risk loving"; 7 = "most risk averse"

Table 14: Variables used in the regressions.

D Additional Analyses

D.1 Responsibility for One Other and Beliefs

We would like to report an additional result. We find that the changes in the number of safe choices between the individual condition and the responsibility for one other condition depend on the elicited belief of the subjects about how risk averse/loving they are *relative to other people*. We find that (regardless of whether the belief is correct) subjects who consider themselves most risk loving tend to make *riskier* choices when responsible for one other and those who think that they are most risk averse in comparison with others make *safer* choices when responsible. Note that this only holds for the objectively risk averse subjects.

t21	**Risk Loving**		**Risk Averse**	
	1	2	3	4
	b/se	b/se	b/se	b/se
t1	–0.901***	–0.875***	0.207	0.068
	(0.195)	(0.216)	(0.354)	(0.260)
rbeliefs		0.163		0.408**
		(0.194)		(0.144)
cons	4.573***	3.790**	–1.793	–2.748
	(0.875)	(1.384)	(2.291)	(1.828)
N	19	19	22	22
R^2	.34	.36	.02	.41

Table 15: OLS regressions of the change in risk choices as dependent on individual risk preferences and beliefs about relative risk aversion. Errors are robust. * – $p < 0.1$; ** – $p < 0.05$; *** – $p < 0.01$.

Table 15 reports four regressions separate for risk loving subjects (number of safe choices 3, 4, 5 in individual HL task) and risk averse subjects (number of safe choices 6, 7, 8 in individual task). Notice that adding independent variable `rbeliefs`, which is the answer to a Likert scale question about subjects' relative standing in population between very risk loving and very risk averse, can explain 41% of the data for risk averse subjects and has no effect on risk loving subjects. For risk averse subjects, the more they think they are risk loving among others, the bigger is their shift towards riskier choice when responsible for others.[1]

[1] Note that risk averse subjects' belief is mostly incorrect. They consider themselves more risk loving than they actually are.

D.2 Control Treatment Regressions

	β_1	β_2	β_3	β_0	$\beta_2+\beta_3$
$\texttt{hl21} = \beta_0 + \beta_1\texttt{geq61} + \beta_2\texttt{hl1} + \beta_3\texttt{geq61}\cdot\texttt{hl1}$	1.17 (1.02)	–1.31 (0.75)		6.43 (3.78)	–1.31 (0.75)
$\texttt{hl31} = \beta_0 + \beta_1\texttt{geq61} + \beta_2\texttt{hl1} + \beta_3\texttt{geq61}\cdot\texttt{hl1}$	–0.77 (0.73)	–0.09 (0.35)		0.57 (1.79)	–0.09 (0.35)
$\texttt{hl41} = \beta_0 + \beta_1\texttt{geq61} + \beta_2\texttt{hl1} + \beta_3\texttt{geq61}\cdot\texttt{hl1}$	0.40 (1.03)	–0.97 (0.79)		5.00 (3.96)	–0.97 (0.79)
$\texttt{hl12} = \beta_0 + \beta_1\texttt{geq62} + \beta_2\texttt{hl2} + \beta_3\texttt{geq62}\cdot\texttt{hl2}$	–3.60 (3.52)	–1.44*** (0.39)	0.80 (0.62)	7.60*** (1.76)	–0.64 (0.48)
$\texttt{hl32} = \beta_0 + \beta_1\texttt{geq62} + \beta_2\texttt{hl2} + \beta_3\texttt{geq62}\cdot\texttt{hl2}$	–0.80 (3.09)	–0.67 (0.60)	0.10 (0.64)	3.80 (2.72)	–0.57** (0.21)
$\texttt{hl42} = \beta_0 + \beta_1\texttt{geq62} + \beta_2\texttt{hl2} + \beta_3\texttt{geq62}\cdot\texttt{hl2}$	1.60 (3.43)	0.00 (0.39)	–0.36 (0.62)	0.40 (1.55)	–0.36 (0.48)
$\texttt{hl13} = \beta_0 + \beta_1\texttt{geq63} + \beta_2\texttt{hl3} + \beta_3\texttt{geq63}\cdot\texttt{hl3}$	3.96 (5.45)	–0.83** (0.38)	–0.54 (0.93)	4.67** (1.79)	–1.38 (0.84)
$\texttt{hl23} = \beta_0 + \beta_1\texttt{geq63} + \beta_2\texttt{hl3} + \beta_3\texttt{geq63}\cdot\texttt{hl3}$	9.92** (3.92)	0.00 (0.46)	–1.75** (0.66)	0.33 (2.05)	–1.75*** (0.48)
$\texttt{hl43} = \beta_0 + \beta_1\texttt{geq63} + \beta_2\texttt{hl3} + \beta_3\texttt{geq63}\cdot\texttt{hl3}$	–0.38 (4.72)	0.33 (0.38)	–0.21 (0.76)	–1.00 (1.76)	0.13 (0.66)
$\texttt{hl14} = \beta_0 + \beta_1\texttt{geq64} + \beta_2\texttt{hl4} + \beta_3\texttt{geq64}\cdot\texttt{hl4}$	–3.42 (4.42)	–1.39*** (0.42)	0.73 (0.78)	7.42*** (1.88)	–0.67 (0.65)
$\texttt{hl24} = \beta_0 + \beta_1\texttt{geq64} + \beta_2\texttt{hl4} + \beta_3\texttt{geq64}\cdot\texttt{hl4}$	3.84 (4.03)	–0.21 (0.38)	–0.65 (0.71)	1.16 (1.59)	–0.86 (0.60)
$\texttt{hl34} = \beta_0 + \beta_1\texttt{geq64} + \beta_2\texttt{hl4} + \beta_3\texttt{geq64}\cdot\texttt{hl4}$	–4.58 (3.49)	–1.11** (0.44)	0.87 (0.62)	5.58** (2.02)	–0.24 (0.44)

Table 16: OLS regressions of the difference in the number of safe choices between all combinations of HL tasks on the number of choices in one of them and greater or equal to 6 dummy. * – $p < 0.1$; ** – $p < 0.05$; *** – $p < 0.01$.

D.3 Responsibility for Three Others

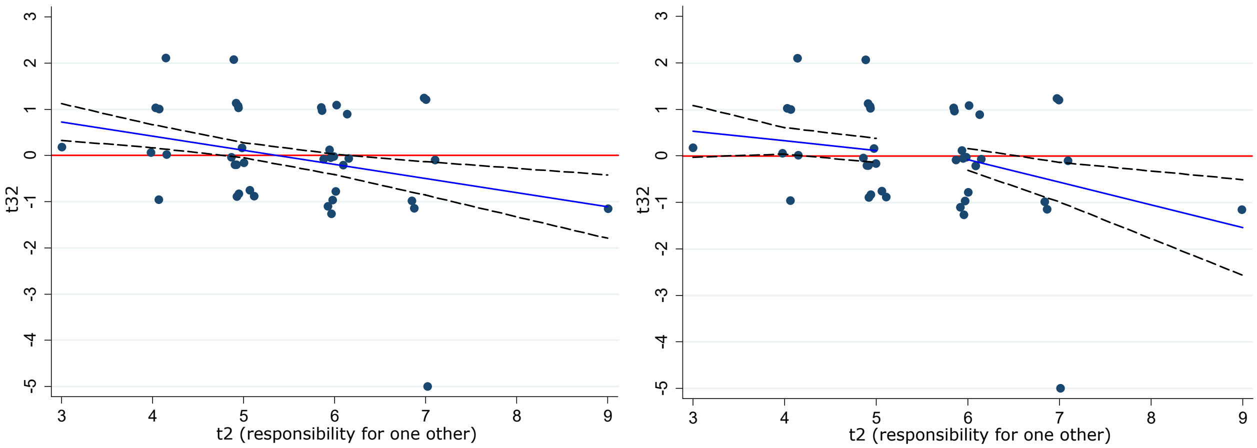

Figure 7: Fitted values of the regressions in Table 7. The dashed lines are ±1 SE. The data points are jittered.

E Instructions

General Instructions
You are now participating in a decision making experiment. If you follow the instructions carefully, you can earn a considerable amount of money depending on your decisions and the decisions of the other participants. Your earnings will be paid to you in CASH at the end of the experiment. In addition to your earnings in the experiment you will receive a €2 show-up fee. During the experiment you are not allowed to communicate with anybody. In case of questions, please raise your hand. Then we will come to your seat and answer your questions. Any violation of this rule excludes you immediately from the experiment and all payments. This research is funded by the Marie Curie action of the EU.

Click OK when you are ready to go on.

***

Example Scenario
In this experiment you will be presented with four scenarios. In each scenario you will need to choose 10 times between the Left and Right option. Each option is a lottery. A lottery consists of two monetary outcomes each of which can happen with certain probability.

On the right side of the screen, you see an example scenario. There are 10 rows which correspond to the 10 choices described above. Every row represents a choice between two lotteries.

You can make a choice in each row by clicking on the lottery that you prefer. The lottery that you have chosen becomes red.

After you have made the 10 choices, the computer will select one of them randomly. Then, the lottery chosen by you will be 'played' by the computer, and you will receive the corresponding payoff.

To demonstrate how this works in this example scenario, please make 10 choices and press OK button to validate. Next, you will see a screen that shows the amount of money that you earned in this scenario. SINCE THIS IS AN EXAMPLE, YOU WILL NOT ACTUALLY RECEIVE THE AMOUNT YOU SEE ON THE NEXT SCREEN. You will NOT see the amount of money you earn after each scenario. You will be informed about your earnings in the end of the experiment.

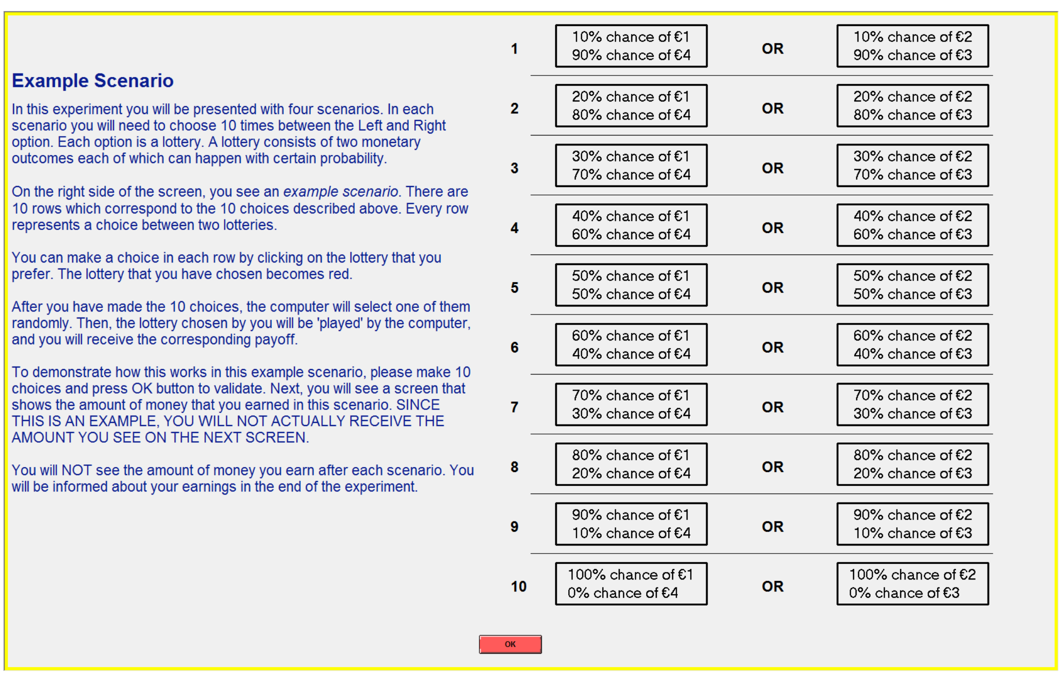

Figure 8: A screenshot of the example scenario.

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Choosing for Yourself
In this scenario, you are the only one who is affected by your choice. You are the only person that receives the payoff of one of the lotteries that you choose. This is exactly the same as the example scenario.

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Choosing for Yourself and One Other Person
In this scenario, there is one other person in this room who is affected by your choices. So, you are not the only person who receives the payoff of one of the lotteries that you choose. You, and the other person will receive the same payoff (the payoff is not divided). For example, if computer randomly determines your payoff to be €2, then the other person will also receive €2. After the experiment the person affected by your choice will be asked how satisfied he/she is with the amount of money he/she received.

***

Choosing for Yourself and Three Other People
In this scenario, there are three other people in this room who are affected by your choices. So, you are not the only person who receives the payoff of one of the lotteries that you choose. You, and the three other people will receive the same payoff (the payoff is not divided). For example, if computer randomly determines your payoff to be €2, then the three others will also receive €2. After the experiment the others affected by your choice will be asked how satisfied they are with the amount of money they received.

***

Choosing with Someone Else for Both of You and Three Other People
In this scenario, you decide together with someone else and three other people are affected by your choice. Therefore you decide together which choices you would like to make.

You can communicate with your partner via the chatbox below. You can type the messages to your partner in the text line and press enter to send. You should agree on each of the 10 choices. Both of you should click on exactly the same lotteries in order to proceed to the next scenario. After you both have made your choices, press the OK button to proceed.

After you click OK, the computer will randomly determine the payoff. You, your partner and three other people will receive the same amount of money. For example, if computer randomly determines the payoff to be €2, then you, your partner and the three others will each receive €2.

After the experiment the others affected by your choice will be asked how satisfied they are with the amount of money they received.

***

In every scenario a reminder was shown which repeated the general explanation of the experiment.

Reminder
In this scenario you need to choose 10 times between the Left and Right option. Each option is a lottery. A lottery consists of two monetary outcomes each of which can happen with certain probability.

On the right side of the screen, you see 10 rows which correspond to the 10 choices described above. Every row represents a choice between two lotteries.

You can make a choice in each row by clicking on the lottery that you prefer. The lottery that you have chosen becomes red.

After you have made the 10 choices, the computer will select one of them randomly. Then, the chosen lottery will be 'played' by the computer, and you will receive the corresponding payoff.