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Are Individual Care Investments Affected by Past Accident Experiences?

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Abstract: In this paper, we analyze the impact of past accident experiences on individual care choices. By relying on standard economic theory and evidence of behavioral economics and psychology, we posit that individuals' care investments should be affected by their past accidents as injurers or victims (accident-history effect hypothesis), or by their prior exposure to accident risks in the opposite role (role-reversal effect hypothesis). We test these two hypotheses using experimental data. We find that individuals' accident history has no statistically significant effect on their care investments, but that care decisions vary with changes in the parties' roles. Specifically, injurers with prior experience as victims invest statistically more in care than injurers without prior victim experience. By contrast, care investments are not sensitive to victims' prior experience as injurers. Our research can be regarded as a preliminary study toward the understanding of the role of past accident experiences on individuals' care behavior, and calls for both replication efforts and reconsideration of traditional economic models of torts.

Keywords: care investments; accident history; role reversal; tort theory; experiment

JEL Classification: K13; C91

1 Introduction

Do individuals' past accident experiences influence their precautionary behavior? While standard tort theory would provide a qualified 'no' as an answer to this question, the empirical understanding of individual behavior in accident

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situations is still too scant to support the theoretical prediction. This crucial knowledge gap can be partly attributed to the methodological obstacles faced in gathering observational data on individuals' precautionary behavior, and to the (thus far) limited experimental legal research on this matter (Guerra 2021; van Velthoven 2009). Indeed, to date only a few experiments have been conducted, with the common, ultimate objective of testing the predictive power of tort models (for reviews: Arlen and Talley 2008; Eisenberg and Engel 2016; Guerra 2021; Sullivan and Holt 2017). Most of these contributions compared individuals' care incentives under different liability rules (Angelova et al. 2014; Deffains et al. 2019; Ghosh and Kundu 2013; Jacob, Lambert, and Garcia 2022; Kornhauser and Schotter 1990, 1992; Wittman et al. 1997). Differently, Guerra and Parisi (2022) analyzed whether individuals' care investments are affected by the role they played in an accident, as either injurers or victims, under symmetric financial incentives. These experiments generally corroborate theoretical predictions.

Several important questions remain unanswered in the empirical literature. Our research focuses on the effect of individuals' past accident experiences on care investments. More specifically, we ask two questions: (1) whether individuals who caused or suffered an accident in the past are likely to change their care investments in subsequent accident situations; (2) whether subjects who have been previously exposed to accident risks as injurers or victims behave differently when they subsequently face an accident risk in the opposite role. Finally, we investigate how long the memory imprint of a past accident experience lasts and continues to affect individuals' care decisions.

We chose this specific line of questions for the following interrelated reasons. Individuals are rarely undertaking care decisions in a vacuum, insulated from their accident history – as standard tort models rather assume. Human behavior is to a large extent driven by past experiences, and it would be important to understand if this holds also for precautionary behavior in accident contexts.

In addressing this question, we seek to respond to a reiterated, but thus far mostly ignored, research call for the inclusion of more aspects of reality into the standard tort models (Guerra 2021; Guerra and Hlobil 2018; Guerra and Parisi 2022). Tort models generally depict individual choices in a "static," i.e., a one-period, model abstracting away from any behavioral dynamics through time. However, in the real world, accident risks are repeatedly faced over time. Indeed, direct exposure to different types of risk has been shown to affect individuals' perceptions and subsequent behaviors in a wide range of settings, from natural events, such as floods, to man-made events, such as terrorist attacks (see, e.g., Kollmann et al. 2022; Rickard 2014). Strong reactions to adverse experiences, such as road traffic accidents or health shocks, are reported in studies using observational data (e.g., Mayou, Simkin, and Threlfall 1991; Sundmacher 2012).

More generally, other contributions showed that past experiences and decisions may spill-over to current decision-making. For example, among others, Alm (2019) reviews some tax-evasion experiments showing that individuals respond to an audit with an immediate reduction in compliance. Kamm, Koch, and Nikiforakis (2021) find that individuals' tax compliance can be influenced not only by current incentives, but also by past institutions and policies. Specifically, they observe low compliance in good-quality institutions when there is a history of evasion, but high compliance when there is no such history. This suggests that "history should not be ignored as it is in traditional models of compliance" (p. 1), because it can affect law-abiding behavior.

Moreover, experimental research on bargaining games (Brosig, Weimann, and Yang 2003; Holt and Sieberg 2022), ultimatum games (Costa-Gomes et al. 2019), trust games (Burks, Carpenter, and Verhoogen 2003), dictator games (Diekmann 2004), redistribution and public goods games (Buso et al. 2021; Cassar and Klein 2019; Lange, Schmitz, and Schwirplies 2022) documents that experiencing the other players' position, i.e., role-reversal, may affect outcomes and behavior through time, increasing trust, cooperation, and pro-social choices.[1] For example, among others, Burks, Carpenter, and Verhoogen (2003) compare a single-role versus role switching trust game, and find that trust and reciprocity are both affected by a switch in the parties' roles, and Costa-Gomes et al. (2019) compare the strategy method and sequential strategies in an ultimatum game, and find that in a sequential game, participants are significantly more likely to treat others how they would like to be treated. Most recently, Solomon (2022) analyzes how role-switching between a plaintiff and a defendant affects learning in a signaling game of pretrial bargaining, and finds that switching roles facilitate learning by allowing individuals to become more familiar with the role of their opponent.

Yet, the results of the experimental evidence are mixed. For example, Chai, Dorj, and Sherstyuk (2018) and Dorj, Sherstyuk, and Chai (2011) find no significant role-reversal effects in altruism and reciprocal behavior. Charness and Rabin (2002) use role reversal to increase observations, explicitly claiming that role reversal would not affect individuals' behavior. But this claim was later challenged by Weimann and Reichmann (2003), which find that in the presence of role reversal, subjects choose their strategies as if they were playing one large game instead of two small independent games.

Overall, the idea that experiencing "the other side" and "walking in someone else's shoes" may change the perspective and lead to different actions, seems to be

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1 Other contributions using role reversal include Kahneman, Knetsch, and Thaler (1986), Bolton, Brandts, and Ockenfels (2005), and Chai, Dorj, and Sherstyuk (2018), but they do not specifically explore the effects of role reversal.

a deeply rooted belief within societies (Lange, Schmitz, and Schwirplies 2022), and there is some evidence that switching roles can have significant effects on subject behavior. However, as the evidence is mixed and still too scant, the role-reversal effect is far from being a decided issue, and, to our knowledge, it has never been explored in an accident setting. Our key contribution is to add evidence to the limited investigations on the topic of role switching, analyzing this latter's effects on individuals' care decisions.

To analyze whether and to what extent care investments are affected by individuals' accident history and reversal in their role of injurers or victims, we test two behavioral hypotheses: (1) accident-history effect hypothesis – under which individual care investments are affected by own past accidents; and (2) role-reversal effect hypothesis – under which individual care investments are affected by experience in the opposite role of injurers or victims.[2] We contrast these hypotheses with the alternative hypotheses grounded on standard tort theory which rather predicts no effects (Brown 1973; Shavell 1980, 1987).

To this aim, we use the experimental data of Guerra and Parisi (2022), who collected individual-level information from 200 subjects (undergraduate students) at the University of Valencia in Spain. The experimental design reproduces all the assumptions of the theory that we seek to test here. Concisely (more details in Section 3), individuals were randomly assigned to the role of injurer or victim, matched in pairs, and asked to invest in a range of alternative levels of care to avoid an accident in 20 identical and independent periods. Importantly, after the first 10 periods, individuals initially assigned to the role of injurers under a strict liability regime switched role and started acting as prospective victims under a no liability regime, and vice-versa, while keeping the same financial incentives.

Our analysis brings to light the following results: (1) in contrast with the accident-history effect hypothesis (and in line with standard economic theory), care investments were not statistically affected by accidents that occurred in previous periods under the same role; and (2) in line with the role-reversal effect hypothesis (and in contrast with standard economic theory), care investments were affected by some changes in the parties' roles. Specifically, injurers were sensitive to their prior experience in the role of victims (they invested statistically more in care than injurers who did not have a prior victim experience), while victims were not sensitive to their prior experience as injurers.

2 We adopt the concept of role-reversibility previously used by Fuller (1969, p. 24) and Fon and Parisi (2008), with the main difference that here, players engage in actions not knowing that in future time periods they may hold a reversal of roles with other players. The status quo is known to each agent at the time of the action, but the actual role in a future time period is not known (whereas in Fon and Parisi 2008, it is known on a probabilistic basis).

This paper is organized as follows. In Section 2, we state our hypotheses, briefly articulating their theoretical foundations. In Section 3, we describe the experiment. In Section 4, we report the results, which we discuss in Section 5. In Section 6, we conclude by highlighting some limitations of our analysis and suggesting ideas for future research. Appendix A contains additional tables; Appendix B reports the experiment instructions for participants (English translation).

2 Predictions

The experimental design reproduces the standard theoretical framing of a unilateral-care accident scenario, i.e., a situation where only one party – the injurer (he) or the victim (she) – can take care to prevent the accident (Landes and Posner 1987; Shavell 1987). In this unilateral-care scenario, tort theory posits that strict liability regimes create socially optimal care incentives for injurers (see, e.g., Miceli 1997). The reason for such incentive alignment is that, through strict liability, the injurer fully internalizes the externality (i.e., the accident loss) created by his activity and is therefore induced to invest in optimal care levels to reduce the risk of such loss (i.e., his expected liability).[3] Likewise, in a no liability regime, the victim fully internalizes the risk of uncompensated accident loss and is therefore incentivized to invest in optimal care to reduce her exposure to such risk. In both cases, the optimality condition is obtained where the marginal cost of care equals the marginal reduction in expected accident loss.[4]

Following the standard framing of tort models, in our experiment, accident events are independent of one another, and individuals' prior accident experiences

3 According to the standard framing of law and economics, an accident loss is an externality, i.e., a cost imposed by the injurer on a third party (the victim) outside of a voluntary market transaction (Landes and Posner 1987; Shavell 1987). It is worth noting that in the experiment liability is imposed without anyone having to incur litigation costs to trigger strict liability. If litigation costs were included, as a theoretical matter the full internalization result would not hold under strict liability (Hylton 1990); as a practical matter, litigation costs may preclude some victims from suing injurers to obtain compensation. Presumably, that would be reflected in lower investments in care by the injurers. Note also that under strict liability, we assume that the passive victims are always compensated; if, however, barriers to litigation were taken into account, some passive victims would not be compensated. These aspects might be worth considering in future experiments.

4 This optimality condition can be found in all textbooks of law and economics (see, e.g., Cooter and Ulen 1997). It is the same condition used by courts to the determine the socially optimal standard of due care under the so-called marginal Learned Hand formula (a restatement of the formula written by Judge Learned Hand in the case *United States v. Carroll Towing*, 159 F.2d. 169 (2d. Cir. 1947)), which defines the notion of negligence in marginal terms, setting the boundary between negligence and diligence where the marginal costs of care equals the marginal benefits (i.e., the marginal reduction in expected accident loss).

– in the role of injurer or victim – do not affect the optimal choice of care investments. Accident losses that occurred in past periods can therefore be equated to sunk costs, i.e., non-recoverable costs incurred in the past.[5]

Our behavioral hypothesis is that individuals do not undertake care decisions in a vacuum, insulated from their accident history – as standard tort models rather assume. Even in situations with uncorrelated events, human behavior is to a large extent driven by past experiences. We posit that this trait of human behavior holds true also for precautionary behavior in accident contexts.

H1: Accident-History Effect Hypothesis. Individuals' care investments – in the role of either injurers or victims – are influenced by past experiences and by accidents that occurred to them in previous periods under the same role.

The alternative hypothesis is no accident-history effect, as the economic theory predicts: rational, risk-neutral individuals make the same care investment, regardless of the accidents that may have occurred to them in previous periods.

A similar set of hypotheses can be formulated for the effect of past experiences in different roles – i.e., when potential injurers had previously been exposed to accident risks as victims, and vice-versa. Our behavioral hypothesis is that individuals carry with them habits of behavior that they followed in the past. Contrary to what standard tort models assume, we expect that habits outlive changes in the surrounding environments. Even in situations where the surrounding environment changes, humans follow patterns of behavior that they adopted in the past and this trait of human behavior holds also for the precautions undertaken in accident contexts.

H2: Role-Reversal Effect Hypothesis. Individuals' prior experiences in the role of injurers or victims affect their care investments when their roles are reversed.

The alternative hypothesis is no role-reversal effect, as the economic theory predicts: since injurers under strict liability and victims under no liability face the same financial incentives, their respective computation of the optimal care investments should not be affected by switches in the role played in the accident.

3 The Experiment

Let us begin with a simplified overview of our experimental design (more details in the next section). There is one active player (Player A) and one passive player (Player

5 One of the basic principles of economics is that sunk costs are irrelevant for future investments (Frank and Bernanke 2006, p. 10; Mankiw 2004, p. 297).

B) in randomly composed groups of two. The game is repeated 20 times, and roles are fixed, but group members are reshuffled in every period. Active players engage in an activity that may have a negative effect (i.e., causing an accident) on passive participants. Active participants are asked to decide whether to pay for costly precautions to reduce the risk of an accident with their matched passive player. The cost of precautions is nonlinear. Individually optimal precautions reduce the risk of accidents but do not completely remove it. Passive players only suffer financial loss, and cannot take any action to avoid the accident.

Active players play the game under two symmetrical liability regimes – namely, strict liability and no liability – which are enforced with certainty and constitute our experimental treatments. If an accident occurs under a strict liability regime, the passive player (the victim) would suffer the initial loss, but the active players (the injurer) would fully be fully liable for the damage caused to the victim. We refer to the treatment where injurers act under strict liability as ISL regime. Instead, if an accident occurred under a no liability regime, the loss would fall upon the active player (the victim) and no liability would accrue for the injurer. We refer to the treatment where victims act under no liability as the VNL regime. What is important here is that the expected payoffs of the active players in the two treatments are identical: in the event of an accident, the active player would always face the full accident loss either under the form of liability toward the passive player (under the ISL regime) or under the form of uncompensated loss to himself/herself (under the VNL regime).

In two out of four experimental sessions, active players played as injurers under strict liability in the first stage (first 10 periods) and as victims under no liability in the second stage (last 10 periods). In the other two experimental sessions, the treatment order was reversed: active players began playing as victims under no liability in the first stage and as acted as injurers under strict liability in the second stage.

In the following, we describe the experimental design in greater detail, along with the procedures that have been more extensively discussed in Guerra and Parisi (2022). We refer to them for additional details that are not directly relevant to the present experimental findings.

3.1 Design

The experiment consists of a within-subject design with two treatments: injurers under strict liability (ISL) and victims under no liability (VNL), which we describe in more detail later.

The "Accident Game" comprised two stages, with one treatment in each stage. Each stage comprised 10 independent and identical periods (subjects' earnings in one period were not affected by their investments and earnings in the other periods).

At the beginning of the experiment, half of the participants were randomly assigned the role of Player A (the active player), and the other half were assigned the role of Player B (the passive player). The roles remained fixed throughout the study. At the beginning of the first period, the computer randomly matched one Player A and one Player B to form two-member groups. In each of the following periods, each player was randomly re-matched with another player of the reversed role.

At the beginning of each period, each player received an initial endowment of 140 tokens (1 token = € 0.01). In each period, the active Players A were asked to decide how much to invest in precaution to avoid an accident with their matched Player B. Each additional unit of precaution yielded a constant marginal benefit, by reducing the probability of an accident by 10 %, and entailed an increasing marginal cost (see the next section for more details). Players B remained passive throughout the entire study, i.e. could not take any action to avoid an accident. At the end of each period, participants learned whether an accident happened or not, their period payoff, and their matched player's period payoff. We use the information about past accidents to analyze its effects on Player A's care choices.

In two out of four experimental sessions, those assigned the role of Player A played as injurers under strict liability in the first stage (ISL in the first 10 periods), and as victims under no liability in the second stage (VNL in the last 10 periods). The treatment order was reversed in the other two experimental sessions: Players A played as victim under the VNL treatment in the first stage and as injurer under the ISL treatment in the second stage. We use this repeated setup with a restart (Angelova et al. 2014) to analyze whether care decisions of subjects with experience in the reversed role (i.e., injurers with experience as victims, and vice versa) differed from those of subjects who did not have that experience.

Regarding the treatments, if an accident occurred under strict liability, the passive Player B would suffer the initial loss, but the active Player A would fully compensate her for the damage suffered. Instead, if an accident occurred under no liability, the loss would fall upon the active Player A and he/she would not receive any compensation. The expected payoffs of both players in the two treatments are thus identical. Importantly, in the event of an accident, the active Player A would always face the full accident loss either as liability toward the passive Player B (ISL treatment) or as an uncompensated loss to himself/herself (VNL treatment).

3.2 Parameters

In each treatment, the active Players A were asked to decide the investment in care, z, that they wanted to undertake in a range from 0 to 6 care units. The probability of an accident was given by $p(z) = 0.85 - 0.10z$, where $z \in [0, 6]$. Each additional unit of care reduced the probability of an accident by 10 %, whereby the probability of a loss thus ranged between 25 % and 85 %. The cost of care was given by $c(z) = 4z + z^2$, with $z \in [0, 6]$. The cost of care thus ranged from 0 to 60. If an accident occurred, the monetary loss L was 80.

The active Player A's expected earnings were computed as $140 - c(z) - p(z)L$; i.e., the initial endowment minus care costs, minus expected accident loss. Player A's optimal investment in care is $z = 2$ (equivalent to a 12 tokens investment in care). The passive Player B's earnings were always equal to 140 tokens: under the ISL treatment, they received full compensation from Player A, and under the VNL treatment, they never had to pay compensation to Player A. See Table A1, which summarizes the parameter of the experiment.

3.3 Procedures

The experiment was conducted in 2017–2018 at the Laboratory for Research in Experimental and Behavioral Economics (LINEEX) of the University of Valencia. It was computerized using zTree (Fischbacher 2007). Participants were recruited via the LINEEX lab participant database.

Data were collected in four experimental sessions, each with 50 participants (25 Players A and 25 Players B), for a total of 200 Spanish participants. The data relevant to the analysis are those related to the 100 active Players A. The other 100 Players B were present in the lab and paid, but they remained passive.

Regarding sample descriptives, 51.00 % of the active Players A were male, on average they were 20 years old (age range of 18–30 years), and they were undergraduate students from different majors, mainly Economics (24.00 %).[6]

4 Results

Tables A2 and A3 in Appendix A report the summary statistics of Player A's care investments, both with observations split by treatment, and pooled across treatments. The statistics show that individual care investments were statistically higher than the efficient care investment of 12 tokens (i.e., the level of care that would be chosen by rational, risk-neutral individuals).[7] This is consistent with the findings

6 For further discussion, we refer the reader to the concluding remarks and to Guerra and Parisi (2022), Section 3.2 Procedure, for more details about the experimental procedure and power analysis.

7 To observe this, we conduct a set of Wilcoxon signed-rank tests and report the p values in column (3) of Table A3. The statistics reveal that in each period of the ISL treatment, the average care

of the previous literature – which mostly explain the observed differences through the lens of risk aversion (Guerra et al. 2023; Guerra and Parisi 2022).[8]

4.1 Are Individual Care Investments Affected by Past Accidents?

In this section, we test the accident history effect hypothesis (H1) – i.e., if the actual involvement in accidents in previous periods influenced the current care investments. To analyze reactions to past accidents, we conduct a set of ordered logit regressions with random effects, with standard errors clustered at the individual level.[9] The results are reported in Table 1. The dependent variable is *Care Investment* by Players A. The key independent variables are *Accident t-1* and *Accident t-2*, each of which is a dummy variable equal to 1 if an accident occurred at *t-1* or *t-2*, respectively, and equal to 0 otherwise.[10]

The regression estimates do not support H1: as shown in columns 1 and 4, in both the first and second stages, the coefficients of *Accident t-1* and *Accident t-2* are

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investments were statistically higher than the investment that would be chosen under rationality and risk-neutrality at the 5 % or lower significance level, except for the last periods of each stage, i.e., in periods 6, 7, 8, 9, and 10 (of the first stage) – when injurers had no previous experience as victims – and in periods 17, 18, 19, and 20 (of the second stage), when injurers had previous experience as victims. Instead, in the VNL treatment, no statistically significant differences (at the 5 % or lower level) could be detected in a higher number of periods, i.e., in periods 1, 3, 4, 5, 6, 7, 9, and 10 (of the first stage) – when victims had no previous experience as injurers – and in periods 12, 13, 14, 16, 17, and 19 (of the second stage), when victims had previous experience as injurers. Next, we compute the proportions of subjects choosing the efficient care level, for each period (Table A3, $\hat{p}_{\mathrm{ISL}}$ in column 1 and $\hat{p}_{\mathrm{VNL}}$ in column 2 for ISL and VNL treatments, respectively), and we test whether those proportions differ between treatments. For this purpose, we conduct a set of Wilcoxon rank-sum tests and report the results in column (4) of Table A3. The results reveal (i) low proportions of subjects choosing the care level expected from rational risk-neutral individuals (on average across periods, $\hat{p}_{\mathrm{ISL}} = 0.149$ and $\hat{p}_{\mathrm{VNL}} = 0.165$), and (ii) no statistically significant differences between treatments (p value $= 0.325$).

8 Different rationales may explain over-spending in care, including individual risk aversion, problems in computational tasks, and biased weighting of probabilities. Most of the designs in the literature are not suited to identify the specific factor(s) that drive the observed non-equilibrium behavior. In all studies, the efficient care investment is computed for risk-neutral individuals. However, human subjects are likely risk averse. Care reduces the risk of accidents, and the "excessive" amount spent on care can be analogized to the "unfair" insurance premiums that risk-averse individuals are willing to pay to reduce risk exposure.

9 Our non-linear statistical models rely on two-way and three-way interaction terms, and, as it is well-known, the interaction terms do not have a direct interpretation, and standard errors cannot be used to calculate p-values (Ai and Norton 2003). To address this concern, we estimated linear models; results are robust to this alternative specification.

10 One might argue that we are estimating dynamic panels, as the probability of an accident is a function of the participant's past investment in precautions, and should then have to account for the resulting endogeneity. This is not the case here: we are treating the data as a static panel.

Table 1: Effect of past accidents.

DV: care investment	(1)	(2)	(3)	(4)	(5)	(6)
Victim	−0.082	−0.090	−0.072	−0.032	−0.093	−0.071
	(0.125)	(0.149)	(0.338)	(0.127)	(0.162)	(0.363)
Accident t-1	0.082	0.075	0.248	0.068	0.080	0.271^{+}
	(0.077)	(0.115)	(0.155)	(0.076)	(0.115)	(0.158)
Victim × Accident t-1		0.013	−0.007		−0.027	−0.110
		(0.170)	(0.240)		(0.178)	(0.260)
Second Stage			0.333			0.521
			(0.341)			(0.345)
Victim × Second Stage			−0.051			−0.066
			(0.650)			(0.659)
Accident t-1 × Second Stage			−0.347			−0.382+
			(0.222)			(0.222)
Victim × Accident t-1 × Second Stage			0.059			0.179
			(0.309)			(0.310)
Accident t-2				−0.038	−0.102	0.062
				(0.089)	(0.121)	(0.162)
Victim × Accident t-2					0.128	0.157
					(0.161)	(0.241)
Accident t-2 × Second Stage						−0.307
						(0.235)
Victim × Accident t-2 × Second Stage						−0.053
						(0.348)
σ^2	2.326^{***}	2.326^{***}	2.331^{***}	2.195^{***}	2.190^{***}	2.201^{***}
	(0.484)	(0.484)	(0.485)	(0.464)	(0.464)	(0.469)
Loglik	−3190.284	−3190.282	−3187.623	−3045.270	−3045.009	−3040.842
$\chi^2(1)$	1.443	1.461	7.250	0.941	2.154	14.477
Prob $> \chi^2$	0.486	0.691	0.403	0.815	0.827	0.208
N	1900	1900	1900	1800	1800	1800
N clusters	100	100	100	100	100	100

Notes: The dependent variable (DV) represents care investment by Players A, and it can take seven values, i.e., 0, 5, 12, 21, 32, 45, or 60. The independent variables are: *Victim*, equal to 1 for the Victim No Liability treatment and 0 for the Injurer Strict Liability treatment; *Accident t-1* and *Accident t-2*, each of which is a dummy variable equal to 1 if an accident occurred in period *t-1* or *t-2*, respectively, and equal to 0 otherwise; and *Second Stage*, equal to 1 for the second stage, and 0 for the first stage. Parameter estimations are from random-effects panel ordered logistic models, with robust standard errors clustered at the individual level in parentheses. $^{+}p < 0.10$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.01$.

not statistically significant. To test whether injurers and victims reacted differently to past accidents, in columns 2 and 5 we include the interactions *Victim* × *Accident t-1* and *Victim* × *Accident t-2*. The estimates show that the coefficients of those interactions are not statistically significant.[11] To test for possible differences between stages, in columns 3 and 6 we interact the *Second Stage* variable with the other key independent variables. Even the coefficients of those interactions are not statistically significant. Similar (null) results hold even if analyzing the effect of *strings*, i.e., if an accident *consecutively* occurred in the last two rounds (Table 2).

Table 2: Effect of strings.

DV: care investment	**(1)**	**(2)**	**(3)**	**(4)**
String 1	0.028	0.028	−0.077	−0.075
	(0.087)	(0.087)	(0.131)	(0.132)
Victim		−0.073	−0.142	−0.146
		(0.124)	(0.121)	(0.118)
Victim × *String 1*			0.209	0.366^{+}
			(0.171)	(0.207)
Second Stage				0.154
				(0.124)
Victim × *String 1* × *Second Stage*				−0.308
				(0.220)
σ^2	2.276^{***}	2.281^{***}	2.283^{***}	2.296^{***}
	(0.480)	(0.480)	(0.480)	(0.484)
Loglik	−3352.514	−3352.116	−3351.404	−3349.852
$\chi^2(1)$	0.106	0.417	2.561	6.139
Prob $> \chi^2$	0.745	0.812	0.464	0.293
N	2000	2000	2000	2000
N clusters	100	100	100	100

Notes: The dependent variable is *Care Investment* by Players A. The key independent variable is *String*, which is equal to 1 if an accident consecutively occurred in the last two periods, otherwise 0. Column 2 adds the dummy variable *Victim* (equal to 1 for the Victim No Liability treatment and 0 for the Injurer Strict Liability treatment), and Column 3 adds its interaction with *String*. Column 4 adds interactions with the variable *Second Stage* (equal to 1 for the Second Stage, and 0 for the First Stage). Parameter estimations are from random-effects panel ordered logistic models, with robust standard errors clustered at the individual level in parentheses. $^{+}p < 0.10$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.01$.

11 This finding further supports the symmetric behavior hypothesis of injurers and victims proposed by Guerra and Parisi (2022), in the sense that they were both unresponsive to accidents occurring in previous periods.

This result – which rejects H1 – can be summarized as follows:

Result 1: No Reaction to Past Accidents. The care investments of injurers and victims are not affected by accidents that occurred to them in previous periods.

4.2 Do Individual Care Investments Change When Roles Are Reversed?

Let us now analyze whether individual care investments were affected by prior experiences in the reversed role. Given that accident events were independent of one another, economic theory would predict no role-reversal effect on care investments, with a resulting rejection of H2. In our experiment, this is confirmed only when injurers started investing in care as prospective victims, but not in the inverse case.

In addition to the summary statistics reported in Tables A2 and A3 in Appendix A, these different behavioral patterns are also revealed in Figure 1, which

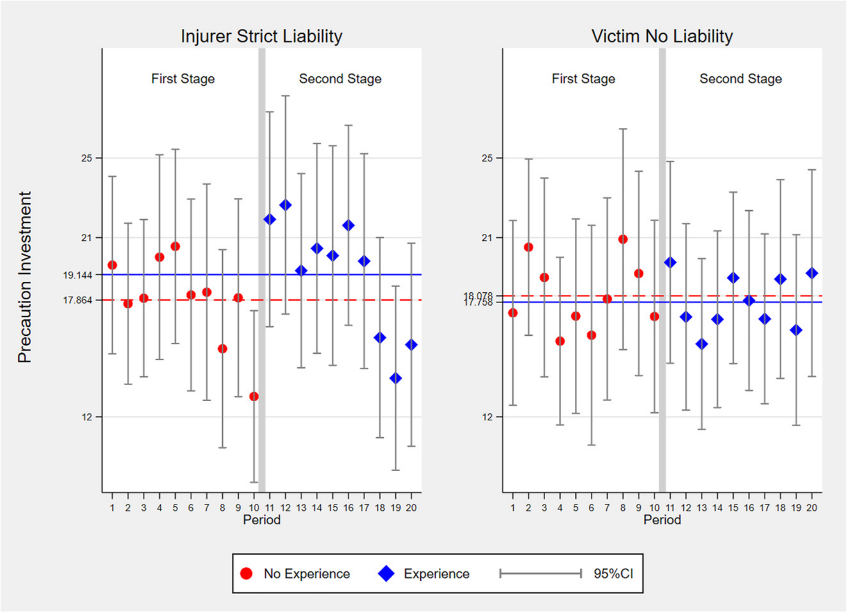

Figure 1: Care investments across periods. **Note**: Periods 1–10 refer to the first stage when subjects did not have any prior experience in the opposite scenario (solid lines "no experience"), and periods 11–20 refer to the second stage when subjects had prior experience in the opposite scenario (dashed lines "experience").

plots the average care investments along the 20 periods by treatment (the Injurer Strict Liability treatment on the left-hand graph, and the Victim No Liability treatment on the right-hand graph). In each graph, periods 1–10 refer to the first stage – when subjects did not have any prior experience in the opposite role (circle symbols) – and periods 11–20 refer to the second stage, after the role-reversal (rhombus symbols). To gain a sense of the variation in average care investments, the graphs also report 95 % confidence interval bars for each period.

By looking at the last periods of the first stage and the first periods of the second stage, it appears that injurers under strict liability who had previous experience as victims under no liability invested more in care than injurers under strict liability without such prior experience. This effect – which we refer to as the prior victim experience – seems to vanish after the first few periods of the second stage. On the contrary, victims did not seem to be sensitive to previous experience as injurers under strict liability.

To formally test H2, we conduct regression analyses. Table 3 shows the estimates from random-effect panel ordered logit regressions, with robust standard errors clustered at the individual level. The dependent variable is *Care Investment* by Players A. The independent variables are: *Second Stage*, a dummy variable equal to 1 if subjects were playing in the second stage, or equal to 0 if subjects were playing in the first stage; *Period*, which ranges between 1 and 20; the variable *Victim*, a dummy variable equal to 1 for the VNL treatment, and 0 for the ISL treatment; the interaction terms.

In column 1, observations are pooled across treatments. The estimates show that average care investments increased in the second stage at a decreasing rate. This is revealed by the coefficient of *Second Stage* – which is *positive* and significant at the 10 % level – and the coefficient of *Second Stage* × *Period*, which is *negative* and significant at the 10 % level.

In column 2, we add the *Victim* variable and its interactions with *Second Stage* and *Period* to capture differences in care investments through time between treatments. The results reveal that the increase in care investments in the second stage – as reported in column 1 – was driven by subjects who had prior experience as victims. This is shown by the coefficient of *Second Stage* – which in column 2 refers to the ISL treatment. The coefficient is positive and statistically significant at the 5 % level, whereas the coefficient of *Victim* × *Second Stage* is not statistically significant. The coefficient of *Second Stage* × *Period* – which refers to the ISL treatment – is negative and statistically significant at the 0.1 % level, whereas the coefficient of *Victim* × *Second Stage* × *Period* is positive but only weakly significant (at the 10 % level). Overall, this reveals the statistically significant effect of prior experience in the role of the victim on injurers' care investments (regardless of whether

Table 3: Effect of prior victim experience.

DV: care investment	(1)	(2)
Second Stage	0.841^{+}	1.576*
	(0.443)	(0.677)
Second Stage × *Period*	−0.048^{+}	−0.096***
	(0.028)	(0.037)
Victim		−0.067
		(0.311)
Victim × *Second Stage*		−1.471
		(1.062)
Victim × *Second Stage* × *Period*		0.095^{+}
		(0.055)
σ^2	2.272***	2.279***
	(0.478)	(0.479)
Loglik	−3348.933	−3345.755
$\chi^2(1)$	3.690	7.472
Prob $> \chi^2$	0.158	0.188
N	2000	2000
N clusters	100	100

Notes: The dependent variable (DV) represents care investment by Players A, and it can take seven values, i.e., 0, 5, 12, 21, 32, 45, or 60. The dependent variables are: *Second Stage*, equal to 1 for the second stage and 0 for the first stage; *Victim*, equal to 1 for the Victim No Liability treatment and 0 for the Injurer Strict Liability treatment; and *Period*, which represents the repeated rounds of the game and ranges between 1 and 20. Parameter estimations are from random-effects panel ordered logistic models, with robust standard errors clustered at the individual level in parentheses. $^{+}p < 0.10$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.01$.

an accident occurred while acting in such a role), with such an effect vanishing over time.[12]

This result – which partially supports H2 – can be summarized as follows:

Result 2: Effect of Prior Victim Experience. Injurers with prior experience as victims invest more in care than injurers without such experience. This effect vanishes over time. Victims' prior experience as injurers does not affect their care investments.

12 This effect is further confirmed by the fact that injurers exhibited stronger variance in their care investments – compared to victims – only in the second stage, i.e., when they had prior experience as victims (18.270 for injurers vs 16.320 for victims; two-sample variance-comparison test p value = 0.012; Levene's robust test statistic p value = 0.042). Instead, no significant differences in variance are detected between treatments in the first stage (16.528 for injurers vs 17.333 for victims; Two-sample variance-comparison test p value = 0.340; Levene's robust test statistic p value = 0.778).

5 Discussion

This paper analyzes the impact of past accident experiences on individual care choices. In contrast with our behavioral hypothesis H1, we find that individuals' care investments were not statistically affected by their accident history. This finding is at odds with the other observational literature on the effects of history on legal compliance (Mayou, Simkin, and Threlfall 1991; Sundmacher 2012) and tax compliance (Alm 2019; Kamm, Koch, and Nikiforakis 2021), and supports the findings of Angelova et al. (2014), which, in line with standard economic theory, found no significant effects of past accidents on tort behavior. Instead, partially in line with our behavioral hypothesis H2, we find that individual care investments had varying reactions to changes in the parties' roles.

While our experimental design and findings do not allow us to identify the specific reasons underlying individual care choices, we can provide possible interpretations by comparing our results to the broadly defined law and economics literature. When looking at behavioral changes over time, our findings reveal that victims' and injurers' care investments changed differently across periods, even if each accident event was completely independent of the others and past accident occurrences did not influence the probability of future accidents. Injurers' precautionary behavior was positively affected by their experience in the role of victims: injurers with prior accident experience as victims invested statistically more in care compared to injurers who did not have that experience, regardless of whether any accident occurred while they were acting in such role.[13] This effect might be due to the fact that as a victim the subjects can learn more about the experience of a non-compensable accident or be better apprised of how victims live through an accident loss. In other words, the fact that the probability of the events is independent of each other would still allow learning something from a prior accident and would not eliminate reasons why experience as a victim could matter. This explanation is consistent with the corollary result of our experiment, in which prospective victims' care investments were not statistically influenced by their experience as injurers, but instead, rapidly adjusted to the new reality that subjects faced in the role of victims. The observed one-sided effect of changes in roles suggests that there may be something salient in what individuals experience when facing an accident situation as victims. Although the experiment involves purely financial losses that are

13 This may be related to the so-called "restart effect" in public goods experiments, where contributions that had decreased over a pre-announced number of rounds jumped back up when the game was unexpectedly restarted (Andreoni 1988; Andreoni and Croson 2008). However, in our case the restart effect is only present in one treatment, and it is disappearing over time (as in, e.g., Brandts, Rott, and Solà 2016; Fréchette and Yuksel 2017).

fully and immediately compensated under the strict liability regime, injurers with experience as victims may become more empathetic to their prospective victims, and willing to invest more in care to reduce the probability of an accident.[14]

While our data do not allow us to identify the mechanisms underlying the prior victim experience effect, our result 2 stands in line with findings from other strands of literature. In legal theory, Fuller (1969, p. 24) suggested that individuals who operate in situations of role-reversibility are inclined to adopt standards of behavior that account for the well-being of the other party in a relationship.[15] Similarly, Fon and Parisi (2008) observed that role-reversibility transforms relationships with asymmetric interests into stochastically symmetrical relationships, fostering higher levels of cooperation and greater attentiveness to the interest of the other party. Research in criminal law and criminology suggests that prior victim experience may result in fear-related behavioral changes, e.g., the acquisition and carrying of firearms (Garofalo 1981; Skogan 1987). Moreover, transportation research shows that competitive road cyclists undertake more prudent behaviors while driving a car compared to average cyclists (Martha and Delhomme 2009). As another example, individuals who experienced extreme weather events are shown to undergo a variation in their climate change beliefs and their willingness to contribute to climate protection (Dai et al. 2015). From a more practical perspective, raising awareness about the situation of others and giving people the opportunity to experience the situation of the opposite party is an often-promoted instrument to foster cooperation between different actors (Lange, Schmitz, and Schwirplies 2022).

Further research should investigate the reasons why the care investments of individuals with prior victim experience do not remain above the optimal level throughout the experiment, and instead converge toward the other group of injurers' care level over time. The reader might at first think that the vanishing effect could be evidence of learning – of a "mistake" that is worked out over time. But this explanation seems to be contradicted by the fact that the vanishing only occurs after individuals change roles from victims to injurers. If viewed as

14 The results suggest that the degree of perceived risk aversion fades over time for injurers who had previous experience as victims. An anonymous referee pointed out that a plausible explanation of this observation is that, once roles are reversed, subjects may mistakenly think that their own victims will be uncompensated, and therefore they may initially take more care. Then, after a few rounds, they would gradually realize that their victims are fully compensated. This would lead to a reduction of the perceived risk, and a reduction of their level of care.

15 Fuller (1969) observed that in a community of commercial traders it is easier to observe the emergence of mutually recognized rights and duties, eliminating the temptation to articulate one-sided rules: "Economic traders frequently exchange roles, now selling now buying. The duties that arise out of their exchanges are therefore reversible, not only in theory but in practice" (Fuller 1969: 24). In Fuller's view, the law merchant therefore illustrates a successful system of spontaneous and decentralized law.

a mistake, the victims' higher level of care observed in the other treatment should similarly arise as a mistake in later periods, notwithstanding their prior experience with accidents, in the role of injurers.

6 Conclusions

Experimental evidence teaches us something about how human actors behave in the real world. Of course, individuals' legally relevant choices are embedded in a wider context. Not so rarely, individuals face situations that are comparable to those that have occurred in the past, in which the decision-maker has made good or bad experiences. Our study represents a first step toward a more comprehensive exploration of the effects of past experiences on future decisions.

In the following, we clarify some limitations of our analysis due to the size and nature of our sample and some specific features of the experimental design, and discuss concerns about external validity and generalizability (Section 6.1). Our findings and the study's limitations call for replication efforts under different experimental conditions. We suggest different paths to explore in future research (Section 6.2).

6.1 Limitations

As is often the case in experimental economics, in our experiment we are faced with a double external validity issue: not only are we expecting people to respond in real-world accident scenarios the same way they did in the experiment, but we look at behavioral adjustments to an experimental accident occurred just a few minutes before and offer them as evidence that similar adjustments can occur, under similar circumstances but different time lags, in the real world. Further experimental and empirical research would be needed to validate these two important questions, to gather a better understanding of when we are likely to observe similar patterns of behavior in real-life accident situations.

Regarding generalizability, as for most experiments carried out in university labs, the subjects were selected from undergraduate students at the same university. While as experimentalists we are primarily interested in the internal validity of our study, the representativeness of the sample of subjects could be expanded to strengthen its external validity. Perhaps more importantly, future research should expand the size of the sample (and, funding permitting, the size of the endowments). Indeed, some might argue that our study is not sufficiently powered to detect statistically significant effects. We did not run a power analysis either before or after running the experiment, hence we cannot rule out this possibility. For this reason, we must exercise caution in generalizing our results, and we make a call for replication efforts to further substantiate, or eventually revise, the findings of the present study.

Given these possible concerns, our research can be regarded as a *preliminary* study toward the understanding of the effects of past experiences on individuals' behavior. As such, it provides several insights for future applied and experimental research on the role of past experiences, especially but not limited to accident contexts and individuals' care behaviors, as we discuss in the next section.

6.2 The Lookahead

Our research particularly calls for further behavioral research to explain what might motivate different care investments when individuals have experiences in reversed roles. Is the different behavior of injurers and victims due to different biases in perceptions of the loss? What is the salient element in the victim's accident experience that triggers different behavioral patterns? Furthermore, why do those different perceptions of the accident carry through after a role-reversal in one case and not in the other?

Tort models could also be extended to account for risk comparative judgments, which are a driver of behavior change in several theoretical models (Martha and Delhomme 2009), namely the need to consider individuals' prior experiences in reversed roles or different activities. From a practical perspective, this suggests the crucial role of some "vulnerable" activities, e.g., cycling, as a prevention policy to boost precautionary behaviors while carrying out other, relatively less vulnerable activities, e.g., driving a car.

Future studies should continue investigating individuals' reactions to adverse experiences under different compensation systems (e.g., incomplete compensation) and loss types (e.g., non-financial losses such as psychological costs). For example, whereas in our experiment the victims are immediately and fully compensated for *financial* losses in the ISL setting, in reality victims also incur uncompensated legal, emotional, and psychological cost to obtain any compensation.

Other extensions of our research should investigate the extent to which the observed patterns of care investments are also found in situations of bilateral care (where both injurers and victims can affect the probability of an accident), under different liability regimes, or when individuals can also undertake activity-level decisions. Do injurers and/or victims reduce their activity levels differently? And, are individuals' activity levels affected by past accident experiences? Similarly, it would be interesting to investigate if the observed departure from the no role-reversal effect hypothesis is observable for the individual's activity levels, i.e., do injurers who have had an experience as uncompensated victims reduce their activity levels more than injurers without that experience? Our contribution can hopefully serve as a springboard to address these questions, to improve our understanding of the role of past experiences on individuals' decision-making in but not restricted to risky contexts.

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Data availability: Data are available on reasonable request.

Appendix A: Additional Tables

Table A1: Parameters (Guerra and Parisi 2022).

Care level z	Care investment $c(z) = 4z + z^2$	Probability of accident $p(z) = 0.85 - 0.10z$	Expected earnings Player A $140 - c(z) - p(z)$	Earnings Player B
0	−0 tokens	85 % accident	60 tokens	140 tokens
		15 % no accident	140 tokens	140 tokens
1	−5 tokens	75 % accident	55 tokens	140 tokens
		25 % no accident	135 tokens	140 tokens
2	−12 tokens	65 % accident	48 tokens	140 tokens
		35 % no accident	128 tokens	140 tokens
3	−21 tokens	55 % accident	39 tokens	140 tokens
		45 % no accident	119 tokens	140 tokens
4	−32 tokens	45 % accident	28 tokens	140 tokens
		55 % no accident	108 tokens	140 tokens
5	−45 tokens	35 % accident	15 tokens	140 tokens
		65 % no accident	95 tokens	140 tokens
6	−60 tokens	25 % accident	0 tokens	140 tokens
		75 % no accident	80 tokens	140 tokens

Table A2: Summary statistics of care investments (Guerra and Parisi 2022).

Stage	Period	Injurer Strict Liability (*N* = 50 per period)						Victim No Liability (*N* = 50 per period)						Pooled sample (*N* = 100 per period)					
		$\bar{z}_{ISL}$	s_{ISL}	Min	Median	Max	*N*	$\bar{z}_{VNL}$	s_{VNL}	Min	Median	Max	*N*	$\bar{z}$	*s*	Min	Median	Max	*N*
First stage	1	19.620	15.671	0	21	60	50	17.220	16.332	0	12	60	50	18.420	15.970	0	16.5	60	100
	2	17.680	14.222	0	12	60	50	20.520	15.571	0	21	60	50	19.100	14.905	0	16.5	60	100
	3	17.960	13.902	0	16.5	45	50	19.000	17.578	0	12	60	50	18.480	15.775	0	12	60	100
	4	20.020	18.089	0	21	60	50	15.800	14.813	0	12	60	50	17.910	16.585	0	12	60	100
	5	20.560	17.164	0	21	60	50	17.060	17.184	0	12	60	50	18.810	17.177	0	12	60	100
	6	18.120	16.952	0	16.5	60	50	16.100	19.416	0	5	60	50	17.110	18.162	0	12	60	100
	7	18.260	19.110	0	12	60	50	17.920	17.866	0	12	60	50	18.090	18.405	0	12	60	100
	8	15.420	17.507	0	8.5	60	50	20.920	19.498	0	21	60	50	18.170	18.641	0	12	60	100
	9	17.980	17.486	0	12	60	50	19.200	18.061	0	12	60	50	18.590	17.697	0	12	60	100
	10	13.020	15.172	0	5	60	50	17.040	17.015	0	12	60	50	15.030	16.165	0	12	60	100
Average		17.864	16.528	0	14.550	58.5	500	18.078	17.333	0	13.100	60	500	17.971	16.948	0	12.900	60	1000
Second stage	11	21.920	18.984	0	21	60	50	19.760	17.834	0	21	60	50	20.840	18.357	0	21	60	100
	12	22.640	19.281	0	21	60	50	17.020	16.477	0	12	60	50	19.830	18.065	0	12	60	100
	13	19.340	17.167	0	21	60	50	15.660	15.087	0	12	60	50	17.5	16.185	0	12	60	100
	14	20.460	18.536	0	21	60	50	16.900	15.618	0	12	60	50	18.680	17.146	0	16.5	60	100
	15	20.100	19.404	0	21	60	50	18.980	15.144	0	21	60	50	19.540	17.325	0	21	60	100
	16	21.620	17.669	0	21	60	50	17.840	15.894	0	21	60	50	19.730	16.828	0	21	60	100
	17	19.820	18.987	0	16.5	60	50	16.920	15.015	0	16.5	60	50	18.370	17.093	0	16.5	60	100
	18	15.980	17.684	0	12	60	50	18.920	17.564	0	16.5	60	50	17.450	17.597	0	12	60	100
	19	13.940	16.269	0	5	60	50	16.360	16.852	0	12	60	50	15.150	16.524	0	12	60	100
	20	15.620	17.944	0	12	60	50	19.220	18.272	0	12	60	50	17.420	18.108	0	12	60	100

Table A2: (continued)

Stage	Period	Injurer Strict Liability ($N = 50$ per period)						Victim No Liability ($N = 50$ per period)						Pooled sample ($N = 100$ per period)					
		$\bar{z}_{\text{ISL}}$	s_{ISL}	Min	Median	Max	N	$\bar{z}_{\text{VNL}}$	s_{VNL}	Min	Median	Max	N	$\bar{z}$	s	Min	Median	Max	N
Average		19.144	18.193	0	17.150	60	500	17.758	16.376	0	15.600	60	500	18.451	17.323	0	15.600	60	1000
Total		18.504	17.454	0	12	60	1000	17.918	16.818	0	12	60	1000	18.211	17.137	0	12	60	2000

Notes: $\bar{z}$ and s represent the mean and standard deviation of Players' A care investments; specifically, $\bar{z}_{\text{ISL}}$ and $\bar{z}_{\text{VNL}}$ represent the mean of Players' A care investments in the Injurer Strict Liability (ISL) and Victim No Liability (VNL) treatments, respectively; s_{ISL} and s_{VNL} represent the standard deviation of Players' care investments in the ISL and VNL treatments, respectively.

Table A3: Actual versus efficient care investments.

Stage	Period	Injurer Strict Liability (ISL) ($N = 50$ per period)		Victim No Liability (VNL) ($N = 50$ per period)		Actual *versus* efficient investments		Injurers *versus* victims
						Wilcoxon signed-rank test *p* values		Wilcoxon rank-sum test *p* values
		(1)		(2)		(3)		(4)
		$\bar{z}_{ISL}$	$\hat{p}_{ISL}$	$\bar{z}_{VNL}$	$\hat{p}_{VNL}$	$H_0: \bar{z}_{ISL} = 12$	$H_0: \bar{z}_{VNL} = 12$	$H_0: \hat{p}_{ISL} = \hat{p}_{VNL}$
First stage	1	19.620	0.240	17.220	0.180	0.008^{**}	0.115	0.624
	2	17.680	0.260	20.520	0.220	0.025^{*}	0.002^{**}	0.815
	3	17.960	0.220	19.000	0.220	0.012^{*}	0.061^{+}	1.000
	4	20.020	0.120	15.800	0.200	0.017^{*}	0.307	0.414
	5	20.560	0.120	17.060	0.200	0.004^{**}	0.285	0.414
	6	18.120	0.120	16.100	0.080	0.056^{+}	0.715	0.740
	7	18.260	0.160	17.920	0.160	0.151	0.175	1.000
	8	15.420	0.140	20.920	0.140	0.673	0.014^{*}	1.000
	9	17.980	0.160	19.200	0.240	0.144	0.063^{+}	0.454
	10	13.020	0.080	17.040	0.160	0.911	0.215	0.356
	Average	17.864	0.162	18.078	0.180	0.000^{***}	0.000^{***}	0.449
Second stage	11	21.920	0.140	19.760	0.120	0.005^{**}	0.018^{*}	1.000
	12	22.640	0.200	17.020	0.200	0.003^{**}	0.173	1.000
	13	19.340	0.160	15.660	0.240	0.028^{*}	0.317	0.454
	14	20.460	0.140	16.900	0.140	0.015^{*}	0.076^{+}	1.000
	15	20.100	0.060	18.980	0.140	0.040^{*}	0.008^{*}	0.318
	16	21.620	0.100	17.840	0.140	0.004^{**}	0.075^{+}	0.759

Table A3: (continued)

Stage	Period	Injurer Strict Liability (ISL) ($N = 50$ per period)		Victim No Liability (VNL) ($N = 50$ per period)		Actual *versus* efficient investments		Injurers *versus* victims
						Wilcoxon signed-rank test *p* values		Wilcoxon rank-sum test *p* values
		(1)		(2)		(3)		(4)
		$\bar{z}_{ISL}$	$\hat{p}_{ISL}$	$\bar{z}_{VNL}$	$\hat{p}_{VNL}$	$H_0: \bar{z}_{ISL} = 12$	$H_0: \bar{z}_{VNL} = 12$	$H_0: \hat{p}_{ISL} = \hat{p}_{VNL}$
	17	19.820	0.160	16.920	0.120	0.064^{+}	0.061^{+}	0.774
	18	15.980	0.140	18.920	0.100	0.602	0.030^{*}	0.759
	19	13.940	0.100	16.360	0.160	0.830	0.329	0.554
	20	15.620	0.160	19.220	0.140	0.715	0.047^{*}	1.000
	Average	19.144	0.136	17.758	0.150	0.000^{***}	0.000^{***}	0.527
Total		18.504	0.149	17.918	0.165	0.000^{***}	0.000^{***}	0.325

Notes: $\bar{z}_{ISL}$ and $\bar{z}_{VNL}$ represent the mean of care investments in the Injurer Strict Liability (ISL) and Victim No Liability (VNL) treatments, respectively. $\hat{p}_{ISL}$ and $\hat{p}_{VNL}$ represent the proportion of subjects choosing the efficient care level in the ISL and VNL treatments, respectively. $^{+}p < 0.10$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.01$.

Appendix B: Experimental Instructions

This Appendix contains the full instructions to participants translated in English (Section B1),[16] and screenshots of some parts of the instructions as they appeared on subjects' computer screens (Section B2).

B1. Instructions to Participants (Translated in English)

This section includes the instructions to participants with the treatment "injurer under strict liability" in Stage 1 and "victim no liability" in Stage 2. In two out of four experimental sessions, the order of these treatments was reversed, but the instructions remained otherwise identical.

General Information

This is a study in the economics of decision making. You will receive €5 for your participation. The instructions are simple. If you follow them closely and make appropriate decisions, you can earn an additional amount of money.

It is very important that, until the end of the study, you remain silent and do not look at the other participants. If you have any questions or need assistance of any kind, please raise your hand and an experimenter will come to you. If you talk, laugh, exclaim out loud, etc., you will be asked to leave and you will not receive any payment. We expect and appreciate your cooperation.

During today's study, your decisions and earnings will be recorded in tokens. At the end of today's session, you will be paid in private and the payment will be made in cash. Tokens earned from both parts of the study will be converted to Euros at a rate of 1 token to 1 cent (€ 0.01).

Part 1: Overview

This first part of the study consists of 2 stages of 10 periods each. At the end of the study, the computer will randomly select 2 of the overall 10 periods – 1 period from the first stage and 1 period from the second stage – for actual payment. The sum of your earnings in the selected 2 periods will constitute your earnings for the first part of the study. You will not know in advance which period will be selected to determine the actual payment. Each period has an equal probability of being selected for your earnings.

At the beginning of the study, half of the participants will be randomly and anonymously assigned the role of PLAYER A, and the other half to the role of PLAYER B. Your role will remain the same in both stages.

16 The instructions in original language (Spanish) are available upon request.

At the beginning of the first period, each player will be randomly and anonymously matched with a player with a different role. In each of the following periods, each player will be randomly and anonymously matched with another player with a different role.

For example, if you have been assigned the role of PLAYER A, at the beginning of the first period you will be randomly matched with a PLAYER B. In each of the following periods, you will be randomly matched with another, different PLAYER B.

During the study, you will never know the identity of the players you are randomly matched with. In sum, matching is random and anonymous. Please press "Continue" to see the role you have been assigned.

Roles

Not read aloud – Only written on computer screens
Only on the screen of PLAYER A –

You have been assigned the role of PLAYER A.

Only on the screen of PLAYER B –

You have been assigned the role of PLAYER B.

Your Task

At the beginning of each period, each player will receive an initial endowment of 140 tokens. Note that each period is completely independent from the other ones: your earnings in one period are not affected by your choices and earnings in the other periods.

What is your task? It depends on the role assigned to you.

If you are PLAYER A, your task in each period will be to decide how many tokens to invest in precautions to avoid an accident with PLAYER B. The more you invest in precautions, the less likely you are to cause an accident. Each unit of precautions has a cost, as will be explained in the next screens.

If you are PLAYER B, your Earnings in each period will exclusively depend on your matched Player A's choice and on chance. Player B cannot invest in precautions to avoid an accident with Player A.

If an accident occurs, the accident loss will be 80 tokens. At the end of each period, the computer will roll a number between 0 and 100. If this is a number between 0 and the probability of having an accident, an accident will occur between you and your matched player.

At the end of each period, players will be informed whether an accident occurred and the players' respective earnings. During the study, players will not receive any information about the others' choices. Each player's decision will remain private.

Stage 1

In this first stage, in each of the 10 periods, if an accident occurs the accident loss will entirely fall on Player B, but Player A will always have to fully compensate Player B for the loss.

In sum: If an accident occurs, PLAYER B suffers the accident loss, and PLAYER A must compensate PLAYER B for the entire loss.

Stage 1: Task 1/4

If you are PLAYER A:

Your task in each of the next 10 periods is to decide whether and how much to invest in precautions to avoid an accident and, in turn, to avoid paying compensation to your matched Player B.

Let us consider some examples. Please look at the table on your screen and follow the instructions.

Look at the first row: you can decide to invest zero tokens in precautions.

- *If an accident occurs* (85 % probability), Player B suffers the accident loss, but you will have to entirely compensate him/her. Your earnings will be 60 tokens: 140 (initial endowment) – 80 (compensation to Player B for the accident loss).
- *If an accident does not occur* (15 % probability), you do not have any accident costs, thus you keep your initial endowment (140 tokens).

You are PLAYER A				
Precaution cost	**An accident occurs**		**An accident does not occur**	
	Probability of accident	**Your earnings**	**Probability of no accident**	**Your earnings**
0	*85 %*	60	*15 %*	140
5	*75 %*	55	*25 %*	135
12	*65 %*	48	*35 %*	128
21	*55 %*	39	*45 %*	119
32	*45 %*	28	*55 %*	108
45	*35 %*	15	*65 %*	95
60	*25 %*	0	*75 %*	80

Stage 1: Task 2/4

If you are PLAYER A:

Look at the second row of the table. Investing 5 tokens in precautions reduces the probability of an accident to 75 %.

- *If an accident occurs* (75 % probability), Player B suffers the accident loss, but you will have to entirely compensate him/her for the loss. Your earnings will be 55 tokens: 140 (initial endowment) – 5 (precaution cost) – 80 (compensation to Player B for the accident loss).
- *If an accident does not occur* (25 % probability), your Earnings will be 135 tokens: 140 (initial endowment) – 5 (precaution cost).

Stage 1: Task 3/4

If you are PLAYER A:

Now look at the last row in the table. Investing 60 tokens in precautions reduces the probability of an accident to 25 %.

- *If an accident occurs* (25 % probability), Player B suffers the accident loss, but you will have to pay compensation. Your final earning will be 0 tokens: 140 (initial endowment) – 60 (precaution cost) – 80 (compensation to Player B for the accident loss).
- *If an accident does not occur* (75 % probability), your Earnings will be 80 tokens: 140 (initial endowment) – 60 (precaution cost).

Stage 1: Task 4/4

If you are PLAYER B:

You cannot take any precautions to avoid an accident. In each period, your earnings will depend solely on the choice of your matched Player A and on chance.

In each of the next 10 periods, regardless of whether an accident occurs or not, you will always earn 140 tokes because Player A will always compensate you in full. To summarize, look at the following table:

If you are PLAYER B	
Has an accident occurred?	**Your earnings**
Yes	140 tokens = 140 (initial endowment) – 80 (accident loss) + 80 (compensation from player A)
No	140 tokens (no accident loss)

Stage 1: Example

Let us consider another example. Suppose that in the first period, PLAYER A decides to invest 5 tokens in precautions:

The probability of an accident is 75 %;

- If an accident occurs, Player B will suffer the loss and Player A has to pay compensation. Player A's final earning will be 55 tokens (140 [initial endowment] – 5 [precaution costs] – 80 [compensation to Player B for the accident loss]);
- If an accident does not occur (25 % probability), Player A's final earning will be 135 tokens (140 [initial endowment] – 5 [precaution costs]);
- Regardless of whether an accident occurs or not, Player B will always earn his/her initial endowment of 140 tokens thanks to Player A's compensation in case of an accident.

Stage 1: Check Questions

We now ask you to answer some questions to check your understanding of the instructions. On the right side of the screen, you can see a table with a summary of the instructions.

Stage 1

Depending upon your role, in the next 10 periods you will be asked to make choices and answer questions. Note that you cannot come back and change your choices. Please make each decision carefully.

In each decision screen, you can always see a summary of the instructions. Please take your time to look at the following table, and if you have any questions, raise your hand.

Not read aloud – Only written on computer screens

SCREEN ONLY FOR PLAYER A –

Stage 1: Period 1

How many tokens you would like to invest in precautions to avoid an accident with your matched Player B?

SCREEN ONLY FOR PLAYER B –

Stage 1: Period 1

While waiting for your matched Player A's decision, we ask you to reply to the following question: In this period, how many tokens do you think your matched Player A will invest in precautions to avoid an accident?

SCREEN FOR BOTH PLAYERS –

Stage 1: Period 1 – Results

Stage 1, Period 1:

An accident [occurred/did not occur] between you and your matched player.
Player B [has/has not] suffered the accident loss of 80 tokens.
Thus, Player A [has/has not] to compensate Player B for the accident loss.
Your respective earnings in this period are the following:
Player A's Earnings = [#] tokens
Player B's Earnings = [#] tokens

Stage 1: New Match

You have now been matched with another, different player. Please press "Continue" to start Period 2.

For the remaining 9 periods participants are asked to make the same type of decision.

Stage 1: Transition Screen

The first stage of the study is finished. Please press "Continue" to start the second stage.

Stage 2

The second stage is similar to the first stage. The only difference with the first stage is that now, in each period, if an accident occurs, the accident loss will entirely fall on Player A. In each period, if an accident occurs, PLAYER A will suffer the accident loss.

Stage 2: Task 1/4

If you are PLAYER A:

Your task in the next 10 periods is to decide whether and how much to invest in precautions to avoid an accident and, in turn, the accident loss.

Let us consider some examples. Please look at the table on your screen and follow the instructions.

Look at the first row: you can decide to invest zero tokens in precautions.

- *If an accident occurs* (85 % probability), you suffer the accident loss. Your earnings will be 60 tokens: 140 (initial endowment) – 80 (accident loss).
- *If an accident does not occur* (15 % probability), you do not suffer any accident loss, thus your earnings will equal the initial endowment (140 tokens).

You are PLAYER A				
Precaution cost	**An accident occurs**		**An accident does not occur**	
	Probability of accident	**Your earnings**	**Probability of no accident**	**Your earnings**
0	*85 %*	60	*15 %*	140
5	*75 %*	55	*25 %*	135
12	*65 %*	48	*35 %*	128
21	*55 %*	39	*45 %*	119
32	*45 %*	28	*55 %*	108
45	*35 %*	15	*65 %*	95
60	*25 %*	0	*75 %*	80

Stage 2: Task 2/4

If you are PLAYER A:

Look at the second row of the table. Investing 5 tokens in precautions reduces the probability of an accident to 75 %.

- *If an accident occurs* (75 % probability), you suffer the accident loss. Your earnings will be 55 tokens: 140 (initial endowment) – 5 (precaution cost) – 80 (accident loss).
- *If an accident does not occur* (25 % probability), you do not suffer any accident loss, thus your earnings will be 135 tokens: 140 (initial endowment) – 5 (precaution cost).

Stage 2: Task 3/4

If you are PLAYER A:

Now look at the last row in the table. Investing 60 tokens in precautions reduces the probability of an accident to 25 %.

– *If an accident occurs* (25 % probability), you suffer the accident loss. Your earnings will be 0 tokens: 140 (initial endowment) – 60 (precaution cost) – 80 (accident loss).
– *If an accident does not occur* (75 % probability), you do not suffer any accident loss, thus your earnings will be 80 tokens: 140 (initial endowment) – 60 (precaution cost).

Stage 2: Task 4/4

If you are PLAYER B:

You cannot take any precautions to avoid an accident. Your earnings in each period will depend solely on the choices of your matched Player A and chance. In each period, regardless of whether an accident occurs or not, you will always earn 140 tokes.

If you are PLAYER B

Has an accident occurred?	Your earnings
Yes	140 (initial endowment)
No	140 (initial endowment)

Example

Let us consider another example. Suppose that, in a certain period, PLAYER A decides to invest 5 tokens in precautions:

The probability of an accident is 75 %;

– If an accident occurs, Player A will suffer the loss. Player A's earnings will be 55 tokens (140 [initial endowment] – 5 [precaution costs] – 80 [accident loss]);
– If an accident does not occur (25 % probability), Player A's earnings will be 135 tokens (140 [initial endowment] – 5 [precaution costs]);
– Regardless of whether an accident occurs or not, Player B will always earn his/her initial endowment of 140 tokens.

Stage 2: Check Questions

We now ask you to answer some questions to check your understanding of the instructions. On the right side of the screen, you can see a table with a summary of the instructions.

Stage 2

Depending upon your role, in the next 10 periods you will be asked to make choices and answer questions. Note that you cannot come back and change your choices. Please make each decision carefully.

In each of the following screens you can always see a summary of the instructions. Please take your time to look at the following table, and if you have any questions, raise your hand.

Not read aloud – Only written on computer screens

SCREEN ONLY FOR PLAYER A –

Stage 2 – Period 1

How many tokens you would like to invest in precautions to avoid an accident with your matched Player B?

SCREEN ONLY FOR PLAYER B –

Stage 2: Period 1

While waiting for your matched Player A's decision, we ask you to reply to the following question: In this period, how many tokens do you think your matched Player A will invest in precautions to avoid an accident?

SCREEN FOR BOTH PLAYERS –

Stage 1: Period 1 - Result

Stage 2, Period 1:

An accident [occurred/did not occur] between you and your matched player.
Player A [has/has not] suffered the accident loss of 80 tokens.
Your respective earnings in this period are the following:
Player A's Earnings = [#] tokens
Player B's Earnings = [#] tokens

Stage 1

You have now been matched with another, different player. Please press "Continue" to start Period 2.

For the remaining 9 periods participants are asked to make the same type of decision.

Stage 2 – Transition Screen

The second stage is finished and the first part of the study is completed.

Part 2

The second part consists of 10 separate decisions. Each decision is a paired choice between "Option A" and "Option B." For each decision row, you will have to choose between Option A and Option B. You may choose A for some decision rows and B for other rows, and you may change your decisions and make them in any order.

At the end of the study, the computer will randomly choose 1 of the 10 decisions for actual payment for this stage. You will not know in advance which decision will be used. Each decision has an equal chance of being selected for your earnings.

Part 2

Please look at the following table, Decision 1 at the top. Option A is a lottery that pays either 200 tokens with probability of 1/10 (10 %), or 160 tokens with probability of 9/10 (90 %); Option B is a lottery that pays 385 tokens with probability of 1/10 (10 %), or 1 token with probability 9/10 (90 %). The other Decisions are similar. As you move down the table, you can note that the chances of the higher payoff for each option increase.

Decision	Option A	Your choice		Option B
		A	B	
1	200 tokens with probability 1/10; 160 tokens with probability 9/10	○	○	385 tokens with probability 1/10, 10 tokens with probability 9/10
2	200 tokens with probability 2/10; 160 tokens with probability 8/10	○	○	385 tokens with probability 2/10, 10 tokens with probability 8/10
3	200 tokens with probability 3/10; 160 tokens with probability 7/10	○	○	385 tokens with probability 3/10, 10 tokens with probability 7/10
4	200 tokens with probability 4/10; 160 tokens with probability 6/10	○	○	385 tokens with probability 4/10, 10 tokens with probability 6/10
5	200 tokens with probability 5/10; 160 tokens with probability 5/10	○	○	385 tokens with probability 5/10, 10 tokens with probability 5/10
6	200 tokens with probability 6/10; 160 tokens with probability 4/10	○	○	385 tokens with probability 6/10, 10 tokens with probability 4/10
7	200 tokens with probability 7/10; 160 tokens with probability 3/10	○	○	385 tokens with probability 7/10, 10 tokens with probability 3/10
8	200 tokens with probability 8/10; 160 tokens with probability 2/10	○	○	385 tokens with probability 8/10, 10 tokens with probability 2/10
9	200 tokens with probability 9/10; 160 tokens with probability 1/10	○	○	385 tokens with probability 9/10, 10 tokens with probability 1/10
10	200 tokens with probability 10/10; 160 tokens with probability 0/10	○	○	385 tokens with probability 10/10, 10 tokens with probability 0/10

Part 2

After you have made your choices, the computer will randomly roll a number from 1 to 10 two times. Once to select one of the 10 decisions to be used to determine your earnings in this stage, and a second time to determine what your payoff is for the option you chose, A or B, for the decision selected.

For example, suppose the first rolled number is 1. This means that the first decision has been randomly selected for your earnings. Suppose that your choice in Decision 1 is Option A and that the second rolled number is 5. Note that Option A pays 200 tokens if the second rolled number is 1, or 160 tokens if the second rolled number is between 2 and 10, extremes included. Since the computer rolled the number 5, you get 160 tokens.

Part 2

Please make your choices now and then press "Continue."

Part 3

In this part of the experiment, you will be asked to make 6 decisions. You will be randomly and anonymously matched with another participant. For each of the decisions, you must choose a distribution of points between the participant with whom you are matched with and yourself. Your decisions will influence both the amount of money you receive, as well as the amount of money received by the person you are matched with.

At the end of the experiment, the computer will randomly select one of the 6 decisions to determine your payment in this part. You will not know in advance which decision will be selected for such payment. Each decision has the same probability of being selected for your earnings.

Once the decision has been randomly selected for your payment, you will be paid based on your decision and the decision of the person with whom you are matched.

In the next screens, subjects are asked to make the six decisions of the Social Value Orientation test, as summarized in the following table.

Decision no.		Items								
		1	2	3	4	5	6	7	8	9
1	You receive	135	135	135	135	135	135	135	135	135
	Other receives	135	126	118	109	100	91	83	74	65
2	You receive	135	137	139	141	143	144	146	148	150
	Other receives	65	69	74	78	83	87	91	96	100
3	You receive	100	104	109	113	118	122	126	131	135
	Other receives	150	148	146	144	143	141	139	137	135
4	You receive	100	104	109	113	118	122	126	131	135
	Other receives	150	139	129	118	108	97	86	76	65
5	You receive	150	144	138	131	125	119	113	106	100
	Other receives	100	106	113	119	125	131	138	144	150
6	You receive	150	148	146	144	143	141	139	137	135
	Other receives	100	104	109	113	118	122	126	131	135

Final: Transition Screen

You have completed all the stages. We will now ask you to answer a short questionnaire, at the end of which we will show you the results and your final earnings.

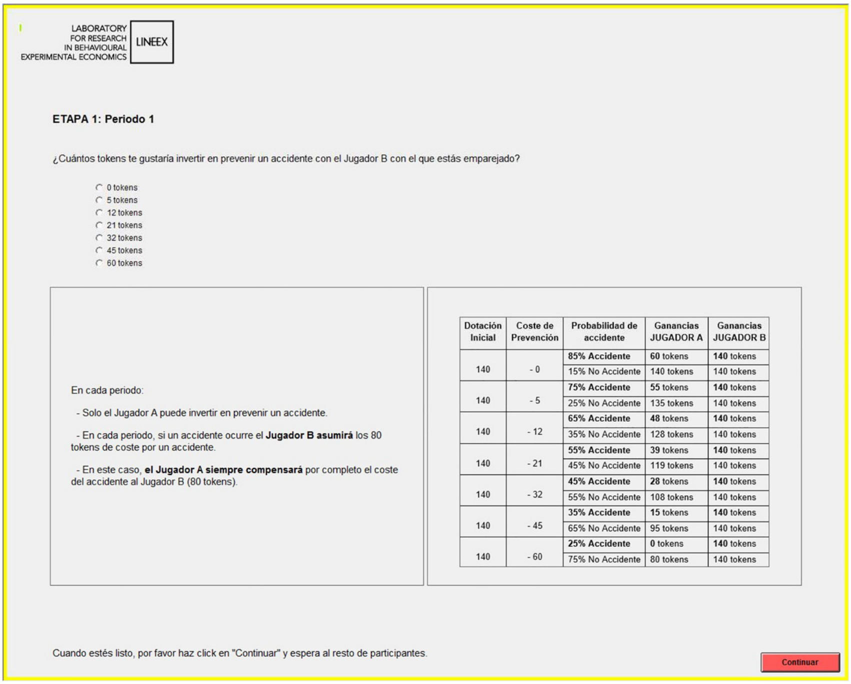
Final Screen: Thank You!

Thank you for your participation in today's study! Please remain seated and refrain from talking to other participants. Once everyone has finished reviewing their own results and earnings, we will give you instructions about how to receive your payment.

B2. Screenshots (in Spanish)

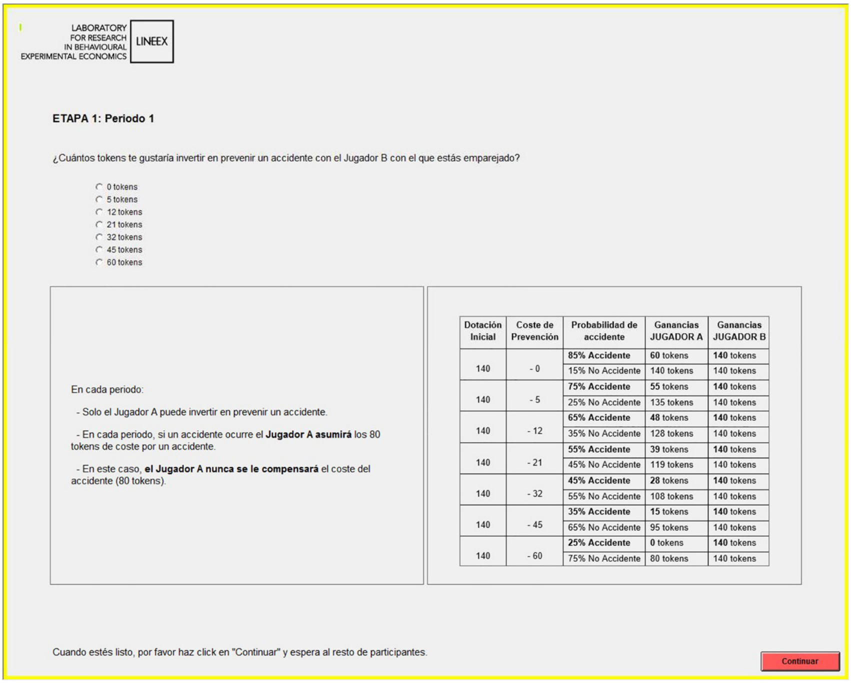
Screenshot 1: Example of Player A's Decision Screen in the Accident Experiment.

(a) Injurer under Strict Liability Treatment



Dotación Inicial	Coste de Prevención	Probabilidad de accidente	Ganancias JUGADOR A	Ganancias JUGADOR B
140	- 0	**85% Accidente**	**60** tokens	**140** tokens
		15% No Accidente	140 tokens	140 tokens
140	- 5	**75% Accidente**	**55** tokens	**140** tokens
		25% No Accidente	135 tokens	140 tokens
140	- 12	**65% Accidente**	**48** tokens	**140** tokens
		35% No Accidente	128 tokens	140 tokens
140	- 21	**55% Accidente**	**39** tokens	**140** tokens
		45% No Accidente	119 tokens	140 tokens
140	- 32	**45% Accidente**	**28** tokens	**140** tokens
		55% No Accidente	108 tokens	140 tokens
140	- 45	**35% Accidente**	**15** tokens	**140** tokens
		65% No Accidente	95 tokens	140 tokens
140	- 60	**25% Accidente**	**0** tokens	**140** tokens
		75% No Accidente	80 tokens	140 tokens

(b) Victim under No Liability Treatment



LABORATORY FOR RESEARCH IN BEHAVIOURAL EXPERIMENTAL ECONOMICS LINEEX

ETAPA 1: Periodo 1

¿Cuántos tokens te gustaría invertir en prevenir un accidente con el Jugador B con el que estás emparejado?

- 0 tokens
- 5 tokens
- 12 tokens
- 21 tokens
- 32 tokens
- 45 tokens
- 60 tokens

En cada periodo:

- Solo el Jugador A puede invertir en prevenir un accidente.

- En cada periodo, si un accidente ocurre el **Jugador A asumirá** los 80 tokens de coste por un accidente.

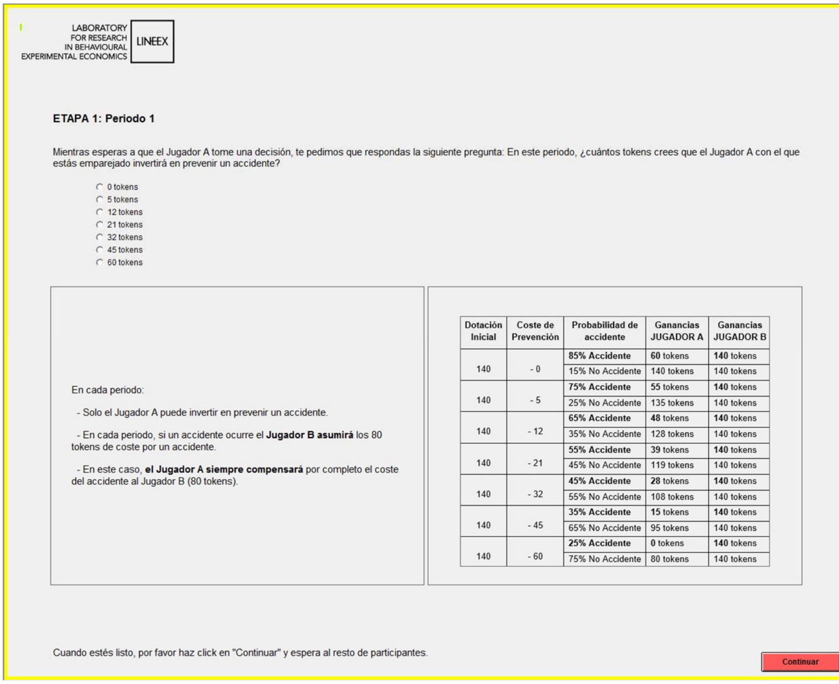
- En este caso, **el Jugador A nunca se le compensará** el coste del accidente (80 tokens).

Dotación Inicial	Coste de Prevención	Probabilidad de accidente	Ganancias JUGADOR A	Ganancias JUGADOR B
140	- 0	**85% Accidente**	**60 tokens**	**140 tokens**
		15% No Accidente	140 tokens	140 tokens
140	- 5	**75% Accidente**	**55 tokens**	**140 tokens**
		25% No Accidente	135 tokens	140 tokens
140	- 12	**65% Accidente**	**48 tokens**	**140 tokens**
		35% No Accidente	128 tokens	140 tokens
140	- 21	**55% Accidente**	**39 tokens**	**140 tokens**
		45% No Accidente	119 tokens	140 tokens
140	- 32	**45% Accidente**	**28 tokens**	**140 tokens**
		55% No Accidente	108 tokens	140 tokens
140	- 45	**35% Accidente**	**15 tokens**	**140 tokens**
		65% No Accidente	95 tokens	140 tokens
140	- 60	**25% Accidente**	**0 tokens**	**140 tokens**
		75% No Accidente	80 tokens	140 tokens

Cuando estés listo, por favor haz click en "Continuar" y espera al resto de participantes.

Continuar

Screenshot 2: Example of Player B's Decision Screen in the Accident Experiment.



LABORATORY FOR RESEARCH IN BEHAVIOURAL EXPERIMENTAL ECONOMICS LINEEX

ETAPA 1: Periodo 1

Mientras esperas a que el Jugador A tome una decisión, te pedimos que respondas la siguiente pregunta: En este periodo, ¿cuántos tokens crees que el Jugador A con el que estás emparejado invertirá en prevenir un accidente?

- 0 tokens
- 5 tokens
- 12 tokens
- 21 tokens
- 32 tokens
- 45 tokens
- 60 tokens

En cada periodo:

- Solo el Jugador A puede invertir en prevenir un accidente.

- En cada periodo, si un accidente ocurre el **Jugador B asumirá** los 80 tokens de coste por un accidente.

- En este caso, **el Jugador A siempre compensará** por completo el coste del accidente al Jugador B (80 tokens).

Dotación Inicial	Coste de Prevención	Probabilidad de accidente	Ganancias JUGADOR A	Ganancias JUGADOR B
140	- 0	**85% Accidente**	**60** tokens	**140** tokens
		15% No Accidente	140 tokens	140 tokens
140	- 5	**75% Accidente**	**55** tokens	**140** tokens
		25% No Accidente	135 tokens	140 tokens
140	- 12	**65% Accidente**	**48** tokens	**140** tokens
		35% No Accidente	128 tokens	140 tokens
140	- 21	**55% Accidente**	**39** tokens	**140** tokens
		45% No Accidente	119 tokens	140 tokens
140	- 32	**45% Accidente**	**28** tokens	**140** tokens
		55% No Accidente	108 tokens	140 tokens
140	- 45	**35% Accidente**	**15** tokens	**140** tokens
		65% No Accidente	95 tokens	140 tokens
140	- 60	**25% Accidente**	**0** tokens	**140** tokens
		75% No Accidente	80 tokens	140 tokens

Cuando estés listo, por favor haz click en "Continuar" y espera al resto de participantes.

Continuar

Screenshot 3: Example of Result Screen in the Accident Experiment.

References

Ai, C., and E. C. Norton. 2003. "Interaction Terms in Logit and Probit Models." *Economics Letters* 80 (1): 123–9.

Alm, J. 2019. "What Motivates Tax Compliance?" *Journal of Economic Surveys* 33 (2): 353–88.

Andreoni, J. 1988. "Why Free Ride? Strategies and Learning in Public Goods Experiments." *Journal of Public Economics* 37: 291–304.

Andreoni, J., and R. Croson. 2008. "Partners Versus Strangers: Random Rematching in Public Goods Experiments." *Handbook of Experimental Economics Results* 1: 776–83.

Angelova, V., O. Armantier, G. Attanasi, and Y. Hiriart. 2014. "Relative Performance of Liability Rules: Experimental Evidence." *Theory and Decision* 77 (4): 531–56.

Arlen, J., and E. Talley. 2008. "Experimental Law and Economics." In *Experimental Law and Economics*, edited by J. Arlen, and E. Talley. Cheltenham: Edward Elgar.

Bolton, G. E., J. Brandts, and A. Ockenfels. 2005. "Fair Procedures: Evidence from Games Involving Lotteries." *The Economic Journal* 115 (506): 1054–76.

Brandts, J., C. Rott, and C. Solà. 2016. "Not Just Like Starting Over-leadership and Revivification of Cooperation in Groups." *Experimental Economics* 19: 792–818.

Brosig, J., J. Weimann, and C.-L. Yang. 2003. "The Hot Versus Cold Effect in a Simple Bargaining Experiment." *Experimental Economics* 6 (1): 75–90.

Brown, J. P. 1973. "Toward an Economic Theory of Liability." *The Journal of Legal Studies* 2 (2): 323–49.
Burks, S. V., J. P. Carpenter, and E. Verhoogen. 2003. "Playing Both Roles in the Trust Game." *Journal of Economic Behavior & Organization* 51 (2): 195–216.
Buso, I. M., D. Di Cagno, L. Ferrari, V. Larocca, L. Lorè, F. Marazzi, L. Panaccione, and L. Spadoni. 2021. "Lab-Like Findings from Online Experiments." *Journal of the Economic Science Association* 7 (2): 184–93.
Cassar, L., and A. H. Klein. 2019. "A Matter of Perspective: How Failure Shapes Distributive Preferences." *Management Science* 65 (11): 5050–64.
Chai, S.-K., D. Dorj, and K. Sherstyuk. 2018. "Cultural Values and Behavior in Dictator, Ultimatum, and Trust Games: An Experimental Study." In *Experimental Economics and Culture (Research in Experimental Economics)*, Vol. 20, edited by Anna Gunnthorsdottir, and Douglas A. Norton, 89–166. Bingley: Emerald Publishing Limited.
Charness, G., and M. Rabin. 2002. "Understanding Social Preferences with Simple Tests." *Quarterly Journal of Economics* 117 (3): 817–69.
Cooter, R. D., and T. Ulen. 1997. *Law and Economics*, 2nd ed. Boston: Addison-Wesley.
Costa-Gomes, M. A., Y. Ju, and J. Li. 2019. "Role-Reversal Consistency: An Experimental Study of The Golden Rule." *Economic Inquiry* 57 (1): 685–704.
Dai, J., M. Kesternich, A. Löschel, and A. Ziegler. 2015. "Extreme Weather Experiences and Climate Change Beliefs in China: An Econometric Analysis." *Ecological Economics* 116 (116): 310–21.
Deffains, B., R. Espinosa, and C. Fluet. 2019. "Laws and Norms: Experimental Evidence with Liability Rules." *International Review of Law and Economics* 60: 105858.
Diekmann, A. 2004. "The Power of Reciprocity Fairness, Reciprocity, and Stakes in Variants of the Dictator Game." *Journal of Conflict Resolution* 48 (4): 487–505.
Dorj, D., Sherstyuk K., and Chai, S. 2011. "Playing Both Roles: Role Reversal Effect and Culture in Simple Games." Working paper. Mimeo, University of Hawaii.
Eisenberg, T., and C. Engel. 2016. "Unpacking Negligence Liability: Experimentally Testing the Governance Effect." *Journal of Empirical Legal Studies* 13 (1): 116–52.
Fischbacher, U. 2007. "Z-Tree: Zurich Toolbox for Ready-Made Economic Experiments." *Experimental Economics* 10 (2): 171–8.
Fon, V., and F. Parisi. 2008. "Role-Reversibility, Stochastic Ignorance and Social Cooperation." *The Journal of Socio-Economics* 37: 1061–75.
Frank, R. H., and B. Bernanke. 2006. *Principles of Microeconomics*, 3rd ed. New York: McGraw-Hill.
Fréchette, G. R., and S. Yuksel. 2017. "Infinitely Repeated Games in the Laboratory: Four Perspectives on Discounting and Random Termination." *Experimental Economics* 20: 279–308.
Fuller, L. L. 1969. *The Morality of Law*. New Haven: Yale University Press.
Garofalo, J. 1981. "The Fear of Crime: Causes and Consequences." *Journal of Criminal Law and Criminology* 72 (2): B39–57.
Ghosh, S., and R. P. Kundu. 2013. "Efficiency of Liability Rules: An Experimental Analysis in India." In *Law and Economics: Theory and Applications*, Vol. 2, edited by V. Santhakumar, and S. Gangopadhyay. New Delhi: Sage Publications India Pvt. Ltd.
Guerra, A. 2021. "Experiments in Law and Economics." In *Research Agenda in Experimental Economics*, edited by Ananish Chaudhuri, Chapter 3, 43–68. Cheltenham: Edward Elgar Publishing, Elgar Research Agenda Series.
Guerra, A., and T. M. Hlobil. 2018. "Tailoring Negligence Standards to Accident Records." *The Journal of Legal Studies* 47 (2): 325–48.
Guerra, A., M. Maraki, B. Massenot, and C. Thöni. 2023. "Deterrence, Settlement, and Litigation Under Adversarial Versus Inquisitorial Systems." *Public Choice* 196: 331–56.

Guerra, A., and F. Parisi. 2022. "Injurers Versus Victims: (A) Symmetric Reactions to Symmetric Risks." *The B.E. Journal of Theoretical Economics* 22 (2): 603–20.

Holt, C. A., and K. K. Sieberg. 2022. "Bargaining, Fairness and Conflict." *Homo Oeconomicus*: 1–30.

Hylton, K. N. 1990. "The Influence of Litigation Costs on Deterrence Under Strict Liability and Under Negligence." *International Review of Law and Economics* 10 (2): 161–71.

Jacob, J., E. A. Lambert, and S. Garcia. 2022. "Efficiency of Liability-Sharing Rules: An Experimental Case." *Journal of Institutional and Theoretical Economics* 178 (1): 1–42.

Kahneman, D., J. L. Knetsch, and R. H. Thaler. 1986. "Fairness and the Assumptions of Economics." *Journal of Business* 59 (4): S285-300.

Kamm, A., C. Koch, and N. Nikiforakis. 2021. "The Ghost of Institutions Past: History as an Obstacle to Fighting Tax Evasion?" *European Economic Review* 132: 103641.

Kollmann, J., Y. Benyamini, N. C. Lages, and B. Renner. 2022. "The Role of Personal Risk Experience—An Investigation of Health and Terrorism Risk Perception in Germany and Israel." *Risk Analysis* 42 (4): 818–29.

Kornhauser, L. A., and A. Schotter. 1990. "An Experimental Study of Single-Actor Accidents." *The Journal of Legal Studies* 19: 203–33.

Kornhauser, L. A., and A. Schotter. 1992. "An Experimental Study of Two-Actor Accidents." C.V. Starr Center for Applied Economics, *Research Report*, 92–57.

Landes, W. H., and R. A. Posner. 1987. *The Economic Structure of Tort Law*. Cambridge: Harvard University Press.

Lange, A., J. Schmitz, and C. Schwirplies. 2022. "Inequality, Role Reversal and Cooperation in Multiple Group Membership Settings." *Experimental Economics* 25 (1): 68–110.

Mankiw, N. G. 2004. *Principles of Microeconomics*, 3rd ed. Mason: Thomson South-Western.

Martha, C., and P. Delhomme. 2009. "Risk Comparative Judgments While Driving a Car Among Competitive Road Cyclists and Non-Cyclists." *Transportation Research Part F: Traffic Psychology and Behaviour* 12 (3): 256–63.

Mayou, R. A., S. Simkin, and J. Threlfall. 1991. "The Effects of Road Traffic Accidents on Driving Behaviour." *Injury* 22 (5): 365–8.

Miceli, T. J. 1997. *Economics of the Law: Torts, Contracts, Property and Litigation*. Oxford: Oxford University Press.

Rickard, L. N. 2014. "Perception of Risk and the Attribution of Responsibility for Accidents." *Risk Analysis* 34 (3): 514–28.

Shavell, S. 1980. "Strict Liability vs. Negligence." *The Journal of Legal Studies* 9 (1): 1–25.

Shavell, S. 1987. *Economic Analysis of Accident Law*. Cambridge: Harvard University Press.

Skogan, W. G. 1987. "The Impact of Victimization on Fear." *Crime & Delinquency* 33 (1): 135–54.

Solomon, M. 2022. "Switching Roles in Experiments: Learning in a Signaling Game." Manuscript, Colby College.

Sullivan, S. P., and C. A. Holt. 2017. "Experimental Economics and the Law." In *The Oxford Handbook of Law and Economics*, edited by F. Parisi, 78–103. Oxford: Oxford University Press.

Sundmacher, L. 2012. "The Effect of Health Shocks on Smoking and Obesity." *The European Journal of Health Economics* 13: 451–60.

van Velthoven, B. 2009. "Empirics of Tort." In *Tort Law and Economics, Vol. 1 Encyclopedia of Law and Economics*. 2nd ed., edited by M. Faure, 377–405. Cheltenham: Edward Elgar. ch.16.

Weimann, J., and T. Reichmann. 2003. "On the Role of Role Reversal: Remarks on Charness and Rabin." In *Working Paper*. Magdeburg: University of Magdeburg.

Wittman, D., D. Friedman, S. Crevier, and A. Braskin. 1997. "Learning Liability Rules." *The Journal of Legal Studies* 26 (1): 145–62.