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ORIGINAL PAPER

Fairness is intuitive

Alexander W. Cappelen [1] · Ulrik H. Nielsen [2] · Bertil Tungodden [1] · Jean-Robert Tyran [2,3] · Erik Wengström[2,4]

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Abstract In this paper we provide new evidence showing that fair behavior is intuitive to most people. We find a strong association between a short response time and fair behavior in the dictator game. This association is robust to controls that take account of the fact that response time might be affected by the decision-maker's cognitive ability and swiftness. The experiment was conducted with a large and heterogeneous sample recruited from the general population in Denmark. We find a striking similarity in the association between response time and fair behavior across groups in the society, which suggests that the predisposition to act fairly is a general human trait.

Keywords Response time · Dictator game · Experiment · Fairness

JEL Classification C90 · D03 · D60

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✉ Erik Wengström
erik.wengstrom@nek.lu.se

[1] Department of Economics, NHH Norwegian School of Economics, Helleveien 30, 5045 Bergen, Norway

[2] Department of Economics, University of Copenhagen, Øster Farimagsgade 5, building 26, 1353 København K, Denmark

[3] Department of Economics, University of Vienna, Oskar-Morgenstern-Platz 1, 1090 Vienna, Austria

[4] Department of Economics, Lund University, P.O. Box 7082, 220 07 Lund, Sweden

1 Introduction

A key question in the social sciences is whether it is intuitive to behave in a fair manner or whether fair behavior requires active self-control. One way to approach this question is to study how long it takes a person to make a decision when choosing between alternatives that are more or less fair. Since a decision that relies on intuition is typically made faster than a decision that relies on deliberation, the response time of a fair decision relative to a selfish decision provides an important indication of the intuitiveness of fair behavior; if fair behavior is intuitive, we would expect a fair decision to be made faster than a selfish decision.

Recently, several experimental studies have used data on subjects' response time in economic games to argue that fair behavior is intuitive (Rubinstein 2004, 2007; Rand et al. 2012; Fischbacher et al. 2013; Di Guida and Devetag 2013; Lotito et al. 2013; Nielsen et al. 2014).[1] In a series of public goods games, Rand et al. (2012) and Lotito et al. (2013) find that the contribution to the public good is decreasing in the participant's response time. A similar association has been documented in the ultimatum game where the response time of the proposer is negatively correlated with the share offered to the responder (Brañas-Garza et al. 2012). In line with these results, studies that exogenously manipulate the participant's response time show that people tend to contribute more to the public good under time pressure and less when they are forced to delay making their decision (Cappelletti et al. 2011; Grimm and Mengel 2011; Rand et al. 2012; Rand and Kraft-Todd 2014).[2] The negative association between response time and fair behavior in these experiments has been interpreted as showing that fair behavior is intuitive. It has been argued that the reason why fair behavior is intuitive in social dilemma experiments is that cooperation has proven a successful strategy in most social interactions outside the lab. This is known as the *Social Heuristics Hypothesis* (Rand et al. 2012; Rand and Kraft-Todd 2014; Rand and Peysakhovich forthcoming). A few studies have, however, challenged these findings. Tinghög et al. (2013) do not find that time pressure increases public good contributions and Piovesan and Wengström (2009) find that faster subjects more often than slower subjects make egoistic choices in distributive situations.

A key problem with the previous studies on response time and fairness, which could explain the conflicting results in the literature, is the fact that the overall response time in such experiments does not only depend on whether the decision is made intuitively. As illustrated in Fig. 1, people can be seen as going through three phases when making a decision in an economic experiment. First, they have to read and understand the decision problem, then they have to make their decision (t_2), and, finally, they have to implement this decision on the computer screen (T). The response time T will thus not only depend on whether the decision itself is based on intuition or deliberation, but also on the subject's cognitive ability and swiftness in implementing their decision. This introduces an important potential confound when a short response time is interpreted as indicating intuitive decision-making, since the

[1] See also Spilopoulos and Ortmann (2015) for a survey of the literature on response time.

[2] See also Rand et al. (2014) for a meta-study.

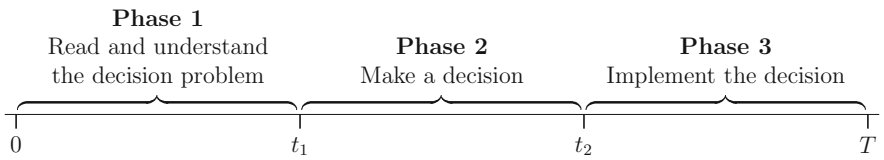

Fig. 1 The components of response time. *Note* the figure illustrates the three phases constituting a participant's response time

short response time could also reflect that the participant easily grasps the decision problem (t_1) or is fast in implementing the decision ($T - t_2$). Hence, a negative association between the participant's response time (T) and the fairness of his or her behavior does not necessarily reflect that there is a negative association between decision time (t_1-t_2) and fair behavior; it might only reflect that there is a negative association between cognitive ability, swiftness, and the weight attached to fairness.

In the present paper, we employ an experimental design with two features that allow us to more clearly identify the association between decision time and fair behavior. The first feature is that we focus on the dictator game.[3] The advantage of the standard dictator game is that it requires little cognitive effort to understand the game. In particular, it is easy to identify the most selfish alternative as well as the most fair alternative. Thus, the time it takes to understand the decision task (t_1) is minimized, which reduces the potential confound created by heterogeneity in cognitive ability.[4] In contrast, the instructions for a public good game are clearly more demanding and it is also non-trivial to identify the selfish and the fair alternative in this game. In the ultimatum game, most people easily identify the fair alternative as a 50-50 split, but it is inherently difficult to identify the selfish alternative since it depends on the participant's belief about how the other participant will respond. The second crucial feature of our design is that we collect independent measures of each participant's swiftness and cognitive ability. This enables us to control for any remaining confound created by heterogeneity in subject's swiftness and cognitive ability.

Our experiment was carried out with a large and heterogenous sample of the Danish adult population recruited with the assistance of Statistics Denmark. This means that the participants in this experiment are much more diverse than a typical sample of college undergraduates. The collaboration with Statistics Denmark also allows us to match experimental data with data from the Danish population registers. This enables us to study whether there are systematic differences in the population with respect to what they find intuitive when making a distributional choice.

[3] Two previous studies of response time and fair behavior have employed the dictator game, but these conducted either a non-incentivized experiment (Rubinstein 2004) or a non-standard dictator game with a fairly complex decision problem (Piovesan and Wengström 2009).

[4] The simplicity of the dictator game also reduces the role of noise in the decision making process. See Recalde et al. (2014) for a study of how noise may matter when interpreting response time in complex decision problems.

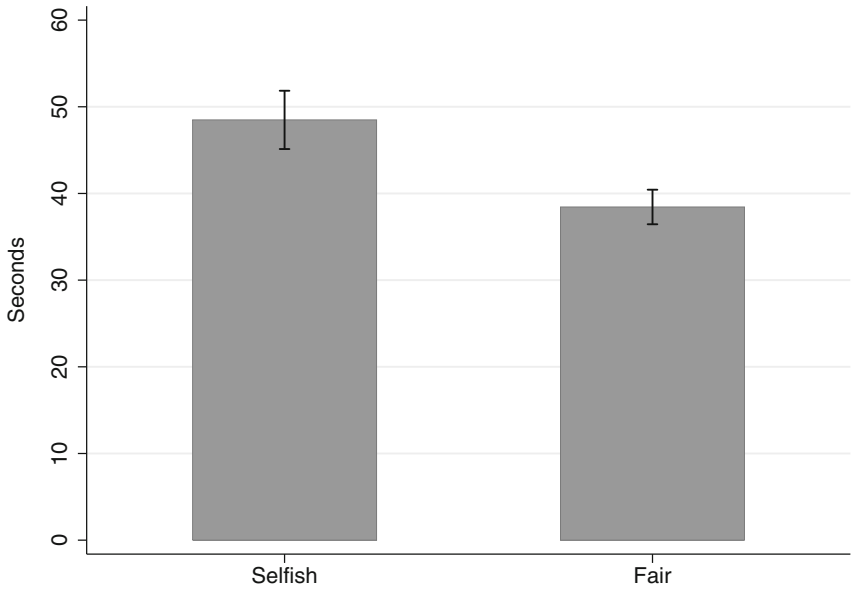

Fig. 2 Average response time of the selfish and the fair. *Note* the figure reports the average response time in seconds (top-coded at 120 sec) for participants who shared nothing (the selfish, 25 % of the 1508 participants) or shared equally (the fair, 52 % of the 1508 participants) with the other participant. Standard errors are indicated

Our first main result, reported in Fig. 2, is that there is indeed a close association between fair behavior and response time. The average response time among the selfish participants (i.e. those who shared nothing with the other participant) was 48.5 sec, whereas it was only 38.4 sec among the fair (i.e. those who split 50–50). We find considerable heterogeneity in both swiftness and cognitive ability among the participants in the experiment. In fact, we find that the observed variance in swiftness is as large as the observed variance in response time, and the differences in cognitive ability are also striking. The association between response time and fair behavior is, however, robust to controlling for these and other factors that could affect the subject's response time. We thus provide clean evidence of fairness being intuitive. Our second main result is that the association between fair behavior and short response time holds across groups in society when differentiating by age, gender, and length of education. Taken together, our two main results provide compelling evidence suggesting that the predisposition to act fairly is a general human trait.

The structure of the paper is as follows: Sect. 2 presents the experimental design and the sample. Section 3 reports the results, while Sect. 4 provides some concluding remarks.

2 The experiment

We here provide an overview of the sample and the experimental design.

2.1 The sample and administrative procedures

The experiment was conducted using the Internet Laboratory for Experimental Economics (iLEE) at the University of Copenhagen, which provides an online platform for running large-scale experiments. It follows the standards (e.g. no deception, payment according to choices) and procedures (e.g. with respect to instructions) that routinely guide conventional laboratory experiments, but subjects make choices remotely, over the internet. The participants were recruited from the general Danish adult population and were randomly selected for invitation by Statistics Denmark. The invitations, sent by standard mail, invited recipients to participate in a scientific experiment in which money could be earned (earnings were paid out via electronic bank transfer). The letter pointed out that choices are fully anonymous between subjects and to the researchers from iLEE. Anonymity was achieved by letting participants log into the iLEE webpage using a personal identification code whose key was only known to Statistics Denmark.[5]

Statistics Denmark provided official register data which can be matched with the experimental data. By using the official register data, we can compare the background characteristics of our participants with a fully representative group of adults from the general population in Denmark. We observe from Table 1 that our sample of 1,508 participants is similar to the general population with respect to age, gender, and length of education.[6]

In order to ensure the participants' anonymity in the experiment, Statistics Denmark generated a unique and random six-digit id-number for each participant. The invitation letter, which was distributed to the participants by Statistics Denmark, included a URL to the experiment's website, and a unique login code which the invitee had to enter on the website in order to access the experiment. The payments to the participants were made anonymously via electronic bank transfers to the subjects' bank accounts.

2.2 The design

The experiment was a standard one-shot dictator game with an endowment of 150 DKK (approximately 27 USD). Participants were matched in pairs and one of the participants, the dictator, was asked to decide how to split the money with the other participant, the receiver. The dictator could choose between 11 different amounts to give to the other participant: 0 DKK, 15 DKK,...., 75 DKK,..., 135 DKK, 150 DKK.

[5] For further details on the iLEE online platform, see http://www.econ.ku.dk/cee/ilee/.

[6] 1565 participants took part in the dictator game, but background information is lacking for 57 participants. Our main analysis is therefore conducted on the 1508 participants for which we have both experimental data and background data. In the Online Appendix, Figure A.4, we show that the association between response time and fairness is robust to the inclusion of the 57 participants for whom background information is missing.

Table 1 Sample characteristics

	Participants		General population	
	Mean	SD	Mean	SD
Age	47.7	14.6	48.7	16.2
Male	0.515	0.500	0.495	0.500
Years of education	13.6	2.37	12.2	2.94

The table reports age, gender and years for education of the 1508 participants in the experiment and for a representative sample of 40,000 individuals in the Danish adult population aged 18–80 years

Due to the simplicity of the experiment, it was not cognitively demanding to identify the selfish alternative and the fair alternative. Each participant was involved in two situations, one as a dictator and one as a receiver, and was matched with a different participant in each situation.[7] After the experiment, one of the two situations was randomly drawn to determine payments to the participants.

In line with the existing literature, we measure the response time, T in Fig. 1, as the time elapsed from opening the experiment's decision screen until closing it again by submitting a decision on the screen.[8] A participant's response time, however, is likely to be affected by a wide range of personal characteristics unrelated to the participant's economic decision. In particular, a participant's cognitive ability and swiftness would affect the time used to read and understand the instructions as well as the time used to implement the decision. We therefore collect information that allows us to control for these factors.

We measure the participant's swiftness as his or her response time on a screen with three background questions about age, gender, and educational attainment. Since these questions are easy to understand and require no deliberation, we view the response time on this screen as capturing an individual's swiftness in implementing decisions. An individual's swiftness may be shaped by a number of features, including his or her personality, age, and the general setting. In the analysis, we use an inverse measure of the participant's swiftness, i.e., a short response time means a high degree of swiftness. We measure the participant's cognitive ability using a 20-item progressive matrices test (Beauducel et al. 2010), which is a test of fluid intelligence, that is, an individual's ability to think logically in unfamiliar situations. We focused on fluid intelligence, since we expected it to be more orthogonal to education and other background variables than crystalized intelligence.

The cumulative distributions of swiftness and cognitive ability are provided in Fig. 3. We observe from Panel A that there is a striking heterogeneity in the

[7] The translated instructions to the experiment are provided in the Online Appendix, Section A.1.

[8] It should be noted that most studies measure response time in the lab, while the present study and Rubinstein (2007) measure it using an online platform. An online experiment allows for less control than a lab experiment, which may lead to both shorter response times (participants may be more inclined to click quickly through the experiment) and longer response times (participants may be more distracted by other activities).

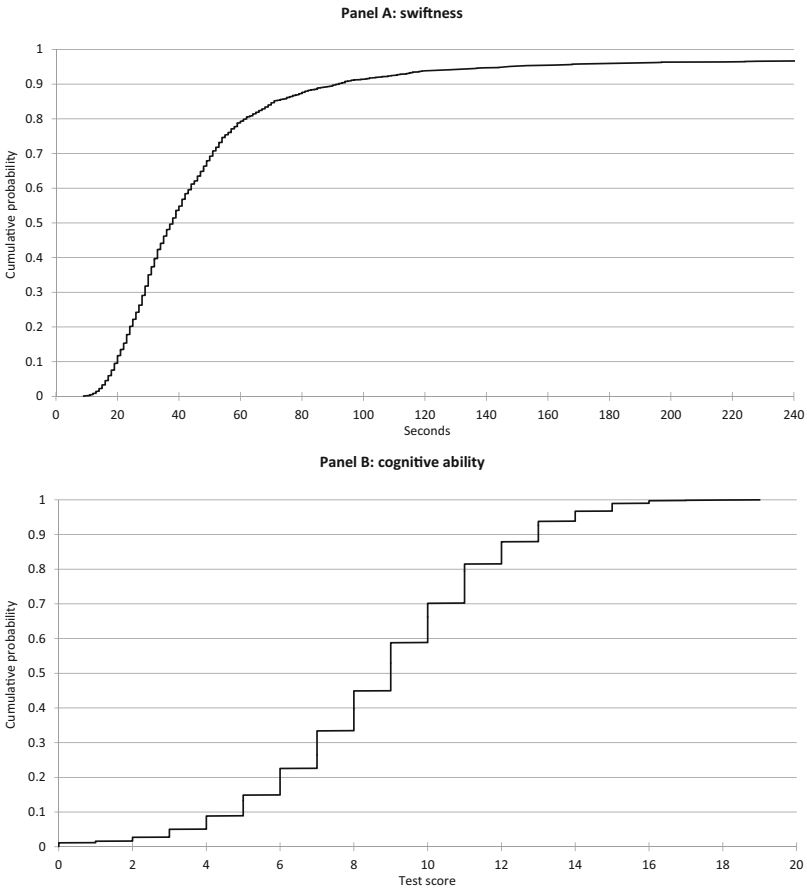

Fig. 3 Cumulative distributions of swiftness and cognitive ability. *Note* the figure shows the cumulative distribution of swiftness (**a**) and cognitive ability (**b**) in the sample of participants (n = 1,508). Swiftness is measured as the response time on a three-item questionnaire on age, gender, and level of education. Cognitive ability is measured as the participant's score in a 20-item progressive matrices test (cognitive ability)

participants' swiftness; the fastest participants spent less than 20 sec on answering the background questions, while the median response time is close to 40 sec. As shown in Panel B, there is also considerable heterogeneity with respect to cognitive ability, with the average score of 8.77 being close to what is typically observed in samples with a similar age distribution (Beauducel et al. 2010). Taken together, the two panels in Fig. 3 show that the potential confounds with swiftness and cognitive ability are serious when interpreting short response time as an indication of intuitive behavior.

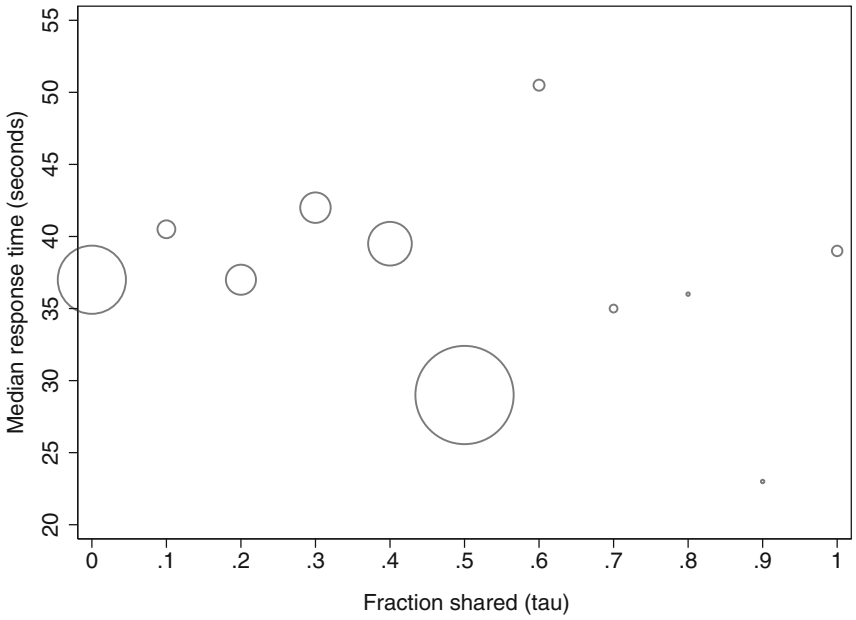

Fig. 4 Choice frequencies and median response time. *Note* the figure shows the median response time for each alternative in the choice set for the 1508 participants. The circle sizes have been weighted by the choice frequencies

3 Results

Figure 4 provides an overview of the choice frequencies and median response time of the different alternatives in the choice set.[9] The average share given to the receiver was 0.34, which is somewhat higher than what is typically found in dictator game experiments with student samples (Engel 2011).[10] We observe that the majority of the participants chose either the selfish alternative (the selfish participants, 25 %) or the fair alternative (the fair participants, 52 %). The median response time among the selfish was 37 sec, whereas it was only 29 sec among the

[9] We did not enforce time restrictions in our experiment. This means that the distribution of response time in the experiment is heavily skewed to the right. Since more than 90 % of the subjects submitted their decision within two minutes, however, we top-code the response time at 120 sec. In the Online Appendix, Section A.2, we show that our results are robust to top-coding at 60 or 240 sec.

[10] This is in line with what has been observed in recent studies comparing students and non-students in the dictator game. In a lab experiment conducted with a sample of participants that is nationally representative for the adult population in Norway and two students samples, Cappelen et al. (forthcoming) find that the representative population give away significantly more than the students (41.2 versus 27.1 %); similarly, (Belot et al. 2015) find that students give away much less than non-students in a in a study carried out in the Nuffield CESS lab in Oxford (35 versus 16 %).

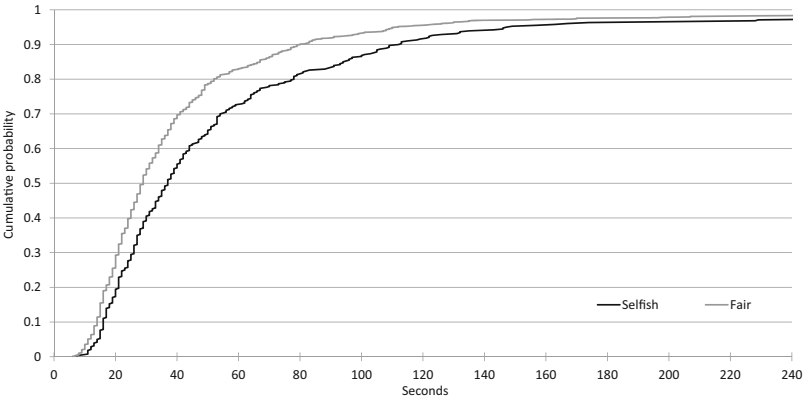

Fig. 5 Cumulative distribution of response time. *Note* the figure shows the cumulative distribution of the response time in seconds for the selfish (25 % of the 1508 participants) and the fair participants (52 % of the 1508 participants). A selfish participant is defined as someone who gives nothing to the other participant; a fair participant is defined as someone who gives 50 %

fair.[11] The median response time among the 23 % of subjects who chose neither the selfish nor the fair alternative (the trade-off participants) was 39 sec.

Our main focus is on whether the intuitive response to distributive behavior is to behave selfishly or fairly, and we thus start by comparing the response time of the two groups. In Fig. 5 we report the cumulative distributions of response time of the selfish and the fair participants. We observe that the cumulative distribution of the fair participants strictly dominates the cumulative distribution of the selfish participants, and we can clearly reject that the two distributions are the same (Kolmogorov-Smirnov test, $p < 0.001$).

Table 2, column (1), reports the corresponding OLS regression, where we again observe that the fair participants have significantly shorter response time than the selfish participants ($p < 0.001$).[12] In columns (2–5), we include different background variables as controls. From column (5) we observe that the association between fairness and response time holds when all controls are included. The estimated coefficient for being fair implies that the average response time of the fair participants is 0.45 standard deviations lower than the average response time of the selfish participants. From column (5), we also observe that swifter participants respond significantly faster. This association highlights the danger of interpreting a short response time (T in Fig. 1) as a short decision time ($t_2 - t_1$ in Fig. 1). When including all controls we do not find any significant association between response time and cognitive ability. Finally, we find that older people tend to have a longer response time than younger people, while we do not find any association between response time and gender or education.

[11] The median response times are lower than the average response times because the distribution of response time is skewed to the right.

[12] In the Online Appendix, Section A.2, we show that the results also hold for Tobit regressions.

Table 2 Regressions of response time, selfish and fair participants only

	(1)	(2)	(3)	(4)	(5)
Fair	−0.316***	−0.412***	−0.377***	−0.437***	−0.450***
	(0.059)	(0.056)	(0.059)	(0.060)	(0.058)
Swiftness		−0.012***			−0.010***
		(0.001)			(0.001)
Intelligence			−0.050***		−0.014
			(0.009)		(0.009)
Age				0.016***	0.005**
				(0.002)	(0.002)
Male				−0.016	0.000
				(0.054)	(0.052)
Education				−0.019*	0.003
				(0.011)	(0.011)
Constant	1.522***	2.441***	2.009***	1.126***	2.212***
	(0.049)	(0.086)	(0.099)	(0.183)	(0.222)
Observations	1,154	1,154	1,154	1,154	1,154
R^2	0.024	0.142	0.050	0.078	0.149

OLS regressions. The dependent variable is the response time (top-coded at 120 sec) divided by the standard deviation of the response time (31.0 sec). Standard errors in parentheses. We have only included the selfish and the fair participants (1154 participants). "Fair" is a dummy for giving half of the money to the other participant, "Swiftness" is measured as 120 sec minus the time used (top-coded at 120 sec) to answer a three-item questionnaire about age, gender, and educational attainment, "Cognitive ability" is the number of correct answers in a 20-item progressive matrices test, "Age" is the participant's age in years, "Male" is a dummy for the participant being a male, and "Education" is the length of the participant's education in years. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Participants who chose neither the fair nor the selfish alternative were engaged in an active trade-off between fairness and self-interest. From Table 3, column (1) we find that there is no significant association between response time and the share given for this group. This finding is robust to the inclusion of the full set of controls in column (5). We also observe that the estimated effect of cognitive ability is highly significant for the trade-off group; the estimated difference between the response time of the participants in the bottom and top 10 % of the cognitive ability distribution is more than 60 sec. We interpret this result as showing that those who engage in an active trade-off between fairness and self-interest rely on deliberation and not on intuition when they make their decision. The estimated effect of swiftness is, however, in line with what we observe in Table 2, which is as expected since swiftness would primarily affect the implementation of the decision.

The fair participants have a shorter response time than the trade-off participants ($p < 0.001$), while there is only a borderline statistically significant difference in response time between the trade-off participants and the selfish participants

Table 3 Regressions of response time, trade-off participants only

	(1)	(2)	(3)	(4)	(5)
Share given	−0.458	−0.270	−0.366	−0.381	−0.273
	(0.331)	(0.305)	(0.315)	(0.324)	(0.298)
Swiftness		−0.015***			−0.013***
		(0.002)			(0.002)
Cognitive ability			−0.096***		−0.063***
			(0.016)		(0.016)
Age				0.017***	0.001
				(0.004)	(0.004)
Male				−0.135	−0.077
				(0.107)	(0.099)
Education				0.024	0.050**
				(0.023)	(0.022)
Constant	1.751***	2.810***	2.529***	0.702*	2.510***
	(0.125)	(0.175)	(0.174)	(0.366)	(0.411)
Observations	354	354	354	354	354
R^2	0.005	0.161	0.101	0.066	0.215

OLS regressions. The dependent variable is the response time (top-coded at 120 sec) divided by the standard deviation of the response time (31.0 sec). Standard errors in parentheses. We have only included participants who chose neither the selfish nor the fair alternative (354 participants). "Share given" is the share of the money given to the other participant, "Swiftness" is measured as 120 sec minus the time used (top-coded at 120 sec) to answer a three-item questionnaire about age, gender, and educational attainment, "Cognitive ability" is the number of correct answers in a 20-item progressive matrices test, "Age" is the participant's age in years, "Male" is a dummy for the participant being a male, and "Education" is the length of the participant's education in years.* $p<0.05$; ** $p<0.01$; *** $p<0.001$

($p = 0.078$).[13] Thus, overall, our analysis provides evidence of fair behavior being intuitive and requiring a short decision-time, whereas any deviation from fair behavior seems to trigger deliberation and a longer decision-time.

3.1 Heterogenous effects

We now turn to the question of whether there are systematic differences across society with respect to how people intuitively respond to a distributive problem. We address this question by examining how the association between fair behavior and response time interacts with the participant's characteristics.

In Table 4, we report OLS regressions of response time on interaction effects for those participants who chose either the selfish or the fair alternative. We observe no significant interaction effect between the fair behavior and swiftness or between fair

[13] Thus, we do not find, as in Evans et al. (forthcoming), that extreme responses in general are faster than intermediate responses. An OLS regression of response time for all participant is included in the appendix.

Table 4 Regressions of response time. Heterogeneity across age, gender, and education, selfish and fair participants only

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Fair	−0.316*** (0.059)	−0.396*** (0.086)	−0.433*** (0.097)	−0.432*** (0.091)	−0.375*** (0.089)	−0.411*** (0.086)	−0.656*** (0.145)
Swift		−0.531*** (0.095)					−0.442*** (0.103)
Fair× Swift		0.015 (0.116)					−0.015 (0.126)
High cognitive ability			−0.357*** (0.103)				−0.240** (0.104)
Fair× High cognitive ability			0.113 (0.123)				0.135 (0.125)
Young				−0.382*** (0.100)			−0.157 (0.107)
Fair× Young				0.078 (0.121)			0.076 (0.130)
Male					−0.062 (0.098)		−0.046 (0.095)
Fair× Male					0.110 (0.119)		0.074 (0.115)
Low education						−0.097 (0.097)	−0.139 (0.094)
Fair× Low education						0.180 (0.119)	0.150 (0.115)
Constant	1.523*** (0.049)	1.842*** (0.074)	1.764*** (0.084)	1.769*** (0.080)	1.559*** (0.075)	1.571*** (0.068)	2.150*** (0.124)
Observations	1,154	1,154	1,154	1,154	1,154	1,154	1,154
R^2	0.024	0.098	0.045	0.053	0.025	0.026	0.110

OLS regressions. The dependent variable is the response time (top-coded at 120 sec) divided by the standard deviation of the response time (31.0 sec). Standard errors in parentheses. We have only included the selfish and the fair participants (1154 participants). "Fair" is a dummy for giving 50 % of the money to the other participant, "Swift" is a dummy for being at or above the median of the swiftness distribution, "High cognitive ability" is dummy for scoring at or a dummy for being at or above the median of the 20-item progressive matrices test distribution, "Young" is a dummy for being at or below the median age distribution, "Male" is a dummy for being a male, and "Low education" is a dummy for being at our below the median of the educational attainment distribution (in years)

behavior and cognitive ability. We also observe that the association between fair behavior and response time is strikingly similar for participants of different age, gender, and educational attainment. Taken together, these results show that the intuitive response to the dictator game is the same across society which suggests that fair behavior being intuitive is a general human trait.

4 Concluding remarks

We find that participants in a large and heterogenous sample use significantly less time to make a decision in the dictator game when they act fairly than when they act selfishly. This is robust to controlling for a rich set of background information about the participants, including independent measures of their swiftness and cognitive ability.

Our analysis sheds light on the conflicting results observed in the previous literature. We find significant heterogeneity in swiftness and cognitive ability among the participants, and we show that these characteristics matter when explaining response time. We argue that this, at least partly, reflects that response time consists of more than decision time; it also captures the time spent on reading and understanding the instructions as well as the time spent on implementing the decision. None of the previous studies on response time and fair behavior controlled for these personal characteristics, which means that the mixed results may reflect confounds related to associations between cognitive ability, swiftness, and the importance attached to fair behavior. Further, it follows from our analysis that an exogenous manipulation of response time does not necessarily map into an exogenous manipulation of decision time (Rand et al. 2012; Tinghög et al. 2013), it may as well affect the other components of response time, and thus does not cleanly identify the effect of increased reliance on intuitive behavior.

We also find a striking similarity in the relationship between fair behavior and response time in the Danish society across gender, age groups, and educational attainment. Taken together our results provide compelling evidence suggesting that the predisposition to act fairly is a general human trait.

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