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The Higher the Cognitive ability of, and/or the Younger, the Dictator, the More the Self-interestedness: Experimental Evidence

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ABSTRACT

By employing 520 participants (aged 20–85) from across Japan and conducting single-blind dictator game experiments, we investigate how cognitive ability and/or ageing affect donating behavior. We have two main results. First, a dictator becomes selfish if his or her cognitive ability is high; generosity is affected by cognitive ability. Second, a dictator becomes generous as he or she gets older. Combining the two results, we find that an old dictator with low cognitive ability is the most generous.

JEL codes: C91, D64

Keywords: Altruism; Cognitive Ability; Dictator Game Experiment, Ageing and Adult Participants

1. INTRODUCTION

Because central and local governments in Japan have been facing financial difficulties[1], governmental services are insufficient to satisfy peoples' needs. Thus, governments have been forced to cooperate with non-profit organizations and volunteers to resolve societal problems in the affected areas and reduce poverty. In this regard, the donating behavior of Japanese residents is an important scholarly topic. Particularly, donations by the elderly population in Japan are worthy of academic attention, given that the proportion of the population above 65 (26.7% of the total population in 2015) is the highest of any country in the world and that the savings of the elderly are 1.4 times larger than the average for all households[2]. Further, the media perceives the

[1] The Ministry of Finance in Japan reports that the amount of outstanding government bonds was JPY 1060 trillion in December 2016. See http://www.mof.go.jp/english/jgbs/reference/gbb/e201612.html. The total amount of municipal bonds was JPY 200 trillion. See https://www.mof.go.jp/budget/fiscal_condition/basic_data/201402/sy2602g.pdf.

[2] The mean savings of households whose residents are more than 65 years old is JPY 25 million, compared with a mean value of JPY 18 million for all households. Moreover, 18.3% of the households of over 65s have more than JPY 40 million as savings; only 11.4% of all households have a similar level of savings (Cabinet Office of Japan, 2016).

elderly to be more generous than the young.[3]

However, academic findings on whether the elderly are indeed more generous than the young are mixed. Yamagishi, Takagishi, Matsumoto, and Kiyonari (2014) and Matsumoto, Yamagishi, Li, and Kiyonari (2016) find that the elderly are more generous than the young, while Roalf, Mitchell, Harbaugh, and Janowsky (2012) and Rieger and Mata (2015) show that the elderly are only as generous as the young. Indeed, multiple factors have been found to influence the generosity of the elderly.

Thus, in this study, we investigate the factors that affect the donating behavior of adults by using single-blind dictator game experiments. Our experiment has the following structure: (1) a dictator is given a certain endowment by the experimenters; (2) he or she donates some money from the endowment to his or her anonymous recipient; and (3) the recipient accepts the offer. If a dictator is selfish and rational, he or she donates nothing in the equilibrium. However, the average experimental donation rate is positive (Camerer, 2003[4]; Engel, 2011[5]), because some people are inequality-averse or altruistic.

[3] The *Guardian* reports that more than half of all charitable donations in the United Kingdom are by the over-60s. See https://www.theguardian.com/news/datablog/2012/sep/25/charitable-giving-generation-gap-age#data.

[4] Camerer (2003) indicates that more than 40% of dictators donate a positive amount of money and that the median of the donation rate is 10–30%.

[5] The simple average of the donation rate in the experimental dictator game is 28.35%.

Donating behavior in dictator game experiments is commonly affected by factors, such as age, gender, cognitive ability, and place of residence[6]. For example, Roalf et al. (2012), Rieger and Mata (2015), Beadle, Sheehan, Dahlben, and Gutchess (2015), and Kettner and Waichman (2016) investigate the aging effect on donating behavior; female dictators have also been found to donate more than male dictators (Bolton & Katok, 1995; Eckel & Grossman, 1998; Ogawa, Suzuki, Takemoto, & Takahashi, 2016).

In addition, Brandstätter and Güth (2002), Ben-Ner et al. (2004), and Chen, Chiu, Smith, and Yamada (2013) investigate the relationship between cognitive ability and altruistic behavior among undergraduate students. Some studies report that cognitive ability is related to rational thinking, reasoning, and risk aversion. For instance, researchers such as Dohmen, Falk, Huffman, and Sunde (2010), Burks, Carpenter, Goette, and Rustichini (2009), Benjamin, Brown, and Shapiro (2013), Beauchamp, Cesarini, and Johannesson (2001), and Shamosh and Gray (2008)

[6] Existing studies have also shown that other factors may also affect donating behaviors. These include the high level of anonymity proposed by the double-blind method (Hoffman, McCabe, & Smith, 1996); the personal traits of a dictator (Brandstätter & Güth, 2002; Ben-Ner, Kong, & Putterman, 2004); the property rights of the endowment (Hoffman, McCabe, Shachat, & Smith, 1994; Cherry, 2001; Cherry, Frykblom, & Shogren, 2002; Ogawa, Takemoto, Takahashi, & Suzuki, 2012); and the difference between group and individual decisions (Cason & Mui, 1997; Luhan, Kocher, & Sutter, 2009; Franzen & Pointner, 2014; Ito, Ogawa, Suzuki, Takahashi, & Takemoto, 2016).

have examined the relationship between cognitive ability and economic behavior (e.g., risk attitude and/or time preference). Hanaki, Jacquemet, Luchini, and Zylbersztejn (2014) and Benito-Ostolaza, Hernández, and Sanchis-Llopis (2016) also investigate how participants with high cognitive ability deal with strategic uncertainty.

However, to the best of our knowledge, no study has thus far investigated the simultaneous effects of aging and cognitive ability on donating behavior. Thus, our research enhances the understanding of how altruistic behavior changes when people with different levels of cognitive ability become older. For example, how much does an older dictator with high cognitive ability donate? Does he or she donate more than a young dictator with low cognitive ability? We currently have no clear answer to these questions.

There are two major findings. First, a dictator becomes selfish if his or her cognitive ability is high. Second, a dictator becomes generous as he or she is getting older. Taking these results into account, we infer that the most generous dictator is old and has lower cognitive ability, whereas the most selfish dictator is young and has higher cognitive ability. Additionally, a regional difference in donating behavior is observed.

The remainder of this paper is organized as follows. Section 2 presents the hypotheses. Section 3 explains the experimental design and procedure. Section 4 shows the experimental results.

Section 5 discusses the results and we conclude in section 6.

2. HYPOTHESES GENERATION

If a dictator is rational and selfish, he or she donates nothing in the equilibrium because doing so decreases his or her utility. However, most experimental results have not supported this prediction. In our study, we confirm whether this is true.

The main purpose of our study is to investigate the effects of ageing and of cognitive ability on donating behavior. First, we examine the ageing effect. Roalf et al. (2012) find that the percentage of half-split offers by older participants (65–85 years) is significantly larger than those by younger participants (21–45 years), while there is no significant difference between old and young participants in the average donation rate. Rieger and Mata (2015) find no significant effects of age in their dictator game. Beadle et al. (2015) show that older dictators give more money than younger dictators when empathy is easily loaded; however, the positive relationship between the offer amount and participant age is not significant in the standard situation in which empathy is difficult to load.

In contrast, Yamagishi et al. (2014) and Matsumoto et al. (2016) find a positive correlation

between prosociality—which is measured by the results of various experiments, such as prisoner's dilemma—and age in Tokyo. Kettner and Waichman (2016) find that dictators above the age of 60 donate more than university student dictators who have participated in an economic experiment before, while there is no significant difference between the elderly and the inexperienced student dictators in the amount donated. Based on these results, we propose the following hypothesis.

H1: The average donation rate of older dictators is higher than that of younger dictators.

The third factor is the effect of cognitive ability. While Brandstätter and Güth (2002) find little evidence of a relationship between cognitive ability and donating behavior, Ben-Ner et al. (2004) show that a dictator with higher cognitive ability donates slightly less. Chen et al. (2013) find that subjects who perform better on the Math portion of the SAT are more generous in their dictator game experiment but that those who have a higher GPA are more selfish[7]. Thus, we propose Hypothesis 2.

[7] Bayer and Renou (2016) find the impact of cognitive ability and the elimination of dominated strategies in strategic-form games and show that this trend is stronger for selfish participants.

H2: The higher the cognitive ability of a dictator, the less he or she donates.

Additionally, we investigate the effect of the place of residence. Theoretically, differences in residence do not affect the donation amount. However, this difference may be because of cultural differences (Henrich et al., 2004) and/or other factors, such as the method used to recruit participants. We have no evidence to show that why, for some reasons, the donating behavior is different in two locations. Thus, we propose Hypothesis 3.

H3: The difference in the place of residence has no effect on donation behavior.

3. EXPERIMENTAL DESIGN AND PROCEDURE

We conducted single-blind dictator game experiments in Osaka (18 sessions, 416 participants) and Yamagata (nine sessions, 102 participants) from March 2016 to March 2017. Participants were non-students and above 18 years. Table 1 shows the profile of dictator participants. The recruiting method was different in Osaka and Yamagata. In Osaka, the third largest city in Japan,

we asked a leaflet distributing company to distribute a flyer to recruit participants from residential areas within a radius of 20 km from the Center for Experimental Economics at Kansai University, which is in the northern part of the prefecture. Those who wanted to participate in the experiment applied for participation in advance by online application, telephone, e-mail, and letter. Additionally, we sent an e-mail and/or direct mail to those who had already participated in another type of experiment to ask for their participation.

In Yamagata, in the Tohoku region of Japan, we conducted a series of experiments in Nishikawa, a town surrounded by high mountains and located in the central part of Yamagata prefecture. The population of this town is about 5,000 and has been declining for the past 30 years. We recruited participants by taking the help of the town hall staff. Specifically, two months before the experiment was conducted, we announced the experiment in the public relations magazine of the town and distributed leaflets about the experiment in all the neighborhoods. Because of the involvement of the town hall, the participants were limited to those who lived or worked in this town. We conducted our experiments at the community center in central Nishikawa.

Participants participated in an experiment only once. Each participant sat on a seat surrounded by partitions to ensure anonymity. After signing the consent form, participants were randomly

assigned the role of either dictator or recipient at the beginning of the experiment. In all sessions, the same experimenter read the instructions.

A summary of these instructions follows[8]. Player A (dictator) is paired with Player B (recipient). Player A, who is given 2,000 points by the experimenter as the endowment, sends some points to Player B. The total amount of points can be between 0 and 2,000 and should be in increments of 200. The decision making is done only once. The points a participant receives in the experiment are the performance based reward, in JPY, that the experimenter pays him or her at the end of the experiment. Every participant also receives the participation reward of JPY 1,000 in addition to the performance based reward. Participants also answers some questions to confirm their understanding of the experiment; these answers did not carry any monetary reward. Decision making was done through a computer console that used Z-tree 3.67[9] (Fischbacher, 2007).

After the experiment ended, participants had 10 minutes to answer a questionnaire[10] that

[8] See Appendix A for the full instructions.

[9] About 5% of participants were unfamiliar with computer manipulation (e.g., double click) and were helped by an assistant. Such participants wrote down what they wanted to do (e.g., "I want to send 400 points"). The assistant then entered the amount and the participant confirmed whether they had entered the correct amount. After confirmation, the assistant clicked the "OK" button.

[10] Only the participants who had not answered this questionnaire answered it.

measured their cognitive ability, regardless of the role performed in the experiment. To do so, we used 16 of the 60 questions in Raven's Advanced Progressive Matrices (Raven, 1936)[11]. We can

[11] Although various indicators, such as the Math score on the SAT, GPA, or CRT (Frederick, 2005), have been used in previous research to measure cognitive ability, Raven's score is appropriate for measuring the cognitive ability of non-student participants. It has the following advantages. (1) This score is used to measure abstract reasoning and regarded as a non-verbal estimate of fluid intelligence; it has been used earlier to explain the economic behavior, such as the risky choice and intertemporal decision making, in the laboratory (Dohmen et al., 2010); Burks et al., 2009; Benjamin, Brown, and Shapiro, 2013: Beauchamp et al., 2015), besides being used for decision making in games with strategic uncertainty (Hanaki et al., 2014; Benito-Ostolaza et al., 2016). (2) This score is not commonly known and almost no participant had experience of answering the Raven's test. Thus, it can be easily collected during the experiment. (3) This score has a positive correlation with SAT score and GPA (Rohde and Thompson, 2007) and is a good proxy for SAT and GPA.

The disadvantage is that there are 48 questions in the original version of Raven's APM test and answering them takes a lot of time, which can be burdensome for participants.

To reduce the load, we select 16 of the 60 questions that measure cognitive ability. The questions selected are commonly used in Japan and Europe (an example is Hanaki et al., 2014) and contain both relatively easy questions and more difficult ones.

measure the cognitive ability of a person, especially fluid intelligence, by using this questionnaire. Those who receive a high score on this questionnaire have the capacity to reason and solve problems never faced before, independent of any past knowledge (Jaeggi, Buschkuehl, Jonides, & Perrig, 2008). Such people also have strong inductive and deductive reasoning ability.

In all sessions, the order in which the problems were displayed remained the same. No reward was provided for this measurement.

4. EXPERIMENTAL RESULTS

The average age of dictators is 56.2 years (n=208, s.d. 1.009) and 47.3 years (n=51, s.d. 2.58) in Osaka and Yamagata, respectively. The difference in the average age in the two areas is significant (Mann–Whitney U test, $p<0.001$). The difference in the average Raven's score in the two locations is not significant (Mann–Whitney U test, $p=0.2170$)[12]. Appendix B presents the

[12] The post-experiment questionnaire result shows that the average age in Yamagata is lower than that in Osaka; thus, household income is significantly higher in Yamagata than in Osaka (at 1 % level). However, the average of the total financial assets and the average of real estate values are not significantly different for the two locations. Because only 75 % of the dictators answered these questions, we did not use them as explanatory variables in regressions.

distribution of the Raven's scores in each location.

We check the relationship among the offer amount, age, and cognitive ability (Table 2). This table shows that the correlation coefficient between age and cognitive ability is -0.547 and significant at the 1% level; thus, the older a person, the lower is his or her cognitive ability. This is similar to the result in Raven (2000). Therefore, when we investigate the simultaneous effect of age and cognitive ability, we consider whether this correlation raises the statistical problem of multicollinearity or not.

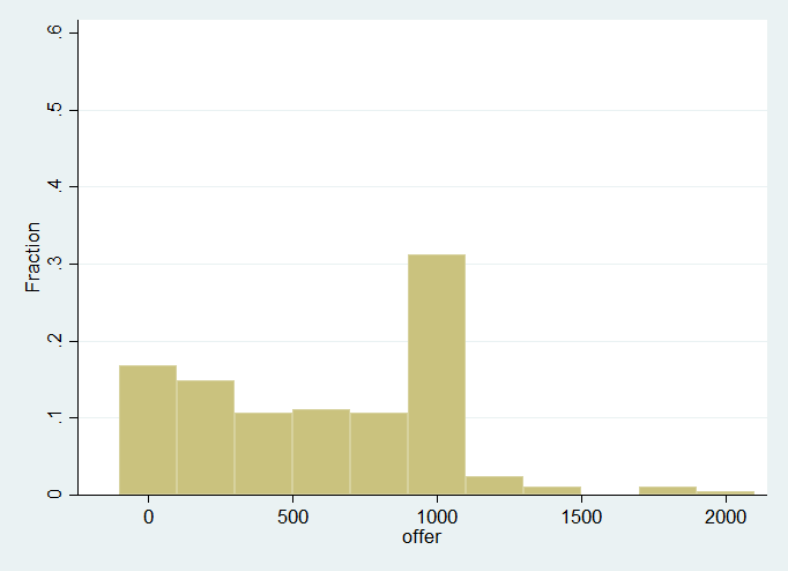
TABLE 1**:** Profile of the Dictator Participants at the Two Locations

Area	**Osaka**	**Yamagata**
No. of dictators (no. of women)	208 (110)	51 (22)
Average age	56.2	47.3
Standard deviation of age	14.56	18.42
Average donation amount[13]	604.81	929.41
Standard deviation of the donation amount	426.39	419.19
Average donation rate	30.2%	46.5%
Minimum donation amount	0	0
Maximum donation amount	2000	2000
Average Raven's test score	7.88	8.43
Standard deviation of Raven's score	3.23	3.54
The number of sessions	18	9

[13] Average donation amounts are JPY 648 (male, Osaka); JPY 924 (male, Yamagata); JPY 565 (female, Osaka); and JPY 936 (female, Yamagata).The gender difference in the donation amount by adults is not significant in either location; this is different from the trend seen in Bolton and Katok (1995) and Eckel and Grossman (1998).

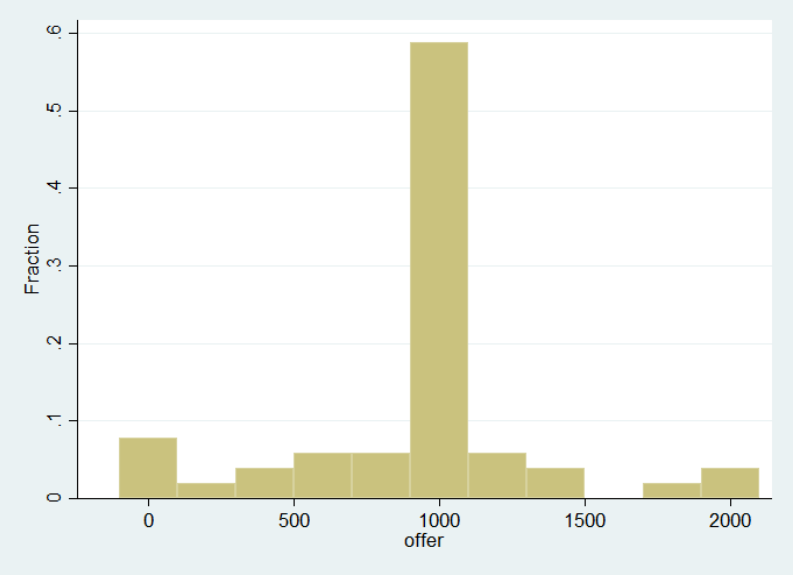
The donation amounts in both the locations are significantly higher than zero and the difference between locations in terms of the amount donated (see Figures 1 and 2) is significant (Kolmogorov–Smirnov test, $p<0.001$, Mann-Whitney test, $p<0.01$, two-sided t-test, $p<0.01$). Thus, we investigate the difference in the place of residence. The average donation rate in Yamagata is somewhat higher than that found in the results of dictator game experiments in Camerer (2003) and Engel (2011). However, the result of the dictator game experiment, in which the participants are workers (Carpenter, Burks & Verhoogen, 2005), is similar to our result.

FIGURE 1



The Distribution of Donations in Osaka

FIGURE 2



The Distribution of Donations in Yamagata

First, we separate age and the Raven's score and conduct Tobit regressions (see the variable list in Table 2). Table 3 indicates that the higher the Raven's score, the smaller is the donation amount (10% level of significance, Model 1) and that the older a dictator, the larger is the donation amount (5% significance, Model 2). Therefore, Hypotheses 1 and 2 are supported. The coefficient of the Yamagata dummy is positive and significant at the 1% level, meaning that Hypothesis 3 is not supported.

Table 2: Correlation among age, Raven's score, and the donation amount; *** indicates p<0.01

	Age	**Raven's Score**	**Donation amount**
Age	1.000		
Raven's score	-0.547***	1.000	
Donation amount	0.073	-0.063	1.000

TABLE 3

Variable Definitions

Variable	**Explanation**
Donation amount	Dependent variable
Raven's score	The Raven's score of a participant
High Raven dummy	1 if Raven's score of a participant is higher than 11, otherwise 0
Low Raven dummy	1 if Raven's score of a participant is lower than 5, otherwise 0
Age	The age of a participant
Yamagata dummy	1 if a participant participates in Yamagata, otherwise, 0

We next consider the simultaneous effects of the Raven's score and aging (see Model (3) in Table 4) by Tobit regression. Incorporating these variables, we can answer whether the donation amount by a young dictator with low cognitive ability is larger than that by an old dictator with high cognitive ability. Only age is significant at the 5% level in Model (3) in Table 4[14].

[14] We note the VIF when we apply OLS regression to Model (3) in Table 4 and Model (5) in Table 5 to show there is no multicollinearity. The mean VIF, VIF of age, and VIF of Raven's score in Model (3) are 1.33,

By depicting the relationship between cognitive ability and the donation amount, we examine the effect of cognitive ability on the donation amount closely. Figure 3 indicates that the higher the cognitive ability, the smaller is the donation amount and suggests that the effect of this ability on the donation amount is different for each category, that is, where cognitive ability is within average score±1 SD; larger than 1 SD; and smaller than 1 SD.

Based on this figure, we introduce High Raven and Low Raven dummies and conduct Tobit regression analyses (Models (4) and (5) in Table 4). In Model (6), only the observations obtained from Osaka are utilized.

1.54, and 1.43, respectively. The mean VIF, VIF of age, and VIF of Raven's score in Model (5) are 2.27, 1.54, and 4.37, respectively. Thus, we confirm that neither of the models has multicollinearity.

TABLE 4

The Results of the Tobit Regressions

Dependent Variable Donation amount	Model (1)	Model (2)	Model (3)
Raven's score	-16.76*		-4.417
	(9.091)		(10.36)
Age		5.352***	4.832**
		(2.053)	(2.364)
Yamagata dummy	366.4***	404.5***	402.3***
	(75.67)	(76.51)	(76.34)
Constant	695.6***	262.7**	326.6*
	(75.09)	(122.7)	(188.5)
/sigma	491.7***	487.8***	487.9***
	(27.87)	(27.75)	(27.69)
Prob.>F	0.000	0.000	0.000
Pseudo R2	0.007	0.008	0.008
Num. of Sessions		27	
Observations		259	

Robust standard errors in parentheses. Significance: *** p<0.01, ** p<0.05, * p<0.1. The left and right censored variables are 0 and 2,000, respectively. The left and right censored observations are 39 and 3, respectively.

TABLE 5

The Results of the Tobit Regressions

Dependent Variable	Model (4)	Model (5)	Model (6)
Donation amount			Observations in Osaka
Raven's score	-49.48***	-35.89*	-43.26**
	(17.08)	(18.55)	(20.22)
Age		4.117*	5.548**
		(2.386)	(2.609)
High Raven	276.8**	242.9*	346.4**
	(125.9)	(126.5)	(138.6)
Low Raven	-181.7	-171.9	-153.5
	(123.5)	(123.7)	(138.7)
Yamagata dummy	362.3***	394.0***	
	(76.12)	(76.37)	
Constant	944.5***	609.0***	568.8**
	(134.0)	(230.4)	(239.0)
/sigma	487.1***	484.3***	484.5***
	(28.33)	(28.07)	(28.31)
Prob.>F	0.000	0.000	0.006
Pseudo R2	0.008	0.009	0.006
Num. of Sessions	27		18
Observations	259		208

Robust standard errors in parentheses. Significance: *** p<0.01, ** p<0.05, * p<0.1. The left and right censored variables are 0 and 2,000, respectively. The left and right censored observations are 39 and 3, respectively.

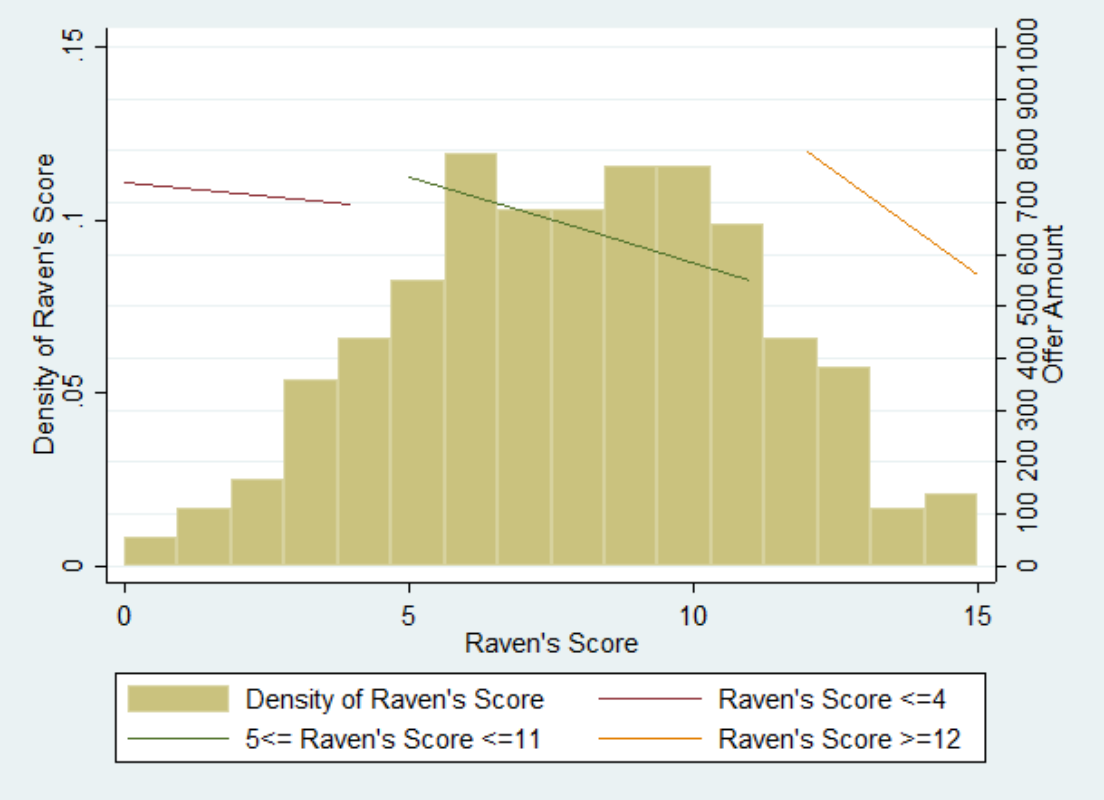
In Model (4), the coefficient of Raven and High Raven dummy are significant at 1 % and 5 %

levels, respectively; the former is negative and the latter is positive.

In Model (5), the coefficients of Age and Raven's score are significant at 10 % levels, respectively; the former is positive, but the latter is negative. The trend remains unchanged in Model (6). The High Raven dummy is positive and significant at 5% level in Models (5) and (6).

Thus, Hypotheses 1 and 2 are supported by the investigation above. Additionally, a dictator with high cognitive ability donates more than one with low cognitive ability, although the donation amount keeps getting smaller as cognitive ability increases.

FIGURE 3: The distribution of Raven's score (histogram) and the simple relationship between Raven's score and the donation amount.



The lines express the relationship between Raven's score and the donation amount; all the observations are used.

The coefficient of the Yamagata dummy is positive and significant at the 1% level in all models. This confirms that Hypothesis 3 is not supported, as the simple analysis indicates.

In summary, average donation amount is positive. Hypotheses 1 and 2 are supported by the simple analysis in Table 3: the older a dictator is, the more he or she donates; the higher the cognitive ability of a dictator, the less he or she donates. When we consider age and Raven's score simultaneously with High and Low Raven dummies, both the hypotheses are again supported.

These results indicate that a young dictator with high cognitive ability donates the least, while an old dictator with low cognitive ability donates the most. Hypothesis 3 is not supported: the average donation amount is different for the two locations, with dictators in Yamagata donating more.

5. DISCUSSION

We investigate donating behavior by using dictator game experiments and arrive at two principal findings. First, the higher the cognitive ability, the smaller is the donation. Second, the older a dictator, the more he or she donates. Our contribution is not only discovering these facts, but also finding the effect on donating behavior if ageing and cognitive ability are considered simultaneously. Additionally, average donation amount is different in Osaka and Yamagata. We discuss each of these findings in turn.

The finding on cognitive ability is in line with Ben-Ner et al. (2004) and, Chen et al. (2013), in which GPA is employed as one of cognitive ability indicators, despite the fact that their method of measuring cognitive ability is different from ours.

High Raven dummy is positive and significant; a dictator with high Raven's score donates more. At the same time, as mentioned above, the donation amount decreases as the score increases. This suggests that the greater cognitive ability brings into play other ways of decision making, such as inequality aversion, as well as selfish decisions.

The finding on ageing adds to the evidence that the elderly are generous, as shown by Yamagishi et al. (2014) and Matsumoto et al. (2016). Additionally, our finding suggests that

elderly people are altruistic even in abstract situations, such as standard dictator game experiments. This finding contrasts with the result of Beadle et al. (2013) that older people only become more generous than the young when they are in an empathy-induced situation.

As they age, they experience many pleasant and unpleasant events and see them from the standpoint of others. Their life history can thus increase their emotional empathy (Graham & Weiner, 1991), which is one of the main motivations for altruism.

Thus, combining our findings, we can infer that an old dictator with low cognitive ability will donate the most. This indicates he or she is the most generous. However, scamsters might exploit an old person with a low cognitive ability by indulging in some kind of grandparent scam. In fact, this scam has caused severe economic loss to Japanese elderly people in the last 15 years. The total financial loss because of this scam in 2016 was JPY 39 billion[15]. This scam has also grown in the U.S. and the financial damage there was more than USD 42 million in 2014[16].

Finally, regarding the regional difference in donating behavior, although the experimental setting is similar in the two locations (e.g., the same instructions, the same software, guarantee of anonymity, and an identical experimenter), the recruiting method in Osaka and Yamagata differed; this might have affected donating behavior.

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[16] https://www.aging.senate.gov/imo/media/doc/217925%20Fraud%20Book%20Final.pdf

Considering this, it is difficult for us to conclude that the difference in average donation amount in two locations stems from the cultural difference; however, Henrich et al. (2001, 2004) find differences in the economic decision making of people in 17 small societies around the world. Because it is difficult to recruit participants in Yamagata with the method used in Osaka[17], another method is required to accurately extract the effect of cultural differences.[18]

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[17] As explained before, we recruited participants in Osaka by posting a leaflet and sending an e-mail or a postcard; the participants in Yamagata were recruited after taking the help of the town hall staff. Considering that 500 leaflets are required to recruit one participant in Osaka, if we recruit participants in Yamagata by using the method employed in Osaka, only ten people would participate; this is because Nishikawa town has only about 5,000 residents. Thus, cooperation with the local government will be necessary to conduct an experiment in such a sparsely populated area.

[18] The evidence below supports the view that the cultural difference might affect donating behavior. We asked a middle manager in the town hall why the donation amount in our dictator game experiments was as high as almost half the endowment. He said, “Our town is in a snowy area and is gradually becoming depopulated. If the people in this town do not jointly carry out snow shoveling, agricultural work, or managing irrigation facilities, we cannot maintain everyday life. Cooperation is required to maintain everyday life. Under these circumstances, the people in this town tend to share something equally among all stakeholders.”

Additionally, Ito et al. (2016) employ undergraduate students from Yamagata University and Hiroshima City

In order to detect the cultural difference, controlling the social distance between a dictator and his or her recipient is required. By doing so, the difference in the recruiting method will disappear and only the cultural difference will be extracted. A promising method to control the social distance is the method of Dreber et al. (2014). In their study, all participants are designated as dictators and donate a certain fraction of the donation amount to future participants. We can modify this and designate as recipient a participant who lives at a place that is distant from a dictator.

Finally, we could not assign participants randomly to a treatment by using the information of age, cognitive ability, and residence. Therefore, our findings might not be general. To confirm our findings are general, we utilize the random assignment of participants and conduct additional experiments[19].

University for their series of dictator game experiments, finding that the donation rate is higher in Yamagata than in Hiroshima. Taking the statements of the officials in Nishikawa and Ito et al.'s (2016) results into account, it can be inferred that Nishikawa may have a culture that respects equality.

[19] As of March 2018, we have utilized a large participant pool in which information on age, cognitive ability, and location of the non-student participants is available. This helps us assign a participant randomly to a treatment.

6. CONCLUSIONS

We conducted single-blind dictator game experiments in two locations—Osaka (an urban area) and Yamagata (a rural area)—and investigated the relationships among ageing, cognitive ability, and altruistic behavior across the Japanese population. Based on an analysis of 520 participants, whose age ranged from 20 to 85, we arrive at two principal findings: (1) a dictator becomes selfish if his or her cognitive ability is high and (2) a dictator becomes generous as he or she gets older.

Thus, our findings make a novel contribution to the literature on understanding the linkages among donating behavior, the aging effect, and cognitive ability. From these linkages, it is found that the elderly are not more generous than the young if they have a higher cognitive ability than the young person.

Although a significant regional difference in donating behavior is observed, whether or not it stems from the cultural difference remains to be investigated in future research. Another future study will separate the cultural difference and the difference in recruiting by conducting the abovementioned experiments. These future studies would not only be in line with the experimental and anthropological studies of Henrich et al. (2004), but also explore in depth the

effect of the cultural difference on economic decision making.

To examine whether our findings are robust, we plan to assign participants randomly based on the information available on age, cognitive ability, and residence and conduct additional experiments in a future study.

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