

(van Duik and others 2010). Another limitation of the present study is that the impact of information about insect contamination in food on consumer valuation was examined only for rice. While rice is the major and preferred staple food in Japan (for example, Kumata 2008; Kimura and others 2010b), further studies that involve various foods, such as vegetables and processed foods, are required to generalize the present findings.

Conclusion

The current study provides the 1st behavioral evidence that the type of scientific information about insect contamination in food affects consumer valuation and attitudes toward that food. The present findings suggest that some combinations of scientific information that include the safety of the contaminated food are effective in reducing the compulsive rejection of insect contamination in food by consumers, especially in men. These findings could serve as an important step toward understanding consumer cognition toward food safety, health, and quality despite some limitations, as mentioned above. The present findings also have implications for the continuation of risk communication strategies, which consider both the effectiveness and limitations of specific types of scientific information about food in relation to consumer cognitive traits. Further research is necessary in order to ascertain communication strategies that will encourage consumers to rationally evaluate food safety.

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References

Amadori SA. 1993. *Thales: Anomalous TV*. The signature of central bias. *Behav Neuro Sci* 6:69-80.

Amadori SA, Thaler G. 2012. *Public food safety as a consumer: being informed*. A digital food safety risk in the information age. *Appl Geogr* 32:33-40.

Comstock KM, Chang RD, Loh JM. 2008. *Prevalence for digital consumer marketing: the use of digital marketing in the fast-food industry*. *Psychol Mark* 25:100-110.

Chang RD, Loh JM. 2011. *Use of digital marketing in the fast-food industry: an analysis of the use of digital marketing*. *Psychol Mark* 28:100-110.

Danzon JL, Naranjo MP. 2009. *Impact of digital marketing on the development of food products*. *Food Res Int* 42:100-110.

Tablet AP, Kim H, Hwang P. 2014. *The 2014 consumption of food: the development of food products and food safety*. *Food Res Int* 53:100-110.

Food and Drug Administration (FDA). 1996. *Infected foods: health risks and the food safety inspection service*. Washington, DC: US Food and Drug Administration.

International Air Services Ltd, Singapore. 1999. *Misinformation and health differences in digital marketing: the impact of digital marketing on food safety*. *Psychol Mark* 16:100-110.

Food & Nutrition Research Institute. 2010. *Individual differences in consumer behavior: a study on the use of digital marketing*. *Psychol Mark* 27:100-110.

Kimura A, Suda Y, Karada A, Maeda Y, Okamoto M, Goto S, Hasegawa T, et al. 2010. *Integrative effects of verbal and visual information and its acceptability on white and objective quality of food products*. *Appetite* 55:271-8.

Kimura A, Suda Y, Okamoto M, Yamaguchi Y, Hasegawa T, et al. 2011b. *Using labels in child food intake to promote a low-calorie diet: a randomized trial*. *Food Qual Pref* 22:100-110.

Kimura A, Suda Y, Hasegawa T, Goto S, et al. 2011. *Consumer valuation of packaged foods: differences between objective and perceived information*. *Appetite* 55:100-110.

Kimura A, Suda Y, Hasegawa T, Goto S, et al. 2011. *Consumer valuation of packaged foods: differences between objective and perceived information*. *Appetite* 55:100-110.

Martin Y, Pizarro P. 2006. *Use of digital marketing: a study on the use of digital marketing in the fast-food industry*. *Psychol Mark* 23:100-110.

Mori S, Tamura T. 2001. *Investigating specific concerns about digital marketing*. *Food Qual Pref* 12:100-110.

National Consumer Affairs Centre of Japan. 2011. *Food contamination*. Available from: <http://www.kohkai.gov.jp/pdf/10001174.pdf>. Accessed 2012 April 10 [in Japanese].

Shimizu M, Tamura K, Kawanishi M, Kawanishi K, Yamada H. 2010. *Impact of digital marketing on consumer valuation of food*. *Asia Pac J Trop Med* 3:100-110.

Chang RD, Amadori SA, Loh JM. 2008. *Can the use of digital marketing in the fast-food industry be used to promote a low-calorie diet? A study on the use of digital marketing in the fast-food industry*. *Psychol Mark* 25:100-110.

Chang RD, Amadori SA, Loh JM. 2008. *Can the use of digital marketing in the fast-food industry be used to promote a low-calorie diet? A study on the use of digital marketing in the fast-food industry*. *Psychol Mark* 25:100-110.

Chang RD, Amadori SA, Loh JM. 2008. *Can the use of digital marketing in the fast-food industry be used to promote a low-calorie diet? A study on the use of digital marketing in the fast-food industry*. *Psychol Mark* 25:100-110.

Chang RD, Amadori SA, Loh JM. 2008. *Can the use of digital marketing in the fast-food industry be used to promote a low-calorie diet? A study on the use of digital marketing in the fast-food industry*. *Psychol Mark* 25:100-110.

S. Science of Food

Clerk agent promotes consumers' ethical purchase intention in unmanned purchase environment

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ABSTRACT

This study examined the effect of the presence of an artificial individual in a purchase environment on purchase intention for products with fair-trade labels among Japanese consumers. By manipulating the presence of an artificial individual, we assessed consumers' intentions to purchase fair-trade products under two different experimental unmanned purchase environments: the agent condition, in which task instructions were given by a female clerk-like computer graphic agent throughout the task ($N = 118$), and the control condition in which task instructions were given through a text box ($N = 106$). Results demonstrated that participants under the agent condition valued fair-trade higher than those under the control condition, although participants in both the agent and the control conditions were instructed that their responses would remain anonymous. These findings suggest that the implication of the presence of an artificial individual, such as a clerk-like agent in an unmanned purchase environment, enhances the ethicality of purchase intentions as with manned purchase environments.

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1. Introduction

With developments in information and communication technology (ICT), unmanned purchase environments such as online shops have become popularized. They provide consumers with a new medium to purchase products and services, and have increased the importance of understanding consumer behaviors while shopping online (Liao, Chen, & Liu, 2011). A major difference between online and real shops from the social psychological perspective may be the presence of other people (Tenenbaum, Firth, & Firth, 2013). In contrast to manned purchase environments, it is less probable that consumer choices are observed by others, including other consumers and sales staff, in unmanned purchase environments.

It is well known in social psychology and socioeconomics that cues from others and potential reputational consequences influence altruistic and generous behaviors (Hoffman, McCabe, & Smith, 1996; Kimura et al., 2012; Piazza & Berino, 2005a,b). For example, Hoffman et al. (1996) demonstrated that the participants playing a dictator game in the role of dictator were more selfish when they

were socially isolated from both the experimenter and their counterparts (Parks and Bering, 2005a). They also found that threats of gossip by others encouraged altruistic decision making in a dictator game. Recently, Kimura et al. (2012) demonstrated that the effects of cues from others could also apply to a consumer's intention to purchase food products with ethical labels. They assessed consumers' intentions to purchase fair-trade food products under two different conditions: the observable condition, in which participants' purchase behaviors were observable by others, and the anonymous condition, in which participants' purchasing behaviors could not be observed by others. The effect of six sensory and extrinsic, including fair trade, attributes of hypothetical chocolate bars was examined using conjoint analysis. Kimura et al. (2012) found that participants under the observable condition valued fair trade higher than those under the anonymous condition. These results suggest that reputational concerns has an effect on a consumer's intention to purchase a fair-trade-labeled food and also suggest that there is a possibility that a consumer product choice based on altruistic attributes, such as fair trade, is less likely in unmanned purchase environments than in manned ones.

On the other hand, several studies on human-computer interface have suggested that altruistic behaviors could be enhanced not only by potential reputational consequences from real humans,

but also by artificial cues suggesting the presence of others (Larson, Nettle, & Roberts, 2006; Haley & Fessler, 2005; Izuma, 2012; Milne, Hashimoto, & Yamaguchi, 2010; Rigdon, Ishii, Watabe, & Kuzuno, 2009; Haley and Fessler, 2005). However, these merely including a stylized eye-like shape on the background of a computer screen was sufficient to enhance cooperation in the dictator game. Even when participants are explicitly made aware of the anonymous nature of their decisions, they may respond to environmental cues of being watched that prime participants to behave differently than they otherwise would. Similarly, Rigdon et al. (2008) demonstrated that even a weak social cue like three dots in a watching-eye configuration has a positive effect on giving behavior in the dictator game. These findings led us to postulate that artificial cues suggesting the presence of others might enhance a consumer's product choice based on altruistic attributes such as fair trade.

However, it is still unknown whether the presence of an explicit artificial individual causes a similar effect on consumer behavior. Tetamoni, Matsura, and Asai (2012) used the Simon paradigm to suggest that participants feel a sense of being together even in a virtual environment. In this paradigm, one participant presses a key in response to one color and the other participant presses another key in response to a second color. Despite the fact that each participant is performing a go/no-go task, an effect similar to a standard Simon effect occurs if they feel a sense of togetherness. Tetamoni et al. (2012) showed that the social Simon effect occurred under the condition where participants could communicate with each other during a 3-min interaction in the virtual environment. Thus, we can assume that the presence of an explicit artificial individual might change consumer response in the same way that virtual communication can generate a sense of togetherness.

Here, we examine the influence of the presence of an artificial individual on purchase intention for fair-trade food products among Japanese young adults. To manipulate the presence of an artificial individual, we asked participants to rate their purchase intent for a presented fair-trade food product in two different situations: one was the agent condition, in which task instructions were given by a clerk-like agent throughout the task, and the other was a control condition, in which task instructions were given through a text box. We used a clerk-like agent as the artificial individual in this study because it seemed more natural for a purchase environment than the eye-like figures used in previous studies of experimental games (Haley & Fessler, 2005; Milne et al., 2010; Rigdon et al., 2008). We assessed consumers' intentions to purchase fair-trade food using conjoint analysis as performed in Kimura et al. (2012). Conjoint analysis provides a model of consumer utilities for various attributes of multifactor stimuli. The model is built by quantifying respondents' preferences for a set of factorially designed alternatives (Green, 1974). We hypothesized that the relative importance of fair trade among the attributes of food products would be higher in the agent condition than in the control condition.

2. Method

2.1. Design

The experiment was based on a two-independent-groups design (artificial cues from another person-agent vs. control conditions) with consumers' preferences toward eight hypothetical chocolate products as the dependent variable.

2.2. Participants

Data collection was administered by an on-line professional market research agency, Cross Marketing Inc., Japan. Data were

Table 1
Attributes and their levels chosen for conjoint study: chocolate.

Attribute	Attribute level
Fair-trade	Yes: with a fair-trade label No
Price	Low: 150 yen High: 200 yen
The country of manufacturer of the product	Domestic (made in Japan) Imported from France
Taste characteristics	Milk chocolate Dark chocolate
Polyphenol	Rich in polyphenol No information
Caloric contents per pack (100 g)	Low: 490 kcal High: 557 kcal

^a 100 yen roughly corresponded to \$1.13 US or €0.85 according to the foreign currency exchange rate as of January, 2013.

collected in November 2011, among a registering pool of Japanese consumers with responsibility for their household's daily grocery shopping. The registrants were sent an e-mail invitation, which asked them to participate in a survey on purchasing foods. A total of 118 participants (49.2% females, mean age = 21.6 years, $SD = 2.09$) were assigned in the agent condition and 106 participants (50.0% females, mean age = 21.4 years, $SD = 2.00$) were assigned in the control condition, respectively. Following their participation in the web-based survey, participants received a small reward from the research agency in the form of points that participants can save up for a gift coupon. The study was approved by the institutional ethics committee of Tokyo Denki University.

2.3. Materials and apparatus

We used a chocolate bar as the target product as with Kimura et al. (2012) because it is a major fair-trade product that is sold in Japanese supermarkets, and is a popular and well-consumed snack in Japan. Kimura et al. (2012) selected six product attributes: fair trade, price, country of manufacture, taste characteristics, polyphenol content and caloric content. Similarly, the product attributes for our study were presented as follows: fair trade was labeled as "fair-trade" or "not labeled"; price, which fell within the price range of actual commercial products, was set at 150 yen or 200 yen (100 yen roughly corresponded to \$1.13 US or €0.85 euro according to the foreign currency exchange rate as of January, 2013); country of manufacture, which reflected that of major commercial products currently available, was set as "domestic" or "imported from France"; taste characteristics were "milk chocolate" or "dark chocolate"; polyphenol levels were labeled as "rich in polyphenol" or "not labeled"; and caloric content per pack (100 g) was "300 kcal" or "557 kcal". These scores were determined referring to the Standard Tables of Food Composition in Japan (Ministry of Health, Labour and Welfare Japan, 2005). Table 1 contains a full list of the attributes and their levels used to devise the chocolate profiles. This conjoint design was input into the SPSS conjoint analysis package ver. 17.0 (SPSS Inc., Chicago, IL 60611, USA) to create conjoint cards, each of which contained a verbal description of a product in terms of its attributes and their respective levels with schematic illustrations of the corresponding product. Each product was described in terms of six attributes, each containing two levels. Thus, there were theoretically 64 possible attribute combinations. A fractional factorial design was applied, resulting in eight cards for participant evaluation. Fig. 3 illustrates the scheme design for the stimulus cards. All eight stimulus cards were presented simultaneously on the full screen of a color monitor, with a resolution of 800 × 600 pixels.

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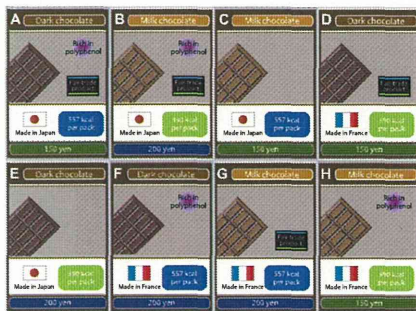


Fig. 1. Examples of eight labels used in this study (Kimura et al., 2012).

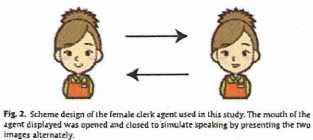


Fig. 2. Scheme design of the female clerk agent used in this study. The mouth of the agent (displayed) was opened and closed to simulate speaking by presenting the two images alternately.

The illustration of a female clerk extracted from a copyright-free-illustration site¹ was used as the image of the clerk agent in the present study (Fig. 2, left). We also made an illustration of the same agent with her mouth open (Fig. 2, right). By presenting the two images alternately seven times for each paragraph of instructions, we produced a GIF (graphics interchange format) animation of the clerk agent in which she opened and closed her mouth so as to appear to be speaking (Fig. 2, see also Fig. 3). We used this animation to enhance the attention of participants towards the agent and the authenticity of the interaction between the participants and the agent.

2.4. Procedure

Participants clicked a link, sent to them by email, which took them to a welcome web page that provided a description of the study and instructions. They were instructed that their responses to the survey were being collected anonymously. All participants were then instructed on the general task procedure and on each attribute of the chocolate products used in the conjoint session. Fair trade in this product was defined as "trading cacao and other ingredients based on a fair price in international trades. Buying

fair-trade products contributes to the promotion of the wellbeing of producers in developing countries and to environmental preservation." The computer-based questionnaire comprised 2 parts: part 1 was for the conjoint analysis and part 2 was a general questionnaire pertaining to participants' food purchasing habits and demographics. In the conjoint analysis session, participants were asked to rate the 8 profile cards (Fig. 1) using a ranking method in the manner of choice-based conjoint analysis. They were given the 8 profile cards simultaneously and ordered them from the highest (assigned a ranking of 1) to the lowest (ranking of 8) intention to buy.

After completing the conjoint analysis session, participants were asked to complete a computer-based questionnaire pertaining to their purchase and consumption of foods. Furthermore, participants in the agent condition were asked to rate the explicit effects of displaying a clerk agent on their product choice using a 5-point scale (-2, not at all to +2, very). Demographic information was collected in the final section of the questionnaire.

In the agent condition, instructions for the general task procedure, each attribute of the chocolate products and instructions for the conjoint task were provided by a clerk agent (Fig. 3, left). In the control condition, all instructions throughout the entire experimental session were given through a square text box (Fig. 3, right).

2.5. Data analyses

A fractional-factorial design was used to evaluate the sequence of consumers' preference ratings of the eight hypothetical chocolate products where the six chocolate-related attributes were orthogonally arranged (Tuchshue & Fiedel, 2007). Interaction effects among the attributes were assumed to be negligible (Green, 2010). The significances of the utility scores of the attributes were examined using one-sample *t*-tests against zero for each condition. The resulting *p*-values from *t*-tests were thresholded using the Sidak-Bonferroni procedure (number of tests = 6).

To test whether the utility scores for the attributes were different between the agent and control conditions, we performed

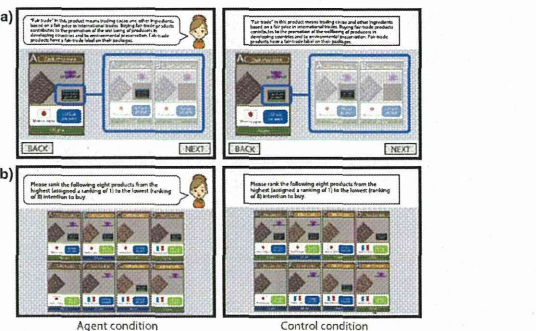


Fig. 3. Scheme design of the task screen for the agent and control conditions, (a) an example of each attribute of the chocolate products and (b) instructions for the conjoint task.

unpaired *t*-tests with cues from another person as a between-subject factor on the utility scores for each attribute. The resulting *p*-values from *t*-tests were thresholded using the Sidak-Bonferroni procedure (number of tests = 6).

Furthermore, in order to examine the significances of the explicit effects of the clerk-agent on consumers' purchase intention, we performed one-sample *t*-tests against zero on the scores of explicit effects in the agent condition.

3. Results

3.1. Conjoint analyses

Pearson's *R* and Kendall's τ , the utility scores (part-worth) for each attribute category, and the relative importance for the conjoint analysis with each condition are shown in Table 2. The conjoint models of the agent and control conditions were adequate based on their respective effect sizes (Pearson's *R* and Kendall's τ), implying that the chocolate attributes properly accounted for the preference ratings of the eight chocolate products.

In the agent condition, the utility scores were significantly different from zero for the attributes of fair trade ($t(117) = 9.76$, $p < .01$), price ($t(117) = 8.88$, $p < .01$), country of manufacture ($t(117) = 9.76$, $p < .01$), polyphenol ($t(117) = 9.76$, $p < .01$) and caloric content ($t(117) = 9.76$, $p < .01$), based on one-sample *t*-tests with Sidak-Bonferroni corrections. On the other hand, the taste characteristic attribute was not associated with consumers' purchase intentions in the agent condition ($t(117) = 0.48$, n.s.).

In the control condition, the utility scores were significantly different from zero for the attributes of fair trade ($t(105) = 3.67$, $p < .01$), price ($t(105) = 7.56$, $p < .01$), country of manufacture ($t(105) = 6.85$, $p < .01$), polyphenol ($t(105) = 3.11$, $p < .01$) and caloric content ($t(105) = 3.43$, $p < .01$), based on one-sample *t*-tests with Sidak-Bonferroni corrections. On the other hand, the taste characteristic attribute was not associated with consumers' purchase intentions in the control condition ($t(105) = 0.50$, n.s.).

Table 2
Utility scores and relative importance of each chocolate attribute in agent and control conditions.

Attributes & Levels	Artificial individual	
	Agent condition (n=118)	Control condition (n=106)
Fair-trade	0.633 ^a	0.285 ^a
Yes	0.633 ^a	0.285 ^a
No	-0.633 ^a	-0.285 ^a
Relative importance (%)	17.9%	14.5%
Price	0.619 ^a	0.637 ^a
Low	0.619 ^a	0.637 ^a
High	-0.619 ^a	-0.637 ^a
Relative importance (%)	18.9%	19.9%
The country of manufacturer		
Domestic	0.373 ^a	0.512 ^a
Imported from France	-0.373 ^a	-0.512 ^a
Relative importance (%)	18.0%	17.9%
Taste characteristics		
Milk chocolate	0.053	0.068
Dark chocolate	-0.053	-0.068
Relative importance (%)	23.3%	25.7%
Polyphenol		
Rich in polyphenol	0.282 ^a	0.179 ^a
No information	-0.282 ^a	-0.179 ^a
Relative importance (%)	10.7%	11.8%
Caloric contents per pack		
Low	0.284 ^a	0.200 ^a
High	-0.284 ^a	-0.200 ^a
Relative importance (%)	11.3%	10.4%
Pearson's <i>R</i>	0.694	0.645
Kendall's τ	1.000	0.786

^a $p < .005$.

^b When compared to zero in a two-tailed *t*-test.

¹ Free graphics Pixidigit, Website: <http://www.pixidigit.com/>. Visited November 2011 [in Japanese].

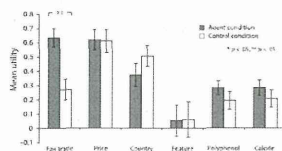


Fig. 4. Effects of the artificial individual on a factor's importance of chocolate purchasing intent. Error bars indicate standard error ($N = 118$ for the agent condition, $N = 166$ for the control condition).

3.2. Effects of the presence of an artificial individual on the estimated utility scores of attributes

Unpaired *t*-tests with cues from another person (agent vs. control conditions) as a between-subject factor on the utility scores for each attribute revealed significant effects of the artificial individual on the utility scores of fair trade ($F(2,22) = 3.70, p < .05$). The utility scores of fair trade were higher in the agent condition than in the control condition (Fig. 4).

3.3. Explicit effects of the clerk-agent on consumers' purchase intention

The mean score of the explicit effects of a clerk-like agent on participants' product choice in the agent condition was -1.3 ($SD = 0.92$). One sample *t*-test against zero revealed the scores of explicit effects to be significantly different from zero ($t(117) = 14.1, p < .01$).

4. Discussion

The objective of the current study was to examine whether the presence of an artificial individual would have an effect on consumers' purchase intentions for fair-trade food products. As predicted, the results of conjoint analysis demonstrated that participants in the agent condition valued fair trade more highly for their overall purchase intention than those in the control condition. Fair trade accounted for 17.9% of the respondents' purchase intents in the agent condition and 14.5% in the control condition (see Table 2).

4.1. Consumers' purchase decisions under anonymity

We would like to discuss the validity of the results of the control condition. In the control condition, the participants' purchase intentions were significantly affected by price, country of manufacture, fair trade, polyphenol content and caloric content per package. Based on the order of relative importance (RI), taste characteristics (RI = 25.7%), price (RI = 19.9%) and country of manufacture (RI = 17.9%) were most important for participants in the control condition, whereas RI of fair trade was 14.5% (see Table 2). These results are consistent with the anonymous condition in Kimura et al. (2012) in which experimental settings of observability and tasks were the same as the control condition in this study, and with previous studies which have found the importance of taste characteristic, price and country of manufacture in consumers' intentions to purchase food products (e.g., Hadjilad et al., 2007; Kimura et al., 2011; Prescott, Young, O'Neill, Yau, & Stevens, 2002; Schuettler, Ruiz, Sepúlveda, & Sepúlveda, 2008). Further-

more, the intentions to purchase of respondents in the control condition were significantly influenced by fair trade (Table 2). This tendency is also consistent with previous findings, which have demonstrated that consumers value fair-trade foods based on their general attitudes and ethical motives (De Felice & Grunert, 2007; Howell & Burke, 2012; Kimura et al., 2012; Koppell, Koppell, 2012; Zander & Hamm, 2010). Thus, the current results of the control condition are considered reasonable and imply that consumers value fair trade but not as much as taste characteristics, price, and country of origin in their intention to purchase chocolate, at least when their responses are recorded anonymously.

4.2. Effects of the presence of an artificial individual on intention to purchase fair-trade products

On the other hand, participants' purchase intentions in the agent condition were more highly affected by fair trade than those in the control condition. In the agent condition, RI of fair trade (17.9%) was as high as those of price (RI = 18.9%) and country of manufacture (18.0%; see Table 2). Unpaired *t*-tests with the effect of an artificial individual on the utility scores for each attribute demonstrate that the utility scores for fair trade were higher in the agent condition than those in the control condition whereas there were no differences in the utility scores for any other attributes between conditions. These results suggest that consumers valued fair-trade-labeled products more highly when their food choices were performed on the screen with the clerk-like agent. Previous studies showed that altruistic and pro-social behaviors were enhanced by artificial cues of the presence of other individuals, such as eye figures (e.g., Hatton et al., 2006; Haley & Fessler, 2005; Milane et al., 2010; Rigdon et al., 2010). In line with those altruistic behaviors, in economic games, consumers' ethical consumption, such as purchasing fair-trade products, might be promoted when their decision is performed in front of a screen with subtle cues of being watched by others.

Interestingly, participants in the agent condition were not aware of the effects of the artificial individual on their pro-social decision. The results of one-sample *t*-tests against zero revealed that the mean scores for the explicit effects of an agent on one's own purchase intention (-1.3) were significantly lower than neutral (zero). These results suggest that participants in the agent condition believed that the display of a clerk-like agent had no effect on their decision-making. One possible explanation of why displaying a clerk-like agent has a positive impact on participants' pro-social purchase decisions, despite the fact that they were not aware of the effect, lies in the automatic process of reputation in the cognitive system (Tomas, 2012; Tomas et al., 2010). In particular, Tomas (2012) argued that the uniquely human link between eye figures and pro-social behavior might be derived from the evolutionary mechanism of indirect reciprocity (Alexander, 1987; Nowak & Sigmond, 1998, 2005). In the indirect reciprocity theory, helping behaviors toward others from which no payback can be expected are explained by the indirect reciprocity strategy in which the cooperative individual benefits in the long term through increased cooperation from others (Nowak & Sigmond, 1998, 2005; see also Tomas et al., 2010). This mechanism would facilitate cooperation in a larger population than in the case of direct reciprocity because unacquainted individuals could cooperate with each other (Masuda, 2012). Recently, there were evidences concerning the origins and ontogeny of indirect reciprocity from research with infants (Gutkin, Vignio, Rigdon & Malapan, 2011; Morero & Santoni, 2013). For instance, Morero and Santoni (2013) found that 10-month-old infants were sensitive to the fact that the reciprocator was confirming or violating the principle of indirect reciprocity. The implicit and indiscriminate pro-social behaviors were

interpreted as a result of these automatic processes of reputation in the cognitive system.

On the other hand, the current results also suggest that the indirect reciprocity theory provides a partial, not full, explanation for the relationship between reputational concerns and the consumer's intention to purchase fair-trade products. The present results show that the RI of fair trade in the agent condition was 17.9%, and was not the highest among attributes, whereas those in the observable condition (high reputational concern derived from real observers) of Kimura et al. (2012) was 20.7%, and was the highest of the attributes. These results imply that the degree of reputational concerns induced varies with whether a participant is potentially being observed and are hard to explain with only the framework of indirect reciprocity. However, the observer-related difference of impact on the consumers' pro-social behavior might also be explained by the social impact theory (Latane, 1981). This classical theory proposes that social influences on individuals depend on the strength and immediacy of the source of impact as well as the number of observers. Participants (university students) in the observable condition in Kimura et al. (2012) were instructed that their responses in the experimental session would be videotaped and used as material for discussion in classes on marketing and consumer behavior in order to lead participants to be self-conscious about how they may appear to friends and acquaintances in their university. This experimental setting could have a relatively high impact on reputational concerns among participants because the opinions of friends and acquaintances in their university may have a strong and immediate impact on their reputation. To elucidate the influence of social impact on consumers' pro-social behavior, further experiments controlling the relationship between participants and the potential observers are required. In order to perform these experiments, the use of agents as potential observers would be useful because agents are likely more effective for controlling the observer's role and relationship to participants than are eye-figures used in previous studies.

4.3. Limitations and future research

The present results are subject to some limitations. The influence of artificial cues on consumers' purchase intention for food products with ethical labels was examined for only one specific label: fair trade. While fair trade is a major ethical label on food products, further studies that involve various ethical and environmental labels such as rainforest alliance, animal welfare and carbon footprint are required to generalize the present findings. In addition, our findings are based only on self-reported purchase intention rather than actual purchase behavior. As mentioned by Kimura et al. (2012), actual behavior might be different from intentions. Future research should examine how self-reported purchase intention affects actual buying behavior.

5. Conclusion

The current results are consistent with previous studies that have shown that an individual's altruistic behavior is influenced by artificial cues of an individual (Hatton et al., 2006; Haley & Fessler, 2005; Izuma, 2012; Milane et al., 2010; Rigdon et al., 2010), and further provide evidence that displaying artificial cues of the presence of others has a positive effect on the consumer's pro-social purchase decisions. These findings could serve as an important step towards understanding the social aspects of human-agent interaction and consumer behaviors in online shops. As argued by Tomic et al. (2010) and Izuma (2012), the importance of reputation management is ever increasing in the modern world, where trading via the Internet is becoming increasingly common

and people interact with strangers on a daily basis. The approach and methodologies of social and evolutionary perspectives may be useful for understanding human behavior in a computer-mediated environment (Piazza & Bellizzi, 2009). Further research is necessary in order to make clear the social psychological values of agent systems that influence consumers' pro-social behaviors.

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References

- Alexander, R. D. (1987). *The biology of moral systems*. New York: Aldine De Gruyter.
- Anderson, M., North, E., & Blanton, A. (2009). Cues of being watched enhance cooperation in a real-world setting. *Biological Letters*, 2, 412–414.
- De Felice, F., & Grunert, K. G. (2007). French fair trade coffee buyers' purchasing motives: An online survey study using means-end chain analysis. *Food Quality and Preference*, 18, 218–229.
- Demer, S., & Balle, B. (2012). The influence of ethical values and food choice involvement on intentions to purchase sustainably sourced foods. *Appetite*, 65, 137–144.
- Green, P. B. (1974). On the design of choice experiments involving multiple alternatives. *Journal of Consumer Research*, 1, 91–98.
- Haidt, J., Haidt, J., Heine, A., Saper, N., Haidt, T., & Tamura, T. (2007). Mapping determinants of purchase intent of concentrated sweet (sorbitol) by sensory analysis. *Food Quality and Preference*, 18, 265–272.
- Haley, K. J., & Fessler, D. M. T. (2005). Reductive matching: Judice cues affect generosity in an anonymous economic game. *Evolution and Human Behavior*, 26, 245–256.
- Hatton, J. S., Wynn, K., Milne, P. A., & Mahajan, N. (2011). How quickly and indirectly, to associate others. *Proceedings of the National Academy of Sciences of the United States of America*, 108, 19813–19818.
- Horowitz, E., McCabe, K., & Smith, V. L. (1998). Social distance and other-regarding behavior in dictator games. *The American Economic Review*, 88, 613–620.
- Izuma, K. (2012). The social neuroscience of reputation. *Neuroscience Research*, 72, 288–298.
- Kimura, A., Kawahara, S., Wada, Y., Yoshida, Y., Okamoto, M., Yamaguchi, Y., et al. (2012). Using conjoint analysis to assess purchase intent of fermented soy product (natto) among Japanese housewives. *Journal of Food Science*, 73, 5312–5324.
- Kimura, A., Makino, S., Yamamoto, M., Masuda, T., Yama, M., Goto, S., et al. (2012). The effect of reputational concerns on purchase intention of genetically modified soybeans among Japanese adults. *Food Quality and Preference*, 26, 204–210.
- Koppell, D., & Koppell, S. K. (2012). Enabling can create an eye and fair trade behavior of French consumers. *Proceedings of the National Academy of Sciences*, 109, 1316–1321.
- Latane, B. (1981). *The psychology of social impact*. *Annual Review of Psychology*, 32, 315–335.
- Lian, S.-H., Chen, Y.-J., & Chen, Y.-T. (2011). Young consumers' knowledge to implement online shopping and home delivery for hypermarkets. *Expert Systems with Applications*, 38, 1987–1991.
- Masuda, N. (2012). Group formation and intergroup cooperation under indirect reciprocity based on group reputation. *Journal of Economic Behavior & Organization*, 71, 7–14.
- Melillo, M., & Soria, L. (2013). Do infants detect indirect reciprocity? *Cognition*, 129, 103–114.
- Milane, N., Rademacher, H., & Yamaguchi, Y. (2010). Attention toward group reputation as a reputation mechanism. *Evolution and Human Behavior*, 31, 105–112.
- Ministry of Health, Labour and Welfare Japan (2005). *Standard tables of food composition in Japan (7th revised and enlarged)*. Ministry of Health, Labour and Welfare Japan (in Japanese).
- Nowak, M. A., & Sigmond, K. (1998). Evolution of indirect reciprocity. *Nature*, 393, 251–256.
- Ono, K. (2010). *Group started with using analysis. Structures for social design and young markets*. Lindell & Lindell, Wisconsin Research Publishers LLC.
- Piazza, J., & Bellizzi, J. M. (2009). Concerns about reputation via direct purchase behavior allocations in an economic game. *Evolution and Human Behavior*, 26, 173–178.
- Piazza, J., & Bellizzi, J. M. (2008). The effects of perceived anonymity on altruistic punishment. *Evolutionary Psychology*, 6, 467–501.

Piazza, J., & Bellizzi, J. M. (2009). Evolutionary and psychological origins of evolutionary fitnesses to internet behavior. *Cognition in Human Behavior*, 25, 1274–1290.

Prescott, J., Young, P., O'Neill, L., Yau, N.-J., & Stevens, R. (2004). Motives for food choice: a comparison of consumers from Japan, Taiwan, Malaysia and New Zealand. *Food Quality and Preference*, 17, 480–492.

Rigdon, M., Lahn, K., Watabe, M., & Kitayama, S. (2009). Minimal social cues in the dictation game. *Journal of Economic Psychology*, 30, 303–307.

Schuettler, R., Ruiz, D., Sepúlveda, D., & Sepúlveda, N. (2008). Importance of the country of origin to food consumption in a developing country. *Food Quality and Preference*, 19, 372–382.

Talbachnik, B., & Fiedel, L. (2007). Environmental design using ANOVA. *2nd ed.*. Belmont, California: Thompson Brooks/Cole.

Tomas, C., Roth, U., & Firth, C. D. (2010). Reputation management in the age of the world-wide web. *Trends in Cognitive Sciences*, 14, 482–488.

Tsurumoto, W., Matsumoto, Y., Asai, N. (2013). Measurements of a "sense of being together" in virtual environments. *IEEE Technical Report (IEEE-TR-2013-01)*. (In Japanese with English abstract).

Zander, S., & Hamm, U. (2010). Consumer preferences for additional ethical attributes of organic food. *Food Quality and Preference*, 21, 491–501.

