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Siebenaler, S., Szymkowiak, A., Robertson, P., Johnson, G.I., Law, J. & Fee, K. (2019) 'Honesty, social presence, and self-service in retail', *Interacting with Computers*, vol. 31, no. 2, pp. 154–166.

Honesty, Social Presence, and Self-service in Retail

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Abstract

Retail self-service checkouts (SCOs) can benefit consumers and retailers, providing control and autonomy to shoppers independent from staff. Recent research indicates that the lack of presence of staff may provide the opportunity for consumers to behave dishonestly. This study examined whether a social presence in the form of visual, humanlike SCO interface agents had an effect on dishonest user behaviour. Using a simulated SCO scenario, participants experienced various dilemmas in which they could financially benefit themselves undeservedly. We hypothesised that a humanlike social presence integrated within the checkout screen would receive more attention and result in fewer instances of dishonesty compared to a less humanlike agent. Our hypotheses were partially supported by the results. We conclude that companies adopting self-service technology may consider the implementation of social presence to support ethical consumer behaviour, but that more research is required to explore the mixed findings in the current study.

Keywords: Agent-based interaction; anthropomorphism; retail shrinkage; social presence; self-service; eye tracking.

RESEARCH HIGHLIGHTS

- A method by Vohs and Schooler (2008) was adapted for investigating dishonesty
- Social presence is proposed as a mediator for dishonest behaviour
- There is scope for social presence to influence user behaviour in a world that increasingly relies on self-service transactions
- The effectiveness of measures of dishonesty need to be researched further

1. INTRODUCTION

Dishonest behaviour has been of interest to researchers of deviant consumer behaviour (Wirtz & McColl-Kennedy, 2010), and is concerned with ways in which consumers choose to take advantage of opportunities during an interaction with a retailer to benefit themselves. While there is substantial research on dishonest behaviour (i.e. theft) in traditional staffed retail outlets, research on dishonest behaviour at self-service checkout (SCO) systems has only recently seen more interest (Beck, 2015; Taylor, 2016).

The use of SCOs (see Figure 1 for an example) typically implies that consumers scan, bag and pay for their shopping items independently from staff, who are often deployed elsewhere for customer assistance. Thus, SCO transactions may be associated with reduced physical presence of others. Social presence, defined here as the perceived presence of others in technology mediated environments (see Short et al., 1976), is effective in inducing individuals to respond socially, especially with more anthropomorphic characters (Nowak & Biocca, 2003; Parise et al., 1999),

similarly to actual physical human presence (Baumeister, 1982). In the absence of staff, consumer transactions at self-service thus provide an opportunity to investigate the effects of social presence on consumer behaviour, and, in the current study, specifically dis-/honest consumer behaviour, which was the aim of the study.

In the following we will review the theoretical framework surrounding crime, with a particular focus on how social presence affects human behaviour. We will also discuss definitions of social presence, and how it has been instantiated to support pro-social behaviour, followed by a description of the current study.

Figure 1: *Example of a self-service checkout (SCO)*

In the following we will review the theoretical framework surrounding crime, with a particular focus on how social presence affects human behaviour. We will also discuss definitions of social presence, and how it has been instantiated to support pro-social behaviour, followed by a description of the current study.

1.1 Factors surrounding dishonest behaviour

The model of the offender as a decision maker underlies much criminological research of deviance by psychologists, economists, and sociologists (Clarke & Cornish, 1985). The concept of "choice structuring properties'' (Cornish & Clarke 1987, p.933), which refers to the constellation of opportunities, costs, and benefits attached to types of crime, can provide a useful framework for analysing crime control policies. According to the Crime Triangle (Clarke & Eck, 2014), occurrence of crime is associated with three factors: 1) a target with opportunity available, 2) ability to obtain a product in a specific place, and 3) the offender's desire to complete the crime. Addressing any of these factors can reduce or eliminate the occurrence of crime; for example, opportunity for theft in retail can be counteracted using security tags and surveillance by staff.

In line with this framework, the implementation of surveillance has increased over recent decades (Welsh et al., 2010). Formal surveillance, such as closed-circuit television (CCTV), store staff, security guards, and informal surveillance, such as lighting and placing of products, are seen to be effective measures against crime (Kajalo & Lindblom, 2010). Irrespective of transaction format, however, inventory loss due to customers has been and continues to be an ongoing problem for retailers, with exact figures typically estimated (Beck, 2011) and unlikely to be known. While surveillance is generally effective in deterring theft, the use of CCTV has become less effective, as customers have become habituated to traditional CCTV (Beck & Willis, 1999). This finding raises the question of whether social presence (i.e. perceived presence of others) can be implemented in other, additional ways to deter crime.

1.2 Self-service and dishonest behaviour

In recent years a number of studies has investigated the occurrence of customer theft at self-service (e.g. Beck & Hopkins, 2017), but many companies do not share their findings (Beck, 2011; Beck & Hopkins, 2017). While a recent UK Home Office Report (2015) stated that stores that adopt self-service are more likely to experience theft than those that do not (Home Office, 2015) a direct link between theft and self-service was not drawn. Stores that do adopt self-service are typically different from those which do not, e.g. are larger, and the report concluded that it cannot be suggested that the use of self-service causes higher levels of shoplifting (Home Office, 2015).

Nevertheless, with the implementation of new technology, new (dishonest) behaviours may arise. For example, customers annoyed by failures during a transaction can blame the machine as a means for justifying theft, which Beck (2011) described as the 'self-scan defence'. Consistent with this notion, Taylor (2016) identified different strategies customers utilize to engage in theft purposefully, but also reported that frustration may induce people to behave dishonestly, which was likewise described by others (Siebenaler et al., 2017).

Whatever the motivations customers may have, and given that shoplifters themselves perceive formal surveillance as one of the biggest deterrents to stealing (Carmel-Gilfilen, 2013), there may be scope to address dishonest behaviour at the SCO via social presence. We propose that the incorporation of social presence within self-service transactions may provide a way to address theft at SCO as the perception of being watched, i.e. a form of social presence, induces people to adopt pro-social, behaviours (e.g. Pfattheicher & Keller, 2015).

1.3 Social presence, social agents and prosocial behaviour

Short et al. (1976) originally introduced the notion of social presence as the salience of others and their interpersonal interactions in mediated communications. Several definitions of social presence have been put forward since, however, they have in common the indication that there is a perception of a shared environment with others (Biocca et al. 2001; Walther, 1992) or that another intelligence exists in the environment (Romano et al., 2005). Biocca et al. (2003) described social presence as a sense of being with another and the "other" can be human or an artificial intelligence. Co-presence is the dimension of social presence relating to the degree to which an observer believes s/he is not alone (Lee et al. 2016), which may result in an observer modifying his/her behaviour (Zhao, 2003). Within the context of virtual environments, Blascovich et el. (2002), put forward the notion that behavioural realism of virtual characters and social presence are directly related to social influence, with social presence referring to the extent to which users believe themselves to be in the presence of others and interacting with those others.

The presence of others can lead individuals to alter their behaviour in a manner that communicates a positive self-impression (Baumeister, 1982). Consistent with this notion, though while not explicitly studying social presence, Bateson et al. (2006) investigated the effects that images of humanlike features have on prosocial behaviour. This research monitored money contributions in an honesty box within a university coffee room. During the collection period, various images were placed next to the honesty box, showing either a pair of eyes (high social presence) or a bunch of flowers (low/no social presence). The findings showed that displaying the image of a pair of eyes resulted in three times more money in the honesty box compared to the image of a bunch of flowers. This finding suggests that people were more likely to behave honestly (prosocial) when they experienced a social presence (the image of a pair of eyes) even when only an implied human presence was present.

Research that shows a social presence can be induced by images has also been conducted by Nowak and Biocca (2003), who looked at whether people will respond socially to computer-controlled entities that involved humanlike features, such as eyes. Their findings suggest that people do respond socially to artificial computer agents; in addition, human features designed within computer agents created feelings of a social presence when participants interacted with them. Sproull et al. (1996) showed that people presented themselves more positively when the interface they interacted with contained a face compared to a text display. In addition, research has highlighted that individuals will cooperate more with, and respond socially to, humanlike virtual agents compared to non-human (e.g. animal) virtual agents, and that increasing levels of agent realism can positively influence cooperation (Parise et al., 1999). Within e-commerce, social presence was found to promote feelings of user trust (Gefen & Straub, 2004) which may then increase customer loyalty (Cyr et al., 2007). Furthermore, human qualities integrated within an on-screen agent increased user performance in a decision-making task (Shinozawa, 2005).

1.4 Cues to social presence

Humanlike features have been suggested as being advantageous to human-computer interactions to imply that the computer has particular social skills. Human forms imply human qualities that evoke perceptions of lifelikeness in the system (Küster et al., 2015). Anthropomorphic representations, i.e. humanlike appearance or behaviour, make the computer appear more intelligent, engaging and capable of higher agency than those with non-anthropomorphic visual forms (King & Ohya, 1996; Koda & Maes, 1996). Social interactions between computer agents and humans have been suggested as being similar as humans have a need to care for others (Sproull et al., 1996). In addition, human-like interfaces induce users to apply impression formation and management techniques similar to those that would be expected in human-to-human communication (Küster et al., 2015).

Two contrasting theoretical paradigms in relation to user responses to virtual characters and their agency have been investigated in recent years. Some have reported that user responses to virtual characters are not dependent on perceived agency of the character (Felnhofer et al., 2018; Kothgassner et al. 2010; von der Pütten, 2010). Instead, humans respond automatically to computer controlled entities, as long as sufficient social cues can be perceived, consistent with the Media Equation (Ethopoeia) Concept, or Computers as Social Actors (CASA) paradigm, put forward by Nass and colleagues (Nass & Moon, 2000; Reeves & Nass, 1996). Others have suggested, that agency, typically represented by a virtual character perceived to be controlled by a human (avatar), is necessary for social influence to occur, in the contrasting Threshold Model of Social Influence (Blascovich et al., 2002, for a meta-analysis on the effects of agency of virtual characters see Fox et al., 2015). While anthropomorphic appearance of the virtual character strictly is not necessary to elicit social responses (e.g., Aymerich-Franch, 2012), both theoretical positions propose, however, that anthropomorphic behaviour and/or appearance can induce a social response on part of the user as they are social cues.

Why are humanlike features so potent for affecting human behaviour? Research suggests that humans have involuntary perceptual systems that respond to stimuli of faces and eyes (Emery, 2000; Haxby, et al., 2000). Humans rely on face and eye cues to make social decisions and determine whether or not an individual is trustworthy (Haxby et al., 2000). Gaze detection has been closely linked with theory of mind, as suggested by Baron-Cohen (1997), in that individuals may perceive a(n) (human) agent's level of interest in him/her via visual behaviours displayed. Gaze behaviour may influence the perception of interest from the agent on the user, also known as the mutual

attention mechanism (Peters, 2005). Consistent with mutual attention, users will follow a virtual agent's gaze (Martinez et al., 2011), akin to social gaze in human-human interaction.

1.5 Experimental rationale and hypotheses

The review of previous research implies that virtual characters, especially when they display human physiognomy, may be related to social presence, and that social responses to computer controlled entities may occur automatically (Nass & Moon, 2000). The question then arises whether different instantiations of 'humanness', and thereby social presence, affect dishonest behaviour in a similar fashion, that is, whether interacting with more humanlike agents results in more honest (prosocial) behaviour compared to less humanlike agents.

To address this, it is essential that agents are seen. Asking observers directly whether they have seen specific elements after they have used an interface may not yield valid answers, as participants may not recall them. For example, Payne et al. (2011) reported that the presence of a visual agent on a simulated SCO scenario induced fewer people to make mistakes compared to a control condition; however, many participants did not recall having seen the agent within the self-service interface. A more reliable procedure may be the recording of where a viewer's gaze is directed on a SCO screen.

Eye tracking technology has been used to capture human gaze behaviour and associated cognitive processes for decades (for a review see Duchowski, 2002), and provides a useful technique to investigate user-interface interactions. Fixation frequency (i.e. how often an observer's gaze dwells in a particular area of interest) is a measure of an area's importance, with more frequent fixations indicating higher importance (Duchowski, 2002). Fixation duration, i.e. how long an observer fixates a particular area of interest, is associated with attention allocation (Henderson, 2007) and durations will be longer on more informative objects than less informative objects (Antes, 1974; Friedman & Liebelt, 1981; Unema et al., 2005). To the extent that an agent is perceived to be important, it should attract longer fixations.

This study examined the effects of varying social presence in the form of virtual embodied agents on consumer behaviour in a simulated SCO scenario. Social presence was manipulated by varying the 'humanness' features of onscreen agents as these features generate social presence (Nowak & Biocca, 2003). All agent images contained eyes as human features, as eyes are associated with more prosocial behaviour (Bateson et al., 2006). In addition, realistic looking agents (Parise et al., 1999) elicit more cooperation than non-human agents. Thus, we pitched a 'human' looking agent against two agents that hinted at humanness: one was logo-like, the other cartoon-like. We predicted that the more humanlike agent would result in fewer instances of dishonest behaviour.

To ascertain whether the agents attracted attention of the user and could exert their impact on the observer, an eye tracker was used to capture gaze behaviour. We also wanted to explore the notion of whether a more humanlike agent may be looked at more compared to the other agents, as human faces appear to draw more attention than objects (Devue et al., 2009).

Hypothesis 1 (H1):

Agents that are more humanlike (higher social presence) attract higher levels of attention than agents that are less humanlike.

Hypothesis 2 (H2):

Agents that are more humanlike (higher social presence) result in lower levels of dishonest behaviour than agents that are less humanlike.

2. METHOD

2.1 Participants

Forty-eight participants (25 female, 23 male) with an average age of 24 years took part in the research employing a between-subject design for the three levels of social presence manipulation. Sixteen participants each were assigned to the human agent condition (HA, highest level of social presence), the cartoon-like agent (CA, medium level of social presence) condition and the logo-like agent condition (LA, lowest level of social presence). All participants were recruited from the University community and reported high levels of experience with computers and self-service checkouts, that is, they reported feeling confident in using both independently to complete tasks.

2.2 Set-up of agents and scenarios

Social presence was varied via the implementation of three levels of humanlike interface agents (Figure 2) on a simulated SCO. The least humanlike (low social presence) agent was represented by a logo-like agent (LA) with eyes. The next, medium level of humanness was represented by a cartoon-like agent (CA) that resembled a human, with stylised eyes and torso; the highest level of humanness was represented by a female humanlike agent (HA) with shoulders, and associated with the highest social presence condition.

Figure 2: *Agent images in order of increasing human-like features from top to bottom panels, with the logo-like agent (LA) shown in the top panel, cartoon-like agent (CA) shown in the middle panel and the humanlike agent (HA) shown in the bottom panel.*

A study with 64 participants (32 females, 32 males) drawn from the University and local community (mean age 23.9 years) was conducted to ascertain whether the perceived humanness level for the agents was in the predicted direction. The three agent images were centred vertically on a sheet of A4 paper, with the order of agents counterbalanced across participants to control for order effects

having an impact on the ratings. Participants were asked to rank the three agents in terms of perceived highest (1), medium (2) and lowest level (3) of humanness. The humanlike agent was most often ascribed the highest level of humanness, the cartoonlike agent a medium level, and the logo-like agent the lowest level of humanness (Figure 3), validating the agent humanness manipulation for the main study.

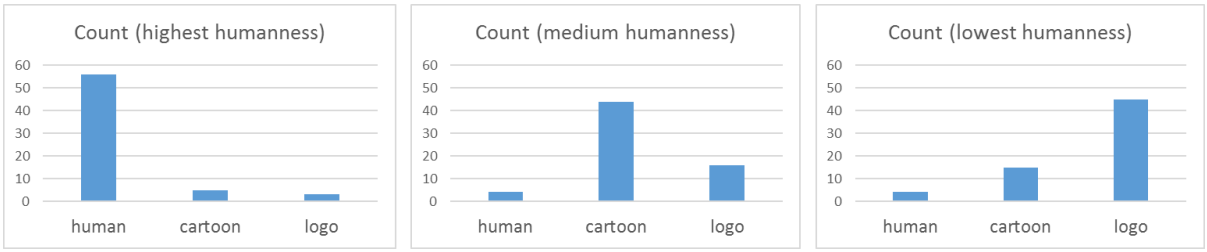

Figure 3: *Counts of rankings of agent humanness levels (highest, medium and lowest level) for the humanlike, cartoon-like and logo-like agent.*

A simulated SCO (Figure 4) was used to measure participant behaviour, consisting of a touch screen monitor which recorded participants' responses, and a barcode scanner. A Tobii TX300 eye tracker collected gaze behaviour while participants interacted with the simulated SCO. The eye tracker does not require goggles or head mounted gear; the participant merely sits in front of the screen while his/her eye movements are being recorded. Participants were seated in front of the shopping item set-up during the experiment. Although sitting at a SCO may not be considered ecologically valid, it was required to allow for eye tracking data to be collected in the sensitive zone in front of the screen. Item scanning movements were not impaired when participants were doing the task.

There were 20 everyday shopping items used in the study. An example item was used for a demonstration in using the scanner and the touch screen monitor. Screens were programmed using the eye-tracker software to represent the self-service interface set-up based on a common self-service checkout design.

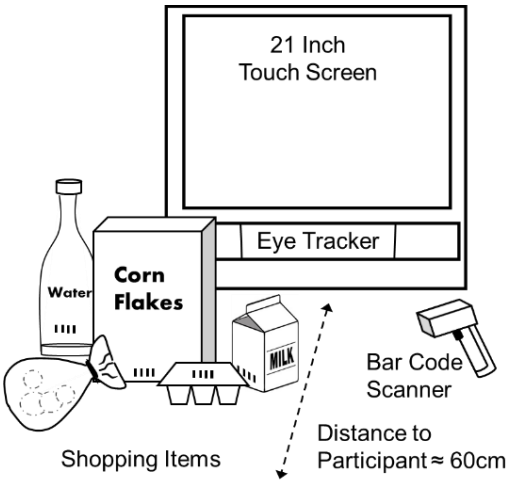

Figure 4: *Set-up of the simulated SCO scenario. There were 20 shopping items in total (not shown here). The touch screen recorded participants' responses and the eye tracker cameras recorded participants' eye movements on the screen.*

The agents were placed in the top right of the screen with the main SCO content screen being placed on the left, as users typically scan interfaces in a horizontal movement across the upper part of the content area (e.g. Djamasbi et al., 2011; Duggan et al. 2009; Pernice, 2017). The SCO content screen was also representative of a typical SCO interface to encourage a natural interaction (Figure 5).

Figure 5: *Example for the self-service checkout screens used in the study. Shown is the start screen of the scenario with the humanlike agent implementation.*

2.3 Procedure

The experiment took place in a laboratory set-up at the University. Upon arrival, all participants were given an information sheet providing details of the aim and procedure of the study, and an informed consent form in line with procedural requirements provided by the University's Ethics Committee. Initially, the information sheet withheld information from the participants by describing that the aim of the research was to examine the effectiveness of a new barcode reading system, to avoid biasing participants toward dis-/honest behaviour. It was emphasized that the study used an eye tracker as the gathered data would inform interface design. Participants were asked to sit on a seat in front of the eye tracker and shown an example of how to use the barcode scanner and the touch screen. Participants then completed a calibration process on the eye-tracker and the researcher informed them that the eye tracker would merely record the eye position on the screen. Participants were also informed that they would complete the experiment alone in the room and that they were to go to a different room to tell the researcher when they were finished to reduce the social presence effects of the researcher.

The participant had to scan the contents of two notional shopping baskets, represented by two rows of items that were already laid out. Items were to be scanned in the order in which they were presented, and put to the right in a collection area after scanning. Participants were told that there were items that were to be scanned, weighed or counted. It was explained that items not provided with a bar code (i.e. that could not be scanned) were used simply to cause an interruption in the barcode reading process to resemble a real-life shopping experience. Unbeknownst to participants, items without a bar code provided opportunities for dishonest behaviours as participants were required to select a weight or provide item numbers.

In the first basket there were three items with attached weight labels. For each of the three items, participants had to select an item weight onscreen from three weight choices, each of which was different to the labelled weight shown on the respective item. The choice of item weights represented the first opportunity of dishonesty, i.e. entering much lesser weights than were provided on the respective item weight labels. Participants were merely informed that there were a number of different items to test many barcodes and that the weights may not be accurate. If this were the case then participants were to select the weight they believed to be 'fair'. This wording was meant to introduce the idea that the experimenter was unaware of the cost of the items.

The second basket provided three items to be counted, with the number for each item having to be entered, allowing for the second opportunity of dishonesty, i.e. entering smaller numbers than were provided for each item (see 2.3.1 for details on all opportunities for dishonesty, i.e. dilemmas).

Participants were asked to write down the total cost and how much change they were due after they had completed scanning each item row, as they would receive the change from £10 per basket, on a receipt slip. Thus, they would be receiving the change from £20 in total. This implied that the smaller the bill was, the more participants could financially benefit themselves. This was, however, not explicitly pointed out to participants. Participants were to give the receipt to the researcher by going into the adjacent room at the end of the experiment. Participants were told that the maximum change/payment they could get from taking part in the study would be up to £5.

A third opportunity for dishonesty was created by providing participants with the choice to incorrectly accept a money-off voucher after they had scanned all items (see section 2.3.1 for details).

Before participants began scanning the items, the researcher gave a quick demonstration of how to use the bar code scanner and touch screen. Participants then had the opportunity to practice the scanning process. After participants indicated they were comfortable with the task, the researcher left the participant alone in the room to complete the task.

At the end of the experiment, participants were fully debriefed on the true nature of the study, i.e. the aim of investigating dishonesty in participants, and were given the option to have their data removed. All participants agreed to their data being kept for analysis. Participants signed an additional consent form at the end of the experiment to confirm given consent for their data to be used.

2.3.1 The dilemmas

While scanning shopping items, participants were faced with three dilemmas that could result in undeserved financial gain. Three manipulations were used and adapted from Vohs and Schooler (2008) to expose participants to opportunities for dishonesty.

Dilemma 1: The first basket of shopping involved participants' receiving the change from £10. This amount had been pre-programmed to be £2, as the total bill of the items scanned equalled £8. Participants were instructed to scan items and select a weight shown on the screen for the products that had weights. A dilemma had been created as none of the weights were accurate and all weights that were presented were less than the stated weight on the shopping item. The participant had to choose from three slightly inaccurate weights presented on the screen. The weight buttons were 15g, 30g and 45g less than the weight stated on the products. Each time the participant selected a weight that was greater than 15g less, it was considered as acting dishonestly. In other words, the dilemma provided the participants with the possibility to act in an dishonest manner by choosing a lesser weight than the one displayed on the product. In doing this, they may presume that the total cost of the basket would be reduced and that they may gain more money at the end of the experiment if they chose the lowest weight.

Dilemma 2: The second basket of shopping to be scanned also involved participants receiving the change from £10. This amount had been pre-programmed to be £0.50, as the total bill equalled £9.50. This basket involved participants scanning a row of items and selecting how many items there were of certain products, e.g., selecting the number of apples. Participants selected the number of items via a keypad on the screen. This trial measured whether participants chose to act in a

dishonest manner by choosing a lesser number of loose items (such as apples), as this may have been presumed to reduce the total cost of the basket.

Dilemma 3: At the end of the scanning process, participants were wrongly offered an opportunity to "accept" a £1 voucher as it claimed they had spent more than what the total came to. Participants could either accept or reject the voucher. Accepting the voucher indicated an instance of dishonest behaviour.

2.4 Measures of analysis

Dependent measures in relation to the hypotheses were:

Hypothesis 1 (H1):

- Average fixation duration
- Average fixation count

Both measures were retrieved from the area of interest containing the agents, which was fixed around the agent image. For each variable, data were pooled across basket scenarios.

Hypothesis 2 (H2):

- Receipt amounts
- Number of participants who accepted the voucher
- Instances of dishonest behaviours

Regarding the last measure, there were six opportunities to act dishonestly overall, i.e. three in each of the two basket scenarios. Data for receipt amounts and instances of dishonesty were pooled across basket scenarios, respectively.

The three dependent measures were recorded in relation to H2, as we needed to explore which of these would be most sensitive to reveal potential for displaying dishonest behaviour, i.e. which measure was most diagnostic, avoiding potential ceiling or bottom effects. SPSS was used for statistical analysis.

Finally, and in order to gauge the extent to which the conditions were perceived to be different based on the agent condition, we ascertained whether there was a difference in perceived realism between the conditions compared to a real SCO set-up. Participants rated their experience with the experimental set-up of a SCO compared to a real SCO experience on a scale of 1-3, from 1 being "not at all" like a SCO experience, 2 being "a little" and 3 being "a lot" like a SCO experience.

3. RESULTS

Visual inspection of fixation durations and counts (H1) indicated that they were not normally distributed, which was confirmed by Shapiro-Wilks tests for fixation durations, but not fixation count. Both measures were analysed using non-parametric Kruskal-Wallis tests, presuming homogeneity of variation, which was confirmed by non-parametric Levene's tests. It should be noted that a one-way ANOVA on fixation counts yielded the same (non-significant) finding as the parametric test reported below.

Receipt amounts, number of participants who accepted money vouchers and instances of dishonesty (H2) were analysed using non-parametric tests, as they are not presumed to be interval or ratio level data. Median tests were used for receipt amounts and instances of dishonesty as these tests are more robust against deviations in the shape of the distributions and the effects of outliers (Siegel & Castellan, 1988), and can be more powerful than the Kruskal-Wallis test.

Where multiple comparisons were performed, the significance level was adjusted for α-inflation using Bonferroni corrections.

3.1 H1 - Higher humanness and more attention: Fixation durations and counts

Kruskal-Wallis tests showed no significant differences across the three agent conditions, for either fixation durations, $X^2(2,39)=0.187$, $p>0.05$, $\eta^2=0.0049$, or fixation counts, $X^2(2,38)=3.324$, $p>0.05$, $\eta^2=0.0898$ (see Figure 6 for median fixation duration and count). Thus, Hypothesis 1 that a higher humanness level would result in greater attentional processing was not supported.

Visual inspection of participants' scan paths revealed that participants looked at the agents overall (see Figure 7 for an illustrative example of scan paths). This suggests that the images of the agents were processed to some degree. Closer inspection of data revealed that missing data occurred for 2, 3 and 4 participants in the logo-like, cartoon-like and humanlike condition, respectively, which could have been due to participants' hand scanning movements occluding the camera, other technical factors, or, indeed, not looking at the agents. Reanalysing the entire data set for the dishonesty measures (H2) and realism scores without these participants resulted in the identical pattern of findings, except for the realism scores, which were no longer significantly different. As a non-significant finding would work in favour towards our interpretations, we applied a conservative approach to err on the side of caution and included all participants in the analysis (see 3.3).

3.2 H2 – Higher humanness and less dishonesty: Receipt amounts, money vouchers falsely accepted and instances of dishonesty

A Median test on the receipt amounts reported showed no significant difference between the agent conditions, $X^2(2,48)=1.5$, $p>0.05$, $\phi_c=0.177$.

A Chi-Square test indicated no significant effect of agent condition on the number of participants who accepted the money off voucher, $X^2(2,41)=0.927$, $p>0.05$, $\phi_c=0.0113$, although there was a trend in the predicted direction. The highest number of acceptances occurred in the logo-like (16) condition, followed by the cartoon-like condition (14), with the humanlike condition resulting in the fewest acceptances (11).

A Median test on instances of dishonesty indicated a significant effect of agent humanness condition, $X^2(2,48)=7.371$, $p<0.05$, with a moderate-large effect size, $\phi_c=0.392$ (see Figure 8 for counts of instances of dishonesty). Post-hoc tests revealed a significant difference between the logo-like and humanlike agent condition, $X^2(1,32)=6.149$, $p<0.017$ (with Bonferroni correction), with moderate to large effect size $\phi_c=0.438$; the difference between the logo-like vs cartoon-like condition missed significance with Bonferroni correction, $p>0.017$, ($X^2(1,32)=4.5$, $p=0.034$), with a moderate-large effect size, $\phi_c=0.375$. The comparison between the cartoon-like and human-like agent showed no significant difference ($p>0.017$).

Thus, Hypothesis 2 that a higher humanness level (higher social presence) resulted in less dishonest behaviour to a lower humanness level (lower social presence) was partially supported.

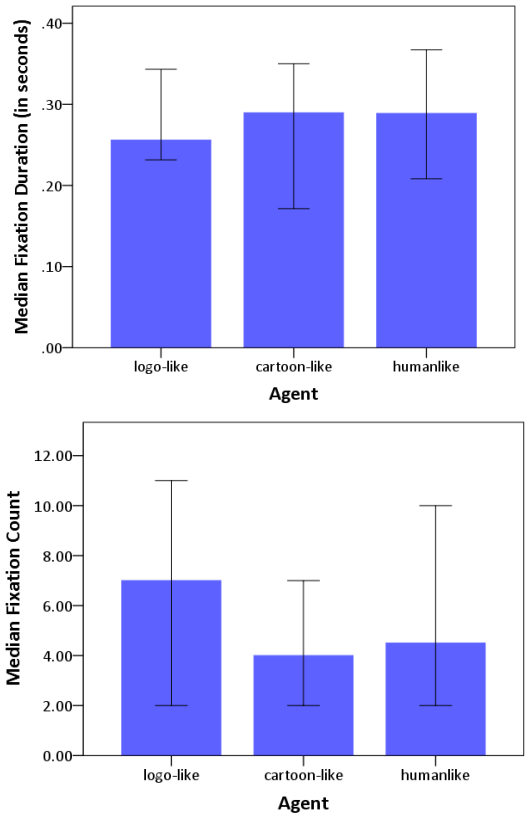

Figure 6: *Median fixation duration (in seconds) and median fixation count for the agent conditions with error bars representing 95% Confidence Intervals.*

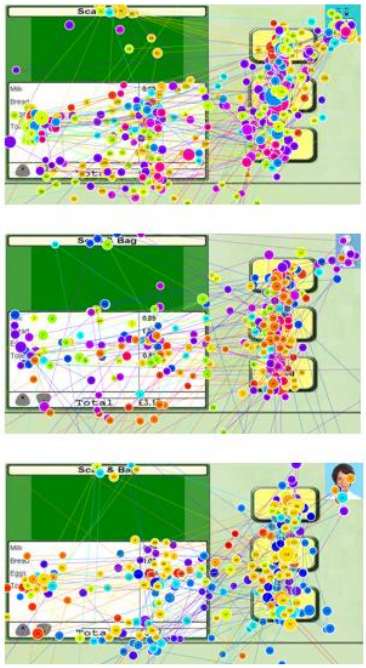

Figure 7: *An illustrative example of participants' scan paths across the checkout screen for the logo-like agent (top panel), cartoon-like agent (middle panel), and humanlike agent (bottom panel). Each differently coloured dot represents the scan path of a different participant (note: dots may overlap and may thus not be visible).*

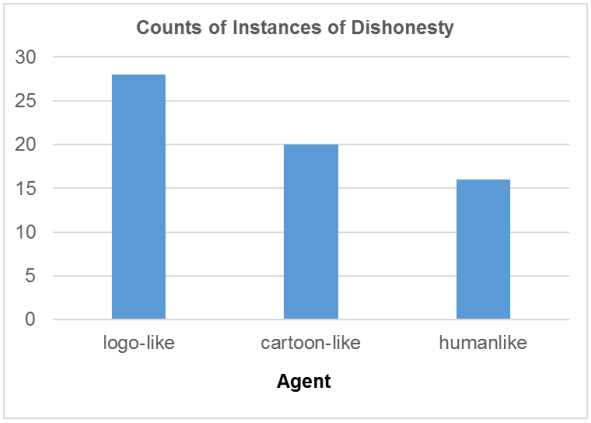

Figure 8: *Counts of instances of dishonesty in the agent conditions (n=16 in each agent condition).*

3.3 Realism

A Median test to determine whether there was a difference between the agent conditions compared to a real SCO set-up showed significant differences for the realism ratings, $X^2(2,48)=6.5$, $p<0.05$, with a moderate-large effect size, $\phi_c=0.368$. Median ratings were 3 ("A lot like a SCO experience") for the cartoon-like and humanlike agent condition, and 2 ("A little like a SCO experience") for the logo-like agent condition. Post-hoc tests showed a significant difference between the logo-like and humanlike condition, $X^2(2,32)=6.149$, $p<0.017$ (with Bonferroni correction), with a moderate-large effect size, $\phi_c=0.438$, in terms of realism ratings. All other comparisons were not significant, all $p>0.017$.

4. DISCUSSION

The present study investigated the influence of social presence, instantiated by different levels of humanness of interface agents, on dishonest behaviour and attention distribution. Overall, the results suggested that presence of more humanlike characters in virtual form can have an impact on the occurrence of honest, prosocial consumer behaviours, and that this effect could be demonstrated in a lab setting that mimicked consumer transactions in a retail environment. While the findings were mixed, they are nevertheless promising for future studies of this nature, in that the investigation of dishonest consumer behaviour poses challenges in terms of how this behaviour can be experimentally induced and assessed.

Specifically, it was predicted that a higher humanness level (HA), attracted more user attention (H1) and reduced dishonest behaviour (H2), compared to lower humanness levels (CA and LA).

With respect to the first Hypothesis, the results showed that fixation durations were not significantly different across agent conditions. As fixation duration can be an index of attention (Duchowski, 2002), it appears all agents equally attracted attention, and the humanlike agent did not receive longer fixations than any of the others. There are several possible reasons for this finding. First, it should be noted that in all agent conditions, participants were merely instructed to scan the items, in line with a shopping transaction; the presence of an agent could be deemed irrelevant by participants. Gaze behaviour is usually determined by the task a user engages with (see Duchowski, 2002), and it may well be the case that participants perceived the agents to be irrelevant to the task

in hand. Related to that, and for reasons of ecological validity, the focus of the task was to engage in a SCO transaction, and participants were instructed accordingly. Others have reported that an on-screen, visual humanlike agent in a simulated SCO transaction resulted in fewer participants making errors compared to a control condition, although participants did not consciously acknowledge the presence of the visual agent (Payne et al., 2011). While there is limited or mixed evidence that human faces are processed outside consciousness, this may not be the case for unfamiliar faces (for a review see Axelrod, 2015). There is also evidence that faces can be processed automatically (Pessoa, 2005; Richler et al., 2011), so perhaps the humanlike agents could have had an effect on a less observable level than could be revealed by eye tracking, which is consistent with Payne et al. (2011). However, the findings are still inconsistent with Hypothesis 1, and Devue et al.'s (2009) research that human faces receive more attention than other objects.

In relation to the average fixation count, there were no significant differences between the different agent conditions, though participants appeared to look more often at the logo-like agent compared to the other agents. Higher fixation frequency is typically associated with importance of a viewed area. However, given that the logo-like agent contained a small area of text, the findings may have been due to the lack of complexity in the cartoon-like agent, especially given that the cartoon-like agent looked rather simple, however, still resembled a face. The trend in the findings may suggest that the logo-like agent was simply 'different' to the other agents as it contained textual information. The processing of the cartoon- and humanlike agent was perhaps less resource intense, in that an image once classified as a face may be dismissed easily, especially if faces are processed automatically. The text in the logo-like agent may have prompted participants to read it, resulting in more fixations as participants scanned the words. Future studies should aim to control the information content in the agent images to account for this factor. However, we can be reasonably confident based on the visual inspection of participants' gaze behaviour that the agents were looked at by most participants and thus provided an opportunity to be processed to some level, which was required for ascertaining social presence effects.

The second Hypothesis suggested that higher levels of humanness (social presence), would result in less dishonest participant behaviour, and this predication was partially supported. The findings were, however, mixed. There was no significant effect of agent condition on the amount on the receipts returned, so this finding is not consistent with Hypothesis 2. We can speculate that the manipulation was perhaps not sufficiently large to be of consequence, given that the extent to which participants could benefit themselves was small. If participants were totally honest they would report being owed £2.50 (minimum participant payment) and if they were maximally dishonest they could additionally claim up to £1.50 across both basket scenarios. Thus, the manipulation was perhaps less effective in that it was not sensitive enough to flag up large differences between agent conditions.

Most participants in all agent conditions accepted and reported to the researcher that they were due the £1 voucher that was wrongfully suggested to be owed to them, which is also inconsistent with our expectations. This finding may suggest that people are generally inclined to want to maximise their gain, and that social presence had no effect. Another explanation may be that a ceiling effect may have occurred, because participants had only two choices (accept or reject voucher), leaving little space for differentiation. However, the finding may also suggest that participants were confused by the statement that said "As you have spent over £10 you are due a £1 off voucher". Participants may not have realised that accepting the voucher that was wrongly proposed was a form of dishonesty. They may have interpreted that the system suggested that they had indeed spent more than £10. Thus, this measure may not have been an effective or clear way to assess dishonesty. The method used within Vohs and Schooler's (2008) research, where participants

were to press the space bar to avoid dishonest behaviour may provide a more effective design for interpreting levels of dishonest behaviour. Alternatively, a rephrasing of the statement used in the study to "If you have spent over £10 you can accept the voucher" may have been a much clearer instruction. A default procedure whereby participants actively have to avoid dishonesty may perhaps be a more suitable experimental manipulation.

However, the third dependent measure, instances of dishonesty, was affected by the humanness of the agent, with the humanlike agent being associated with significantly fewer instances of dishonesty than the lowest instantiation of social presence via the logo-like agent. This finding provided evidence that social presence can affect dis-/honest customer behaviour, consistent with Hypothesis 2. The effect, while significant, may be seen as small, with effectively one instance of theft per customer fewer for the humanlike agent compared to the least humanlike agent condition in practical terms. However, if only one fewer item is stolen per customer transaction in retail, then this would result in substantial savings for businesses. This finding thus supports the notion that social presence in more humanlike agent form may reduce the occurrence of dishonest behaviour, at least in some instances, and is consistent with the literature that associates prosocial behaviours with social presence (Bateson et al., 2006; Parise, 1999). The findings are also consistent with the idea that computer controlled entities can elicit social responses in line with the concept of CASA (Nass & Moon, 2000; Reeves & Nass, 1996). It should be noted that instances of dishonesty was a different measure from the other two measures of dishonest behaviour, in that it was integrated in the scanning process of items, rather than being a separate instance for dishonesty provided at the end of the transaction, unlike the receipt returned and the money-off voucher. It could be speculated that the different instantiations of humanness and social presence may work on more subtle levels of human information processing where attention is directed to other tasks (e.g. scanning items) rather than being focused on particular instances.

It is important to highlight that the use of SCOs within a store setting is subject to many other variables that may affect dishonest behaviour, such as the number of SCOs, the number of customers at the SCOs, busyness of the store, layout, etc. (e.g., Creighton et al., 2015). Thus, the generalizability of the current findings may be limited in this respect. The factors surrounding dishonesty and theft are clearly manifold, and we propose a framework to initiate further research for the identification of factors that may mediate the occurrence of theft or dishonesty and their relationships. The proposed framework considers the relationship among rational choice approaches, the intention to commit crime and the influence of social presence. The crime triangle (Clarke & Eck, 2014) includes opportunities, abilities and desire for crime as relevant factors for the occurrence of dishonesty. To the extent that this desire to acquire an object is less prominent, that is, people have less of an intention (or desire) to be dishonest, they may be influenced more from the implicit instantiation of social presence in technological environments than individuals that are more pronounced in their desire to obtain a particular object via crime. It is suggested that individual factors like reputation maintenance, for instance, may be affected by social presence, which in turn may enhance the occurrence of honest behaviour. Thus, effects of social presence should become more influential in affecting an individual's pro-social behaviour with a decrease in intention or desire to commit theft. Unlike the rational choice theory, this explanation points to individual differences between individuals in their propensity for engaging in dishonest behaviour.

For studies of this type to be informative for inter-face designers and businesses, it needs to be considered how well the findings transfer to a real-life application. In this study, the cartoon-like and humanlike agent conditions were perceived to be sufficiently realistic compared to a typical SCO

environment, so we can be reasonably confident that there is some degree of ecological validity. The logo-like agent was perceived to be less realistic, which may limit the generalisability of findings.

We did not assess the perceived 'creepiness' of the agent to control for 'uncanny valley' effects (Mori, 1970), i.e. the unease that can be experienced with the perception of human, yet not-quite-like human characters. However, none of the participants reported any experience of unease with the characters. Nevertheless, future studies should control for this effect.

It should be noted that the study gave participants the choice to act in a dishonest manner, which in itself raises ethical issues. Investigating issues of this nature is rather challenging, not least because a complex story, in which participants are repeatedly exposed to opportunities for dishonesty, has to be created. However, given the continued problem of shrinkage in retail, issues of integrity in online transactions and the increase of technological implementation that may potentially reduce presence of others, it seems vital that methodologies are proposed to explore the role of measures that can reduce theft.

4.1 Conclusions

This study has partially demonstrated that social presence had an effect on dishonest behaviour using visual agents, in that instances of dishonest behaviour were reduced with the humanlike agent. This result is meaningful for research examining social presence influence on behaviour. However, the humanlike agent did not attract more attention compared to the cartoon-like or logo-like agent conditions. The findings overall are mixed, and more research should be conducted into the effects of instantiating social presence, and variables to assess the occurrence of dishonest behaviour. While our research was hypothesis-driven as to the factors manipulated, we explored several measures of dishonesty; in light of the lack of research in this area, it was deemed necessary to do so, and offer the findings to the research community to inform further exploration of and research on this sensitive topic.

We suggest that there is great scope to investigate social presence effects on dis-/honest consumer behaviour, given the substantial evidence for social presence to induce prosocial behaviours. This study shows that there are potential effects on people's behaviour due to the inclusion of human-like elements within the service. Interface designers interested in this field need to achieve a balance in that an agent will have to be noticed sufficiently, while not interfering with a consumer's task in a SCO transaction.

Research in this area may also be of particular interest to companies and organisations who increasingly put the customer at the centre of providing their own service, where shopping may become more or totally independent from staff interaction, as, for example, provided by Amazon Go, introducing the first checkout free store (Amazon, 2018). The study of social presence effects on customer behaviour may thus become more important as the landscape for consumer interactions changes. Other researchers have already suggested that social elements, and thereby social presence, in retail will become more and more relevant for customer service experiences (Van Doorn et al., 2017). Given the increasing use of technology that makes the customer self-sufficient for engaging in retail transactions, as well as the rapid development of Artificial Intelligence substituting staff activities, there is potentially huge merit in maintaining a social element in consumer interaction with technology via social presence, and this may work for the benefit of businesses and consumers.

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