

Becoming More Human:  
Changing Beliefs Through Cognitive Empathy in Video Games


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This Thesis is entirely my own work, and has not been previously submitted to this or  
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### **Abstract**

The goal of this study was to investigate the importance of empathy, and more specifically perspective taking towards an avatar, in the possible change of social belief through video game experience. Participants were randomly assigned into two groups. The control group played a single and simple chapter of the game *Detroit: Become Human* (Quantic Dream, 2018) in which they incarnated a female android. The experimental group also played a second strongly emotionally and morally immersive chapter of that same game. The results showed a positive evolution in the beliefs concerning topics directly addressed in the game, more specifically in significantly higher avatar-emotional connection context. Therefore, cognitive empathy seems to be a moderator of belief change in video game environment.



## **Introduction**

In 2016, about 2.5 billion humans were reported to play video games (Video Game Industry Statistics, 2020). Fahey (2008) predicted, 'It's inevitable: soon we will all be gamers.' As this number will grow, it is more and more important to investigate the impact of video gaming on the populations. In the past few years, the research in this area has developed. One of the main topics of interest is the influence video game experiences might have on human behaviours and attitudes towards specific social groups; Playing as a black avatar shown to reduce bias against African Americans and enhanced the support for 'pro-minority' policies (Behm-Morawitz et al., 2016). Another example is Peña and collaborator's study (2018) on immigration in the United States of America. Their results showed that incarnating an immigration inspector could change beliefs towards immigrants; After playing, participants were then more willing to help them.

If it has been shown that playing a video game might impact a social belief, it has not yet been explained how. The study presented here proposes to investigate the change of beliefs towards a specific social group through the scope of perspective taking and emotional connection with an avatar belonging to that group.

## **Literature Review**

### **Empathy**

Multiple researchers have been trying to define empathy for decades. A consensus was found on the definition of empathy as an innate ability to understand and share thoughts and feelings of others (Camassa, 2019; Decety & Cowell, 2014; Decety, 2015). Empathy could grow on imaginative enactment, and be roused by a narrative. The definition this study was built on is the one presented by Decety in 2015, based on neuro-cognitive processes. Those empathy-related processes are considered as potential motivators for pro-social behaviours. Developmental and affective neuroscience latest research suggests for empathy to be composed of multiple neuro-cognitive components (Decety & Cowell, 2014; Decety, 2015). The first of the three components is emotional empathy. It defines a state in which an

individual would share and become affectively aroused by people's emotions. The second component can be explained as the consequence of the first. Motivational empathy builds on empathic concerns, leading to care for another's welfare. Finally, the cognitive empathy is the affective perspective taking.

This latest is the process of understanding someone's perspective, without sharing feelings or emotions with that person. According to Decety and Yoder (2016), it could influence drastically moral behaviours as it might then induce concerns for others. It has been presented as powerful way to lead people to reflection about their own beliefs (Haidt, 2012; Decety, 2015). Following its evolutionary roots, empathy is experienced more naturally for in-group members, leading to in- and out-group biases, influencing general decision-making. But if it is not instinctive to develop empathy for the out-group, it can be triggered by emotions (Haidt, 2012). Empathy responses appear to be alterable through experience (e.g. taking a first-person perspective as members of another group). An example of provoked cognitive empathy is the use of it as a medium to change individual's perspective in therapy and education, allowing them to develop deeper insights on multiple topics; e.g. psychodrama therapy, role-playing therapy, education through imitative play (Gerdes et al., 2011). Moreover, cognitive empathy has been shown to promote justice motivation as it leads to reasoning (Decety & Yoder, 2016). Devine (1989) stated that stereotypes automatically associated with people often involve morally evaluated traits. When taking the perspective of a person experiencing distress, including social distress due to prejudices, the belief or stereotype towards the social group might be rethought (Tousignant et al., 2016). Smiley (2005) lead a study on book-reading experiences on over one hundred novels. Her conclusions presented that when a character suffers social immorality, the reader's moral judgement of society had a tendency to be changed. Tousignant and collaborators (2016) propose that through perspective taking humans might feel the negative emotions of peers, and thus be motivated to change their own behaviours to decrease the uncomfortable emotions experienced. This could lead to the reduction of partiality in the attitude towards a prejudiced social group.

## **Changing a Belief**

In 2012, Haidt presented his final version of the moral intuitionism model in a book chapter called *The Intuitive Dog and its Rational Tail* (p. 82–136). Intuition is explained as the precursor of moral judgement, followed by a slow moral reasoning usually used to justify the previous ‘gut feeling’ judgement. This feeling is explained by Damasio in 1994 through the somatic marker hypothesis; experiences trigger emotions involving bodily changes and feelings. Moral intuitionism is painted as an automatic reaction due to moral beliefs and limitations taught by the culture and environment an individual has been brought up in. In other words, social moral judgements would be based on feelings and autobiographically established beliefs. Agreeing with the theory presented earlier, Haidt (2012) proposes multiple ways to change a belief. One of them would be perspective taking, through which a human could reflect on its own belief and change it when reasoned consideration conflict with intuitions (Greene & Haidt, 2002).

## **Identification**

Perspective taking might happen when playing a video game. In this context, identification with the avatar played occurs. The notion of identification has been defined by Cohen first, in 2001. At the time, Cohen was referring to the identification with a book or a movie character. It was then explained as follows: ‘An individual would replace their identity and role as audience member with the identity and role of the character within the text’ (p. 251). In 2009, Klimmt and collaborators applied this theory to video games. The player would adopt the avatar’s first-person perspective, leading to the unification of the character’s and the player’s qualities in the player’s self-perception (Van Looy et al., 2012). Thus experiences lived virtually by the avatar would be perceived as happening to them by the players.

In 2016, Ratan and Dawson developed a scale building on the identification theory. The results of their study highlighted for the self-perception of the player to be linked with the emotional connection felt with the avatar. The higher the avatar-emotional connection score was, the more the experiences lived by the avatar were

perceived as self-relevant by the players, and the more the consequences would last in time. Therefore, a higher avatar-emotional connection would be leading to a bigger chance for the individual to take the first-person perspective of the character, and to experience the changes ensuing as lasting in time. On the other hand, the authors noted gender as an important factor of the connection. If the player identified as a similar gender as the avatar's, then the connection was significantly higher.

Thus the general empathy of the player might facilitate the avatar's perspective taking, and a strong first-person perspective taking with the avatar can be monitored through the avatar-emotional connection score. This connection might lead to a change in the social beliefs towards a specific group in which the avatar belongs.

H1: The Avatar-Emotional Connection score will impact positively the changes in the beliefs.

H2: The Toronto Empathy Questionnaire score will correlate positively with the Avatar-Emotional Connection Score.

### **Narrative Video Games**

The game to choose for this experiment had to allow for an easy and natural emotional connection between the player and the avatar. Heron and Belfort (2014) discussed the different characteristics a game could have and their consequences on the player's experience. From the list they presented, the important components for emotional connection and involvement were multiple. First, the perspective of the player had to be a first-person one. The game narrative had to involve an emotional play load, and one or multiple objectives for the player to focus on (Lankoski, 2007). The avatar had to be perceived positively for the player to develop sympathy towards it. Moreover, Frasca (2001) highlighted that the less personality the avatar had, the more freedom in-game the player enjoyed. So, the character's personality should be malleable by the player's decisions to allow a greater identification throughout the game. Additionally, actions were to be perceived as owned by the player, creating a feeling of agency, and to have consequences. This last point was displayed as being particularly important when the choices to make were moral decisions, allowing for

the moral actions to be perceived as more meaningful, and engaging the player morally and emotionally (Dechering & Bakkes, 2018). Thus players would need to experience a moral responsibility (Grimshaw et. al, 2011). When challenged by a moral conflict in game, players seem to rely on their own moral intuition (Joeckel et al., 2012).

Finally, the game chosen had to present a particular social group being stigmatised to allow for an evaluation of social beliefs about this specific group before and after playing throughout a uncomfortable gameplay. Holl (2019) presented *Detroit: Become Human* (Quantic Deam, 2018), describing its gameplay as complying with the characteristics listed earlier, but also as allowing for some less immersive chapters. The social group being stigmatised in the game is the androids. In the experiment proposed here, the players would play Kara, a female android caring for a house and for a little girl named Alice. One condition of the experiment was to play a low emotional gameplay, with no moral decision. The second condition was to play the same first chapter, and a second one being theoretically highly immersive, asking for moral decisions to be made by the player. In this second chapter, Kara would have to break through the code controlling her to be able to act outside of the orders she received and save Alice from the violence of her father.

H3: The Avatar-Emotional Connection of the participants identifying as females will be significantly higher than the one of participants identifying as males.

H3.b: The Avatar-Emotional Connection will be significantly higher in the experimental condition compared to the control one.

H4.a: The changes in each beliefs will be significant between the first and the second collection.

H4.b: The changes in each beliefs will be significantly higher in the experimental condition.

H4.c: The change in each beliefs will be significantly higher for the female participants.

## Methodology

### Design

Beck and Rose's experiment (2018) investigated the impact of video games presenting objectified women versus games without objectified women on the participants' belief in the rape myth. Building on their proposition, the design chosen for this experiment was quantitative with repeated measure of the beliefs. The belief questionnaire was based on a survey displayed as a bonus in the game *Detroit: Become Human* (Quantic Dream, 2018).

The other dependant variables were the general empathy measured with the Toronto Empathy Questionnaire (Spreng et al., 2009), and the identification with the avatar measured with the Avatar-Emotional Connection Scale (Ratan & Dawson, 2016).

Following Heron and Belford (2014) details of an emotionally strong and immersive video game and building on Dechering and Bakkes (2018) moral engagement of the player, two experimental groups were created. The control condition played a single chapter of the game *Detroit: Become Human* (Quantic Dream, 2018) (Holl, 2019) called 'A New Home', allowing the player to grow familiar with the controls of the character and the environment of the game. The experimental group played this same first chapter, and a second one called 'A Stormy Night'. In the latest, the player would experience a strong emotional gameplay involving moral decision-making and distress of the avatar. To ensure adequate exposure, the total time played by the participants was at a minimum of 15 minutes. This decision was based on designs presented in other experiments proposing an exposure time from 10 to 30 minutes (Gabbadini et al., 2016; Yao et al., 2010).

Both groups answered a demographic questionnaire, allowing to control for their gender identification, their gaming habits and familiarity with the game used in the experiment.

## Participants

The participants (N = 35) were students recruited from the Dún Laoghaire Institute of Art, Design and Technology (IADT). The cohort was composed of students identifying as male (n = 19) and female (n = 16). The age range was from 18 to 50 years old (M = 24, SD = 7). The groups composing both conditions were created randomly.

The recruiting tools were posters placed around IADT and published on social media including Twitter and WhatsApp (Appendix J).

The explicit exclusion criteria were the contraindications to play video games (e.g. epilepsy). On the information sheet was explained the possible violent content of the game and it was asked of the participant to not take part in it or withdraw from it at any moment if they were feeling uncomfortable with the topic addressed in-game.

## Materials

Participants were tested at a table in a closed room in IADT. On the wall was a screen set on the menu page of the game *Detroit: Become Human* (Quantic Dream, 2018) on PlayStation 4 Pro. The experiment started with the presentation of an information sheet, followed by an informed consent form (Appendix A) and a demographical questionnaire (Appendix B). At the end of the experiment, a debrief sheet was presented (Appendix G).

The game used for this experiment was *Detroit: Become Human* (Quantic Dream, 2018) due to its gameplay's quality and diversity. The two chapters chosen for the experiment were 'A New Home' and 'A Stormy Night'. The different options allowed by the game in those chapters are presented in Appendix E.

To control the general empathy of the participants as a confounding variable, the Toronto Empathy Questionnaire was used (Spreng et al., 2009). The questionnaire consists of 16 items (e.g. 'Other people's misfortunes do not disturb me a great deal'; 'When I see someone being taken advantage of, I feel kind of protective towards him\her'). Each item was to be rated on a five-point Likert scale (1 = never, 5 = always) (cronbach's alpha = .632) (Appendix D).

The Avatar-Emotion Connection Sub-Scale (Ratan & Dawson, 2016) was used to evaluate the player's connection with the avatar. The measure is composed of three items (e.g. 'When scary events happen to your avatar, to what extent do you feel afraid?'). Each item was to be rated on a five-point Likert scale (1 = not at all, 5 = extremely) (cronbach's alpha = .77) (Appendix F).

The belief questionnaire used was composed of 5 items present in a 13-item survey build by the Quantic Dream game design team (Appendix C). The items chosen covered the topics of trust in androids and technology in general (e.g. 'Would you consider having a relationship with an android that looks like a human?', 'If you needed emergency surgery, would you agree to be operated on by a machine?'). Each question had to be answered by one of the four affirmations: 'Yes' (= 2 points), 'No' (= 0 points), 'Don't Know' (= 1 point), 'Do not wish to answer' (= missing value). No participants chose the 'Do not wish to answer' proposition. One question was reversed scored: 'Do you think that technology could become a threat to mankind?' as answering positively would reflect a negative feeling towards the androids.

One pilot study was ran, and no change in the general design of the experiment was done. A few misspelling in the information and debrief sheets were corrected. It was decided to explain to the participants a bit about how to use of a PlayStation 4 Pro remote before letting them play as it seemed relevant to avoid a discomfort playing coming from the lack of experience with the device which could impact the data collected.

## **Procedure**

When the participants entered the room, the information sheet was placed in front of their chair, with a pen. The researcher enquired on how they were feeling that day. The participants then were to read the information sheet, and the researcher offered to answer any question about the experiment before handing them the consent form. When the consent form was signed, the researcher asked once again if there was any question, and reminded them that they could leave the experiment at any time without giving explanations. The demographic questionnaire was given to them, as well as the beliefs questionnaire, and the Toronto Empathy Questionnaire (Spreng et



al. 2009) (in that order every time to avoid a priming effect of the empathy questionnaire on the beliefs questionnaire's answers). Once the questionnaires were handed back to the researcher, they were turned over so that the participant could not see their previous answers, specifically for the beliefs questionnaire.

The researcher would then give a few information about the PlayStation 4 Pro remote: the right joystick was to interact with the objects and move the camera around, the left joystick was for the movement of the avatar, and the R2 trigger was to see the objectives, and with which objects they could interact in game. After that quick overview, it was said to the participants that everything would be re-explained in game as the first chapter played included a tutorial.

After the end of chapter one, the participants were asked how they were feeling. For those who were in the experimental condition, they were asked if they wanted to continue. It was explained to them that Alice, the child character, could die due to her father's violence. No participants refused to continue. When they said yes, the researcher asked a second time if they were sure, and stated once again that they could stop at any time and withdraw from the experiment without explanation. For the experimental condition participants, the second chapter was launched. When this second chapter was finished, the participants were asked once again how they were feeling and if they were agreeing to answer the final questionnaires.

The Avatar-Emotional Connection scale (Ratan & Dawson, 2016) was given to them, as well as the beliefs questionnaire and the debrief sheet, once again in that order to avoid bias from the beliefs on the Avatar-Emotional Connection questionnaire's answers.

Finally, the researcher asked the participants if they had any questions, and their opinions on the experiment. It happened that the participant would ask questions about the changes in the beliefs, and with their authorisation the researcher scored their beliefs questionnaires in front of them to see if there were any changes. The main point was to make sure the participants were leaving the room with a smile and feeling good, not distressed or uncomfortable about what happened in game.

## **Ethics**

The main ethical challenge in the experiment proposed was the video game narrative presenting violence from a father to a child character, and to an android. Both characters could end up dead depending on the player's decisions in game. To prevent harm, the participants were explicitly informed before beginning the game that 'this study includes video game scenes of very violent content and strong domestic violence, including violence against a child. In some cases this violence may result in the death of the child character. If you feel affected by this content in any way, stop at any time.' Moreover, the information was repeated before the part of the game including those possibilities started. The possibility to withdraw at any moment without explanations was written in the information sheet and repeated by the researcher multiple times throughout the experiment. The researcher was to stay alert as of the stress level of the participant and was to stop the experiment if they felt as if it was needed. It happened that the researcher would ask the participant while they were playing how they were feeling and made sure they were willing to continue. Finally, the debrief was to be led as extensively as felt necessary by the participant and the researcher. To help the participants in case of discomfort, all data collection occurred on IADT campus, with IADT students, when the counsellor was present on the site. Permission was received from the IADT counsellor to include their details. As an addition, the National Domestic Freephone Helpline number was given at the end of the debrief form.

It was also presented to the participants that all data were to be kept anonymous by the researcher, and they could withdraw their data until a given date.

The DTP Ethics Committee approved this research.

## Results

To control for individual differences in the experimental and control group participants, subjects were randomly assigned to one or the other depending on their gender.

### Initial Controls

In the demographic questionnaire participants gave multiple information relating to their gaming habits: did they play Detroit: Become Human (DBH) previously to the experiment, did they finish it, and how many hours a week they usually play video games?

#### *Playing DBH and Avatar-Emotional Connection*

An independent samples t-test (assuming equal variance) was run to evaluate if the 4 participants who previously played DBH had a different score in Avatar-Emotional Connection compared to the 31 participants who did not. There was not a significant difference in the scores between the participants who played DBH before ( $M = 4.24$ ,  $SD = .318$ ) and the ones who did not play ( $M = 3.30$ ,  $SD = .932$ ) [ $t(33) = -1.998$ ,  $p = .054$ ].

This result allowed using all participants' data for the following tests.

#### *Players and Avatar-Emotional Connection*

The second control introduced was the possible correlation between the usual number of hours played per week by the participants and the Avatar-Emotional Connection. There was no correlation found between the two variables [ $r = .086$ ,  $N = 35$ ,  $p = .625$ ].

This result allowed using all participants' data for the following tests.

### Avatar-Emotional Connection

Multiple hypothesis concerned the relationship between the Avatar-Emotional Connection (AEC) and other variables.

### ***AEC and Empathy***

Investigating the relationship between empathy and avatar-emotional connection (AEC) of the 35 participants, a spearman's correlation was processed. The results showed a statistically significant positive correlation between both, confirming H2 [ $r_s = .354, p = .037$ ].

### ***AEC and Gender***

An independent sample t-test (assuming equal variance) was conducted to compare the AEC score of female participants ( $n = 16, M = 3.83, SD = .78$ ) and male participants ( $n = 19, M = 3.05, SD = .91$ ). A significant difference between both was revealed [ $t(33) = -2.382, p = .011$ ]. These results confirmed H3.a, suggesting that female participant's connection with the avatar would be significantly higher than men's.

### ***AEC and Condition***

To evaluate if the difference in AEC was significant between the experimental condition ( $n = 18, M = 3.74, SD = .589$ ) and the control condition ( $n = 17, M = 3.05, SD = 1.10$ ) an independent t-test (equal variance not assumed) was conducted. The results were statistically significant [ $t(24) = -2.293, p = .033$ ]. Thus, H3.b was confirmed, implying that the AEC score was significantly higher in the experimental condition.

### **Changes in the Beliefs**

The second main point of interest of this research was the changes in the beliefs (CiB) according to the five-item questionnaire proposed to the participants.

#### ***General CiB***

First, a paired-sample t-test exposed in Table 1 was conducted to compare each of the five items score before and after playing the game.

Table 1. Paired sample *t*-test for pre- and post-gaming scores in beliefs per item.

	Mean	SD	S.E. Mean	Paired <i>t</i> test		
				<i>t</i> value	<i>df</i>	Sig (two-tailed)
ITEM 1						
Pre-Playing	.63	.843	.143	-1.974	34	.057*
Post-Playing	.80	.901	.152			
ITEM 2						
Pre-Playing	.57	.850	.144	-1.675	34	.103
Post-Playing	.69	.867	.147			
ITEM 3						
Pre-Playing	.54	.817	.138	-4.346	34	.000**
Post-Playing	1.11	.867	.147			
ITEM 4						
Pre-Playing	1.57	.778	.131	-1.675	34	.103
Post-Playing	1.69	.676	.114			
ITEM 5						
Pre-Playing	1.06	.873	.147	-2.472	34	.019*
Post-Playing	1.29	.825	.139			

\* $p < .05$  ; \*\* $p < .01$

*Note.* SD = Standard Deviation. S.E. Mean = Standard Error Mean. Item 1 = Would you consider having a relationship with an android that looks like a human? Item 2 = Do you think that technology could become a threat to mankind? Item 3 = Would you let an android take care of your children? Item 4 = If you needed emergency surgery, would you agree to be operated on by a machine? Item 5 = Do you think on day machines could develop consciousness? Score per item was rated over 2 points (« Yes » = 2 points, « Don't Know » = 1 point, « No » = 0 points) with reverse scoring for Item 2.

There was a significant difference in the scores of the third item ('Would you let an android take care of your children?') before ( $M = .54$ ,  $SD = .817$ ) and after ( $M = 1.11$ ,  $SD = .867$ ) playing [ $t(34) = -4.346$ ,  $p < .01$ ]. These results suggest that the opinions on the androids and childcare changed positively after playing the game independently of the condition of the experiment or the gender of the participants.

It was also reported that a statistically significant change in the answers happened for the fifth item of the questionnaire ('Do you think one day machines could develop consciousness?') between before ( $M = 1.06$ ,  $SD = .873$ ) and after ( $M = 1.29$ ,  $SD = .825$ ) playing the game [ $t(34) = -2.472$ ,  $p = .019$ ]. These results suggest a significantly positive change of opinion between before and after playing the game by the participants, regardless of the condition they were in or of their gender, when it came to the possibility of machines developing consciousness.

The difference in score of the first item ('Would you consider having a relationship with an android that looks like a human?') before ( $M = .63$ ,  $SD = .843$ ) and after ( $M = .80$ ,  $SD = .901$ ) showed a tendency towards statistical significance [ $t(34) = -1.974$ ,  $p = .057$ ]. These results suggest that the change of opinion concerning a relationship after playing the game in general changed positively, but not enough to be significant.

Finally, the answers of the participants on item 2 ('Do you think that technology could become a threat to mankind?') and item 4 ('If you needed emergency surgery, would you agree to be operated on by a machine?') did not change significantly before and after playing the game. Therefore, H4.a was partially confirmed.

### ***CiB and Condition***

Investigating the changes in the beliefs depending on the condition (Control, Experimental) was done through the implementation of a split per condition paired-sample t-test. The results are presented in Figure 1.

In the control condition ( $n = 17$ ), the answers to the third item were reported to change significantly before ( $M = .29$ ,  $SD = .588$ ) and after ( $M = .82$ ,  $SD = .883$ ) playing the game [ $t(16) = -2.729$ ,  $p = .015$ ]. In the experimental condition ( $n = 18$ ), the third item answers did change significantly as well, before ( $M = .78$ ,  $SD = .943$ ) and after ( $M = 1.39$ ,  $SD = .778$ ) playing the two chapters of the game [ $t(17) = -3.335$ ,  $p < .01$ ]. These results suggest that in both conditions the opinion of the participants towards androids and childcare was modified positively when playing the game. The change seems greater in the experimental condition.

The fifth item's answers changed significantly in the experimental condition ( $n = 18$ ) pre- ( $M = 1$ ,  $SD = .840$ ) and post-gaming ( $M = 1.22$ ,  $SD = .808$ ) [ $t(17) = -2.204$ ,  $p = .042$ ]. The results imply that participants in experimental condition had their opinion concerning the possibility of machines developing consciousness altered positively after playing the game.

H4.b was partially confirmed.

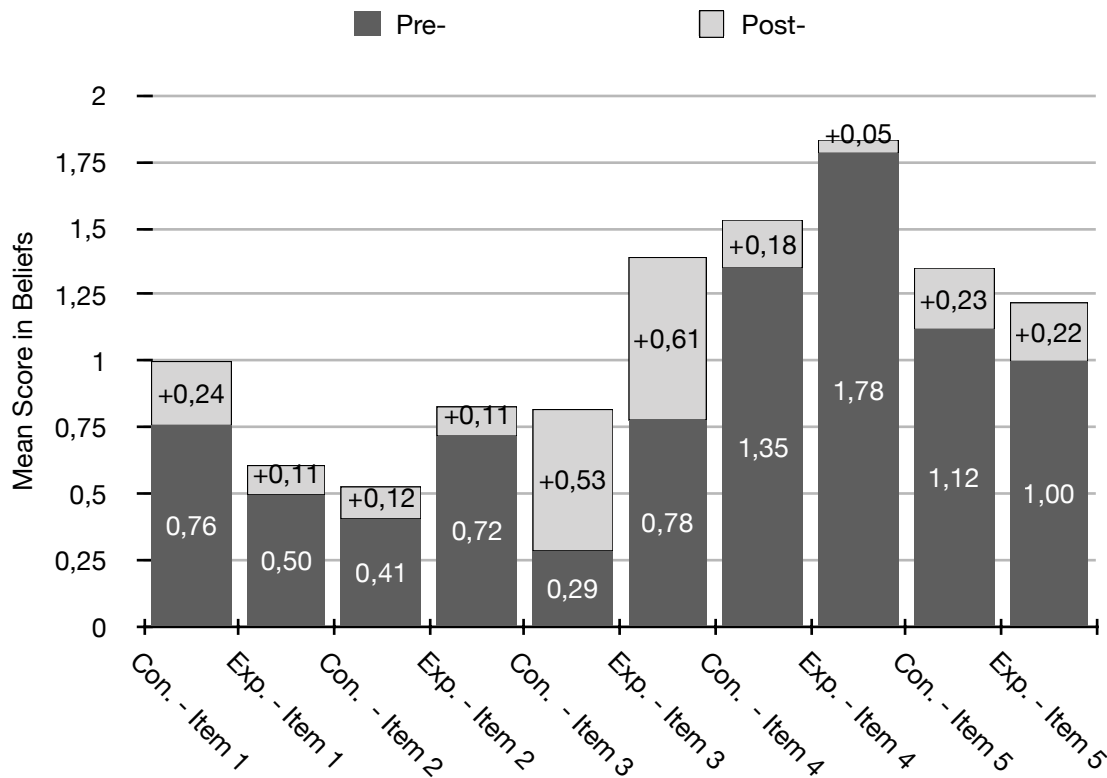


Figure 1. Mean score per item per condition (Experimental, Control) pre- and post-gaming.

### ***CiB and Gender***

Investigating the changes in the beliefs depending on the gender of the participants, a split per gender paired-sample t-test of the item's responses was executed. The results are presented in Figure 2.

Male participants ( $n = 19$ ) showed a significant difference in their answer of the third item before ( $M = .74$ ,  $SD = .872$ ) and after ( $M = 1.16$ ,  $SD = .898$ ) playing [ $t(17) = -2.65$ ,  $p = .016$ ]. Female participants' ( $n = 16$ ) answers to the third item did change significantly as well before ( $M = .31$ ,  $SD = .704$ ) and after ( $M = 1.06$ ,  $SD =$

.854) playing the game [ $t(15) = -3.503, p < .01$ ]. These results suggest a significant positive change of opinion on the role of androids in childcare after playing the game, independently of the gender. However, gender seems to have an effect on the strength of the difference.

For female participants, the difference in score of the first item before ( $M = .56, SD = .814$ ) and after ( $M = .94, SD = .929$ ) showed a tendency towards statistical significance [ $t(15) = -2.087, p = .054$ ]. These results suggest that female participants' opinion concerning a relationship with an android after playing the game changed positively, but not enough to be significant.

Finally, female participants' responses to item 5 showed a tendency to change before ( $M = .88, SD = .806$ ) and after ( $M = 1.19, SD = .834$ ) playing [ $t(15) = -2.076, p = .055$ ]. Thus, their belief about androids developing consciousness seemed to change, but not enough to be significant.

H4.c was partially confirmed.

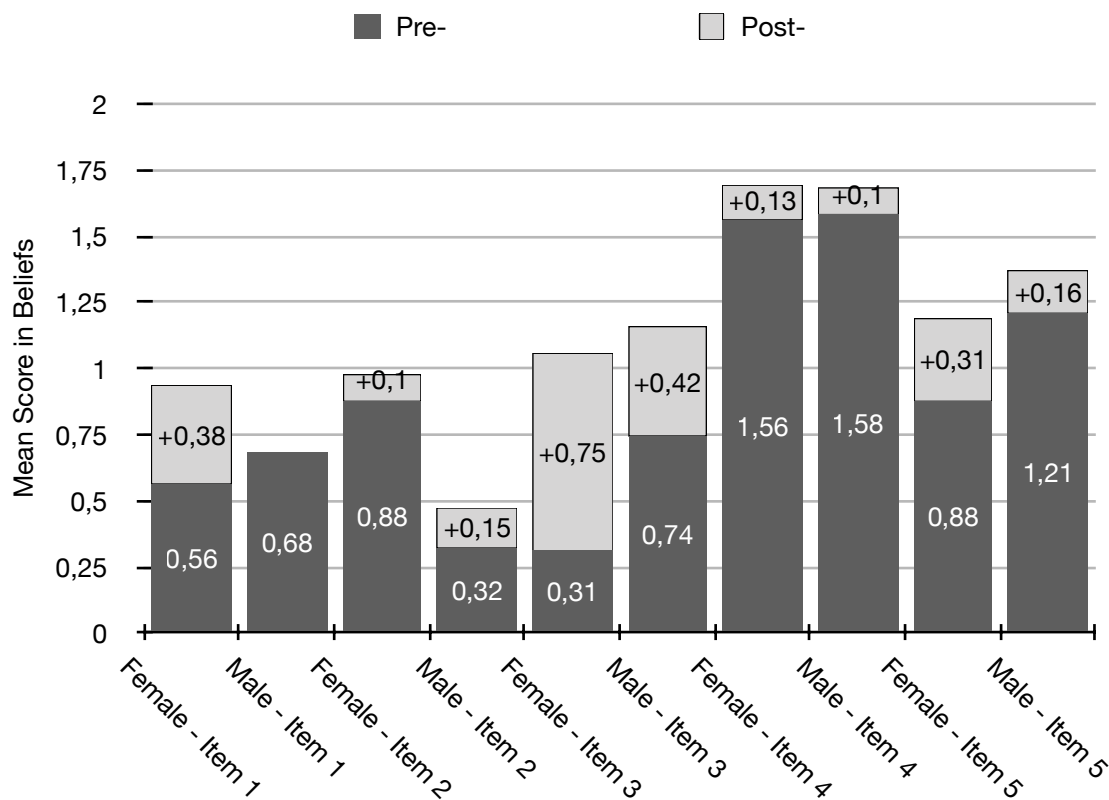


Figure 2. Mean score per item per gender pre- and post-gaming.



## Discussion

The study presented here proposed to investigate the changes of beliefs towards a specific social group through the scope of perspective taking and emotional connection with an avatar belonging to that group. To do so, an experiment was led using the game *Detroit: Become Human* (Quantic Dream, 2018), broadcasting androids breaking through their encoded resilience to orders and developing consciousness and agency. The chapters played by the participants were Kara's character first chapters. Into control condition, the participants would go around the virtual environment to complete simple tasks like taking the trash out and cleaning the rooms. In the experimental condition, participants had to make the right decisions in order to save the little girl of the house from her violent father. The social beliefs studied were the opinions and trust in androids and technology in general.

### Significant Findings

The first hypothesis proposed in this research was that avatar emotional connection would impact positively the change in the belief. Because of the small number of participants (N=35), no statistical test could be run to confirm or reject it. Therefore, this hypothesis will be answered theoretically, based on the significant findings presented here.

#### *Avatar-Emotional Connection*

The first main theme of this research was the emotional connection build between the player and the avatar. Taking the avatar's perspective was monitored through the Avatar-Emotional Connection Scale (AEC, Ratan & Dawson, 2016). General empathy was hypothesised as being correlated with the perspective taking of the player. Indeed, a correlation between general empathy, score by the Toronto Empathy Questionnaire (Spreng et. al, 2009), and the AEC was found significantly positive. Thus, players being more empathetic in general would have a tendency to empathise more with an avatar in-game.

The participants AEC score was found to be higher for female participants, following Ratan and Dawson's (2016) conclusions. The avatar played, Kara, was a

female android, creating a gender bias in the connection made with her. Moreover, this AEC appeared to be higher in the experimental condition, confirming Heron and Belfort's (2014) list of characteristics accuracy, as well as Frasca's (2001) affirmation for the need of agency, and Dechering and Bakkes's (2018) importance of moral decisions in-game. Building on this confirmation, the game environment seemed favourable for a change in social beliefs.

### ***Changes in the Beliefs***

The main topics addressed in the video game chapters chosen were the place of the androids in childcare, and the development of their own agency and consciousness. In general, the participants' opinions linked to both concepts were changed positively after playing. These results are in line with previous research displaying changes in social beliefs through video game experience (Beck & Rose, 2016; Behm-Morawitz et al., 2016; Fox et al., 2014; Peña et al., 2018).

The third item proposed was 'Would you let an android take care of your children'. Participants showed an inclination to the yes after playing, without regard for gender or condition. Therefore playing an avatar having for primary mission to care for a child, with or without strong emotional connection, seemed to be enough to make them change their opinions. Further statistical analysis revealed that female participants seemed to have a more important change of attitude. This might be explained by their first answers being in average lower than the man's ones. It could also be explained by their higher connection with the avatar, leading trust towards androids as carers. Moreover, the participants in experimental condition showed a significantly higher change towards positive attitudes when it came to letting an android taking care of their children, and the avatar emotional connection was shown to be higher in this condition as well. An explanation for the witnessed phenomenon could be, as presented by Joeckel and collaborators (2012), that when having to take strong moral decisions in game, a player will apply its own morality to the avatar. Thus, applying its own morality to the avatar in context of childcare when taking its perspective might bias the player's opinion on the expected behaviours of the individuals belonging to the avatar's social group in 'real life', building trust towards them.

The fifth item's answers ('Do you think one day machines could develop consciousness?') also changed significantly positively after playing in general. When further statistical analysis was done, some difference was found between gender and experimental groups. Indeed, female participants seemed to have a tendency to change their opinions but without significant results. Additionally, participants in the experimental condition changed their replies significantly when the control condition participants did not. Both female and experimental condition groups were recognised as having significantly higher connection with the avatar. Moreover, the experimental condition participants had to play the android choosing to break the code or not, allowing her to take her own decisions and to act as she wished. This would be linked to androids developing consciousness. Therefore, the change in the belief for this experimental group might be due to this in-game experience of moral choice, as an addition to their connection with the avatar.

The first item's answers ('Would you consider having a relationship with an android that looks like a human?') showed to change in general but not enough to be significant. This might be due to the size of the sample, or to the misinterpretation of the item. Multiple participants asked for clarification of the word 'relationship' in the formulation. The researcher clarified that it included every type of relationship, like friendship. But some participants might have focused their attention to romantic relationships and answered accordingly.

The fourth item ('If you needed emergency surgery, would you agree to be operated on by a machine?') shown to have a high pregame score. In other words, participants seemed already inclined to say yes. According to Fiske, Cuddy, and Glick (2007), two universal dimensions exist in the evaluation of others: warmth and competence. Warmth refers to positive social traits and emotions. Competence is defined as the general perceived ability. When it comes to robots, participants could have had a preconceived high perception of their competence, explaining the pregame high score for this specific item. This same explanation could apply to the lack of discrepancy in the answers between pre-and post-game data collection for item 2 ('Do you think that technology could become a threat to mankind?'). If technology is

perceived as competent without social competences, the lack of positive feelings towards its future evolution could be explained.

## **Implications for the Future**

### ***Theoretical implications***

The results presented here suggest an implication of empathy in the change of social beliefs, confirming previous authors' statements (Haidt, 2012; Decety, 2015; Decety & Yoder, 2016; Tousignant et al., 2016). Applying this theory to video games allowed to give a clearer view of the process behind the change already witnessed in other studies (Peña et al., 2018, Beck & Rose, 2016). Continuing the research on the impact of video games on attitudes and behaviours, the results presented here proposed a path to understanding the 'how' through a multidisciplinary scope. If empathy seems to be an interesting direction to follow, some further studies need to be done in order to get a better understanding of the process behind the importance of video games.

### ***Practical Implications***

The gaming industry, more specifically the game designers could benefit from the findings of this research, confirming the importance of an emotionally involving narrative allowing agency in a player's identification to the avatar, and thus emotional engagement. According to Ryan and Rigby (2020), engagement would lead to motivation to play. The highlight was also put on gender in this research, suggesting that a female avatar would engage more importantly a female player. Knowing that 46% of the gamers are now female (Brosman, 2019) calls for a change in the gaming industry when it comes to engaging women as much as the traditional man player.

The change in beliefs towards a social group due to game experience also opens a new path for the educational games. The development of games to reduce social bias could change the face of discrimination.

## **Criticality**

### ***Limitations of the study***

First, the number of participants who took part in this experiment was of 35, and the population was composed of students of the Institute of Art, Design, and Technology of Dún Laoghaire, Co. Dublin, Ireland. Those restrictions in the population lead to a low generalisation of the results. Moreover, the different abilities of the participants to play on a PlayStation 4 Pro were not assessed before the experiment which could have affected their experience of the game.

The time spent playing the game was of 15 min to 35 min. It is not known if the time spent played had an impact on the results. In the future, a control could be introduced. Another point concerns the decisions made in game. They might have impacted the gamer's experience. In the future, a control should be implemented.

Concerning the material, the empathy questionnaire used was to evaluate general empathy, but did not allow to investigate which empathy was involved at which level in the process of identification, and change in the beliefs. Additionally, the belief questionnaire proposed was built on a survey present in the *Detroit: Become Human* (Quantic Dream, 2018) game. In the future, it would be relevant to use a statistically tested belief questionnaire.

Finally, the possible moral disengagement of the players was not controlled (Hartmann & Vorderer, 2010). In violent game environment, a user might disengage morally to ease possible feelings of guilt. The risk of this phenomenon occurring was minimum as the players were given moral agency (Weaver & Lewis, 2012).

### ***Strengths of the Study***

The new approach proposed allowed to build an experiment more complete on the topic of video games impact on social beliefs than the one existing to the researcher's knowledge. The experimental design was built on existing literature, and included more controls allowing for a clearer overview of the implication of empathy in game experience and its consequences.

### ***Future Research***

Building on this research findings, it would be relevant to lead a study repeating the experiment with more than 150 participants from different geographical

placed, allowing to test the results through regression, investigating the importance of the avatar-emotional connection on the changes in beliefs. Moreover, if general empathy has been shown to correlate with the emotional connection to the avatar, it would be interesting to investigate which component of the empathy is the most involved by using a sub-scaled empathy questionnaire. Finally, the control of the participants' comfort to use the device on which the game is played should be done.

Beck and Rose (2016) proposed an hour-long gameplay followed by a longitudinal data collection of the belief score and observed that if the belief they were studying did not change significantly right after the game, it did 6 months later. This might be attributed to the time a person might take to reflect on their belief due to new experiences. Thus, it might be relevant to follow Beck and Rose example in future studies.

From another angle, it has been hypothesised that the changes in the beliefs might be due to the attribution of one's own moral beliefs to an avatar (Joeckel, 2018). For future studies, collecting the decisions made in game by the player and comparing them to their real-life beliefs might be relevant. Also, collecting that information and comparing it to a score of enjoyment could be relevant.

Following the idea that choices in game might impact the player's experience, it might be relevant to investigate which of the 5 types of moral foundation (Graham et al., 2011) would be the most involved in changing beliefs. Those five types are labelled as harm, fairness, loyalty, authority, and purity and might be challenged in game through moral decision-making. Exploiting this proposition, it would be important then to control which choice is perceived the most as a moral violation by the participants as this might variate depending on the cultural upbringing (Haidt & Kesebir, 2010).

Finally, instead of investigating a change in the beliefs, it might be interesting to bring the focus on the evolution of trust towards a social group. Changing a social belief for the positive, and thus reducing stereotypes, could be linked to the evolution of trust towards a specific group, and the reduction of prejudices towards its members.

**Conclusion**

Throughout this research, confirmations of previous affirmations were made, and propositions of new angles were presented. Empathy, through emotional connection with an avatar, seems to be involved in the process of changing opinions on social groups. A combination of characteristics triggering this identification with the avatar was presented. And a change for the better was seen in the participants' opinions. Having this information, researchers, educators, and the gaming industry could work together to build games designed to reduce discrimination and socially educate people. The power of gaming can be used in multiple ways, social education should be one.

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## Appendix A

### Information Sheet

**Study Title:** Becoming More Human: Learning through Cognitive Empathy in Video Game.

#### **Purpose of the Research**

This study investigates the impact of cognitive empathy towards an avatar, on moral judgements. When humans play a Narrative Video Game (NVG) involving moral decision-making, they have a tendency to apply their own morality to resolve the decisions in game and to identify with the avatar. Identification leads the player and the avatar to merge in the self-perception of the player. This research aims to investigate if this cognitive empathy, also called perspective taking, will impact the perception and the beliefs that players have concerning the group in which the avatar belongs. If it does, it might impact the player's future moral judgements and behaviours towards that specific group.

#### **Invitation**

You are being invited to consider taking part in the research study *Becoming More Human: Learning Through Empathy in Video Games*. This project is being undertaken by Auxane Boch.

Before you decide whether you wish to take part, it is important for you to understand why this research is being done and what it will involve. Please take time to read this information carefully and discuss it with friends and relatives if you wish. Ask us if there is anything that is unclear or if you would like more information.

#### **Do I have to take part?**

You are free to decide whether you wish to take part or not. If you do decide to take part, you will be asked to sign a consent form, one is for you to keep and the other is for our records. *You are free to withdraw from this study at any time and without giving reasons.*

#### **If I take part, what do I have to do?**

First, you will be asked to complete questionnaires. Then, you will play a video game called Detroit: Become Human. Then you will be asked to complete questionnaires again. Finally, you will be given a debrief sheet as well as a time with the researcher for her to explain the full research and answer your questions. The estimated duration of the experiment is 45 minutes to an hour.

#### **What are the disadvantages and risks (if any) of taking part?**

Taking part in this study might put you in a psychological discomfort and/or distress. This study includes video game scenes of very violent content and strong domestic violence, including violence against a child. In some cases this violence may result in the death of the child character. If you feel affected by this content in any way, stop at any time.

***If you are experiencing psychological fatigue, psychological fragility, mental illness, or discomfort with the topic addressed in this experience, please do not take part in this study as it might be harmful.***

If you feel psychological discomfort or psychological distress during the experience, please remember that ***you are free to withdraw from this study at any time and without giving reasons.*** Moreover, you are free to skip any questions which you don't want to answer.

### **How will information about me be used?**

The questionnaires are the collected data in this study. All revolted data will be anonymised through a code you will generate according to a pattern. The data will then be kept by the researcher and only the researcher, encrypted and protected by a password on a computer and on an external hard drive. The data will be retained by the researcher for at least one year. If the research is to be published, most scientific journals require original data to be kept for five years.

***You can ask to withdraw your data from the study until the 15th of March 2020.***

### **What will happen to the results of the study?**

The results of this study will be used in the researcher's MSc in Cyberpsychology thesis, in the Dun Laoghaire Institute of Art, Design and Technology. It is not yet known if this research will be published.

### **Who has reviewed the study?**

This study has been approved by the Department of Technology and Psychology Ethics Committee (DTPEC).

### **What if there is a problem?**

If you have a concern about any aspect of this study, you may wish to speak to the researcher who will do her best to answer your questions. You should contact Auxane Boch or her supervisor Dean McDonnell.

### **Contact for further information**

Researcher's email: [n00183037@student.iadt.ie](mailto:n00183037@student.iadt.ie)

Supervisor's contact: [Dean.McDonnell@iadt.ie](mailto:Dean.McDonnell@iadt.ie)

**Thank you for taking the time to read this information sheet.**

## CONSENT FORM

**Title of Project:** Becoming More Human: Learning Through Cognitive Empathy in Video Games.

**Name of Researcher/s:** Auxane Boch

**Please tick box**

- 1 I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions.
- 2 I understand that my participation is voluntary and that I am free to withdraw at any time.
- 3 I agree to take part in this study.
- 4 I understand that data collected about me during this study will be anonymised before it is submitted for publication.
- 5 I agree to allow the data collected to be used for future research projects.
- 6 I agree to be contacted about possible participation in future research projects.

\_\_\_\_\_  
Name of participant

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Researcher

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

**Appendix B**  
**Demographic Questionnaire**

You identify more as a:      Women      Men      Other      Doesn't wish to answer

How old are you: \_\_\_\_\_

How many hours a week do you usually play Video Games: \_\_\_\_\_

Have you ever played Detroit: Become Human:                      Yes                      No

    If yes, did you finish the game?                      Yes                      No

    How many hours did you play \_\_\_\_\_



**Appendix C**  
**Beliefs Questionnaire**

Below is a list of statements. Please read each item carefully and answer each question. Circle your answer on the response form. There are no right or wrong answers or trick questions. Please answer each question as honestly as you can, the data will remain anonymous.

1. Would you consider having a relationship with an android that looks like a human ?	Yes	No	Don't Know	Do Not Wish to Answer
2. Do you think that technology could become a threat to mankind ?	Yes	No	Don't Know	Do Not Wish to Answer
3. Would you let an android take care of your children?	Yes	No	Don't Know	Do Not Wish to Answer
4. If you needed emergency surgery, would you agree to be operated on by a machine?	Yes	No	Don't Know	Do Not Wish to Answer
5. Do you think one day machines could develop consciousness?	Yes	No	Don't Know	Do Not Wish to Answer

**Appendix D**  
**Toronto Empathy Questionnaire**  
**(Spreng et al., 2009)**

Below is a list of statements. Please read each statement carefully and rate how frequently you feel or act in the manner described. Circle your answer on the response form. There are no right or wrong answers or trick questions. Please answer each question as honestly as you can.

Responses are to be given using a 5-point Likert-scale corresponding to various levels of frequency (i.e., never, rarely, sometimes, often, always).

	Never	Rarely	Sometimes	Often	Always
1. When someone else is feeling excited, I tend to get excited too	1	2	3	4	5
2. Other people's misfortunes do not disturb me a great deal	1	2	3	4	5
3. It upsets me to see someone being treated disrespectfully	1	2	3	4	5
4. I remain unaffected when someone close to me is happy	1	2	3	4	5
5. I enjoy making other people feel better	1	2	3	4	5
6. I have tender, concerned feelings for people less fortunate than me	1	2	3	4	5
7. When a friend starts to talk about his/her problems, I try to steer the conversation towards something else	1	2	3	4	5
8. I can tell when others are sad even when they do not say anything	1	2	3	4	5
9. I find that I am "in tune" with other people's moods	1	2	3	4	5
10. I do not feel sympathy for people who cause their own serious illnesses	1	2	3	4	5
11. I become irritated when someone cries	1	2	3	4	5
12. I am not really interested in how other people feel	1	2	3	4	5
13. I get a strong urge to help when I see someone who is upset	1	2	3	4	5

14. When I see someone being treated unfairly, I do not feel very much pity for them	1	2	3	4	5
15. I find it silly for people to cry out of happiness	1	2	3	4	5
16. When I see someone being taken advantage of, I feel kind of protective towards him\her	1	2	3	4	5

## Appendix E

### Game Play : All Possible Ends

Note: All videos presented in this Appendix were made by Joshiball channel in 2018.

#### **Phase 1: A New Home**

##### ***Finished Cleaning***

<https://www.youtube.com/watch?v=3BqI5yFh5Oo>

Do the shores around the house, start talking to Alice and get introduced to the father. He might be bullying the character depending on what you do.

There is only one possible ending in A New Home. When Kara finishes cleaning the second floor she will need to go back downstairs, at which point a cinematic will end the chapter. While this is the only possible conclusion, 100 percent completion of the chapter is preferred as there are two instances where Kara can unlock possible paths in Stormy Night.

#### **Phase 2: The Stormy Night**

##### ***Todd Kills Alice***

<https://www.youtube.com/watch?v=k2VWAivImho>

The only way to get this ending is to obey Todd when he tells Kara not to move. Either don't break free and become deviant or do but don't ever go upstairs to intervene. Just know that if this ending is saved it will have major consequences on how the game plays out moving forward. There will be entire chapters missing.

##### ***Todd Broke Kara Outside***

[https://www.youtube.com/watch?v=cCAHjTn0p\\_Y](https://www.youtube.com/watch?v=cCAHjTn0p_Y)

There are multiple ways to get this ending but the common idea between them is that Kara and Alice got out of the house but didn't get on the bus. To achieve it as part of 100 percent completion, get outside and just stand there. After several seconds Todd will catch up with Kara and Alice and break Kara, drastically altering future events.

##### ***Kara Shot Todd***

<https://www.youtube.com/watch?v=zenyHjPT08U>

This ending is possible only if players found the gun in A New Home. Kara must become deviant, then head upstairs to Todd's room and retrieve the gun. Head into Alice's room and confront Todd, then win the fight. Kara will shoot and kill Todd, which is likely to be the most popular ending for this chapter.

##### ***Alice Shot Todd***

<https://www.youtube.com/watch?v=HkaOaMstEf4>

This ending is achieved by finding the gun in A New Home, then becoming deviant at

the start of this chapter. Head upstairs and take the gun, then confront Todd in Alice's room. Win the fight up to the point where Kara must dash for the gun, then fail the QTE. Todd will get the upper hand, but Alice will retrieve the gun and kill him.

### ***Todd Broke Kara in the Corridor***

<https://www.youtube.com/watch?v=ldMRzdEeFIM>

For this ending to be achieved Kara and Todd must fight in Alice's room, but the gun cannot be present. Leave it in Todd's room. Just go into Alice's room (before or after Todd) and fight him. Win that fight and Kara and Alice will flee to the corridor. Stand there and do not attempt to get away and Todd will break Kara in the corridor.

### ***Todd Broke Kara Downstairs***

<https://www.youtube.com/watch?v=WeUeBEcHohg>

This ending is unlocked by getting away from Todd's upstairs, either by fighting or fleeing. When Kara and Alice head downstairs, try the front door but fail the QTE. Todd will catch up to Kara and attack her. Purposely fail all QTEs from this point on and the ending will pop. If Kara heads to the backyard instead of the front door, this ending is impossible, even if they fight downstairs.

### ***Kara and Alice Evaded Todd***

<https://www.youtube.com/watch?v=r8XGWpcEVyM>

This is probably the fastest ending to unlock in the chapter. Kara will need to become deviant as soon as Todd tells her to stay put. Head upstairs and choose to lock Alice's bedroom door, then go out her bedroom window only if it was discovered in A New Home. Nail the QTEs and run for the bus and this ending is unlocked in just a couple short minutes.

### ***Kara and Alice Fought Their Way Out***

<https://www.youtube.com/watch?v=nc6FEypQD0E>

This ending is achieved multiple ways. The first is to fight with Todd's upstairs (without the gun) and win, or fight with him downstairs and win. If Kara wins all her fights with Todd and escapes with Alice, this is the ending players will get. It also requires that players do not escape through Alice's bedroom window.

**Appendix F**  
**Avatar-Emotion Connection Sub-Scale**  
**(Ratan & Dawson, 2016)**

Please answer this question in rating your answer from 1 (*not at all*) to 5 (*extremely*).

1. When sad events happen to your avatar, to what extent do you feel sad?	1	2	3	4	5
2. When scary events happen to your avatar, to what extent do you feel afraid?	1	2	3	4	5
3. When arousing events happen to your avatar, to what extent do you feel aroused?	1	2	3	4	5

## Appendix G

### Debrief Sheet

**Thank you very much for taking part in this research study.**

The study investigates the impact of cognitive empathy with an Artificially Intelligent (AI) robot avatar on beliefs and moral judgements towards AI. The hypothesis is that experiencing a strong empathy with the avatar while playing through a strong emotional gameplay presenting moral decisions will impact the beliefs towards the group in which the avatar is identified as, leading to change in the moral judgements, and so change future behaviours towards this group. Two groups will be compared. Group 1 played through one chapter of the game in which no moral decisions occurred. Group 2 played that same chapter plus a second chapter presenting moral decisions and strong emotional situations. If results suggest that moral implication of the gamer while experiencing a strong empathy towards the avatar might change a belief, it could help create a new approach to prevent prejudice towards specific groups. Moreover, this framework could be explored in other situations to help understand how games impact players and their morality.

If you have questions about this study or you wish to have your data removed from the study before the February the 15th 2020, please contact me at the following e-mail address: [N00183037@student.iadt.ie](mailto:N00183037@student.iadt.ie).

Alternatively, you may contact my supervisor, Dean McDonnell, at [Dean.McDonnell@iadt.ie](mailto:Dean.McDonnell@iadt.ie).

We ***thank you*** sincerely for contributing and assure you that your data is confidential and anonymous, and if published the data will not be in any way identifiable as yours.

If you have been affected by the content of this study in any way, IADT's counselling service may be of assistance. You can send an e-mail at [studentcounselling@iadt.ie](mailto:studentcounselling@iadt.ie) to request an appointment, or drop on Monday to Friday 9:00 a.m. to 9:30 a.m. You can also contact the National Domestic Violence Freephone Helpline number at +3538082000247.

Auxane Boch

## Appendix H

### DTPEA Form B

#### Department Of Technology And Psychology Ethical Approval Form B

Title of project: **Becoming More Human: Learning Through Cognitive Empathy In Video Game**

Name of researcher **Auxane Boch**

Email contact **n00183037@student.iadt.ie**

Name of supervisor **Dean McDonnell**

		Yes	No	N/A
1	Will you describe the main research procedures to participants in advance, so that they are informed about what to expect?	<b>X</b>		
2	Will you tell participants that their participation is voluntary?	<b>X</b>		
3	Will you obtain written consent for participation (through a signed or 'ticked' consent form)?	<b>X</b>		
4	If the research is observational, will you ask participants for their consent to being observed?			<b>X</b>
5	Will you tell participants that they may withdraw from the research at any time and for any reason?	<b>X</b>		
6	With questionnaires, will you give participants the option of omitting questions they do not want to answer?		<b>X</b>	
7	Will you tell participants that their data will be treated with full confidentiality and that, if published, it will not be identifiable as theirs?	<b>X</b>		
8	Will you debrief participants at the end of their participation (i.e., give them a brief explanation of the study)?	<b>X</b>		
9	If your study involves people between 16 and 18 years, will you ensure that <u>passive</u> consent is obtained from parents/guardians, with active consent obtained from both the child and their school/organisation?			<b>X</b>



10	If your study involves people under 16 years, will you ensure that <u>active consent</u> is obtained from parents/guardians <u>and</u> that a parent/guardian or their nominee (such as a teacher) will be present throughout the data collection period?				X
11	Will your project involve deliberately misleading participants in any way?			X	
12	Is there any realistic risk of any participants experiencing either physical or psychological distress or discomfort?		X		
13	Does your project involve work with animals?			X	
14	Do you plan to give individual feedback to participants regarding their scores on any task or scale?			X	
15	Does your study examine any sensitive topics (such as, but not limited to, religion, sexuality, alcohol, crime, drugs, mental health, physical health)		X		
16	Is your study designed to change the mental state of participants in any negative way (such as inducing aggression, frustration, etc.)		X		
17	Does your study involve an external agency (e.g. for recruitment)?			X	
18	Do participants fall into any of the following special groups?	People with learning or communication difficulties		X	
		Patients (either inpatient or outpatient)		X	
		People in custody		X	

If you have ticked No to any of questions 1 to 10, or Yes to any of questions 11 to 18 you should refer to the PSI Code of Professional Ethics and BPS Guidelines. There is an obligation on the lead researcher to bring to the attention of the Department of Technology and Psychology Ethics Committee (DTPEC) any issues with ethical implications not clearly covered by the above checklist.

\* This Ethics B form should be completed by researchers whose studies involve any ethically questionable practices.

**1. Purpose of project with very clear and specific justification for the study [its potential benefits], given the acknowledged sensitivity of the topic of study or the methods used.**

The study investigates the impact of cognitive empathy with an Artificially Intelligent (AI) robot avatar on beliefs and moral judgements towards AI. The hypothesis is that experiencing a strong empathy with the avatar while playing through a strong emotional gameplay presenting moral decisions will impact the beliefs towards the group in which the avatar is identified as, leading to change in the moral judgements, and so change futur behaviours towards this group. Two groups will be compared. Group 1 will play through one chapter of the game in which no moral decisions occur. Group 2 will play that same chapter plus a second chapter presenting moral decisions and strong emotional situations. If results suggest that moral implication of the gamer while experiencing a strong empathy towards the avatar might change a belief, it could help create a new approach to prevent prejudice towards specific groups. Moreover, this framework could be explored in other situations to help understand how games impact players, and their morality.

**2. Proposed methodology (approximately 300 words).**

- a. Eighty or more participants will be recruited on a voluntary basis, following convenience and snowball methods. The target population is gamers and non gamers, over 18 years old. It is interesting to have multiple ages because of the topic addressed: artificial intelligence robots. Different generations might experience the game in different ways. The exclusion criteria will be any medical condition contraindicating playing video games including violent language, and violent scenes: mental illness, epilepsy, and physical disabilities preventing the use of the Play Station.
- b. The participant will be given the information sheet and the consent form (Appendix A), as well as the demographical questionnaire (Appendix B). Then, the participant will be asked to answer two questionnaires (Appendix C,D): a belief towards AI questionnaire and a general empathy questionnaire. The video game phase will then start with « A New Home» chapter of the game for both groups. A second chapter, « A Stormy Night », will be played by group 2 (Appendix E). The participant will be asked to answer questionnaires again: beliefs towards AI questionnaire again, and the avatar-emotion connection sub-scale (Appendix F). Finally, the debrief sheet will be given (Appendix G). The researcher will debrief with the participant and take the time to answer any questions asked. In between each step of the experiment, the researcher will ask the question « Do you want to continue the experiment or do you wish to stop? ».

***A clear but concise statement of the ethical considerations raised by the project and how you intend to deal with them.***

- To prevent any harm, the participant will be informed before the beginning of the experiment that a sensitive topic will be addressed: violent and abusive behaviours from a father to a daughter, and to a robot.
- A sentence will be added to the information sheet: « If you are experiencing psychological fatigue, psychological fragility, mental illness, or discomfort with the topic addressed in this experience, please do not take part in this study as it might be harmful. »
- It will be written on the information sheet that the participant can withdraw at any moment, and the participant will be asked in between each step of the experiment if they wish to withdraw. The researcher proposing at every step will facilitate the process of withdrawal for the participant as they might be uncomfortable asking.
- The topic of abuse towards robots, (robots looking like) children, and the situation in which the participants will be may harm them and create psychological discomfort. The researcher will stay alert to any physical sign of stress (e.g. abnormal sweating, trembling or shaking, physical discomfort) presented by the participant and will stop the experiment if any signs show. The researcher will then take time to debrief with the participant.
- During the debrief, some informations will be delivered to the participants. Alice, the little girl present in both chapters of the games and abused in the second chapter played (by group 2) is not a child but a robot. If the participant plays in a way that ends up with Alice's death, this information will be delivered automatically by the researcher, to distanciate the participant from the character, and help coping with the situation. If the participant plays in a way that Alice survives, the information will be given only if they wish to know as it is a spoiler of the game story. Statistically, Alice survives in most of the gameplay recorded datas (the game shows world's players statistics on each outcome when a chapter is finished).
- Finally, the debrief will take place and the researcher will take all the time needed to answer every question and explain the research clearly.
- The National Domestic Violence Freephone Helpline number will be given at the end of the debrief form: 0808 2000 247.

I am familiar with the PSI Code of Professional Ethics and BPS Guidelines (and have discussed them with the other researchers involved in the project). I have read and understood the specific guidelines for completion of Ethics Application Forms.

## Appendix I

### Chair of DTPEC Feedback on Ethics B Application

Dear Auxanne

Thank you for your Ethics B application to the DTPEC.

Your application needs to be revised in accordance with the feedback below.

Adherence to these revisions can be approved by your supervisor and you do not need to resubmit to the DTPEC unless your project changes in such a way that additional ethical issues arise.

Your required changes are:

1. Two applications were received from this student – this one relates to the one entitled “Becoming more human”
2. Participants must be given the option of not answering questions (item 6 on Ethics B form)
3. More specific advance warnings must be given that the content of the game potentially includes violence against a child and their potential death in both the information sheet and at the start of gameplay
4. Recommended wording is: “this study includes video game scenes of very violent content and strong domestic violence, including violence against a child. In some cases this violence may result in the death of the child character. If you feel affected by this content in any way, stop at any time”
5. The data collection should only occur on IADT campus, with IADT students. Permission should be received from the IADT counsellor to include their contact details, and the study should only take place during the hours that the IADT counsellor is present.

The committee also noted a number of issues which arose across several projects, and these are listed below. If any of these apply to your project you should also amend your materials to adhere to them.

- Remove all phone numbers for IADT staff except for the IADT main desk
- Use IADT student email accounts only – not personal accounts such as gmail etc.
- In the consent sheet remove the items relating to future research and anything else which is not relevant to your study
- In the consent sheet ensure that you have removed one of “will/will not” from the item relating to anonymity
- Add a line saying “I am over 18” to the consent sheet for participants to tick
- Ensure that you clearly state in the Information Sheet that participants are free to skip any question which they don’t want to answer

- When asking questions regarding gender, you should use the following options unless there is a clear and valid reason otherwise: “Male”/”Female”/”I prefer to self-describe”
- If you are planning on using Virtual Reality for your study you must screen participants for motion sickness using the Motion Sickness Susceptibility Questionnaire

Thank you for your application to the DTPEC  
Grainne Kirwan  
Chair of DTPEC

**Appendix J****Poster Displayed on IADT Campus and Social Media**

CYBERPSYCHOLOGY RESEARCH

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# **PARTICIPANTS WANTED**

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Becoming More Human: Learning through  
cognitive empathy in video games

This study investigates the impact of cognitive empathy towards an avatar, on moral judgements. When humans play a Narrative Video Game involving moral decision making they have a tendency to apply their own morality to resolve the decisions in game and to identify with the avatar. This research aims to investigate if this cognitive empathy, also called perspective taking, will impact the perception and the beliefs that players have concerning the group in which the avatar belongs.

**HOW TO PARTICIPATE ?**

Use the flash code or the link to get to the research schedule. If you wish to take part in the experiment please note your initials in the box corresponding with your availability. Only one person can do the experiment at the time. The schedule will be updated by the researcher every week.



<http://bit.ly/2NMxzFA>

***Thank you for your help, Auxane B.***

*Figure 3. Participants wanted poster.*

**Appendix K**  
**Comparison AEC Score between Groups (Played DBH or Not)**

Table 2. Group statistics of avatar-emotional connection score between groups played Detroit: Become Human before and not.

	Played DBH	N	Mean	Std. Deviation	Std. Error Mean
Score Avatar-Emotional Connection	No	31	3,300277	0,9321572	0,1674204
	Yes	4	4,249750	0,3188232	0,1594116

Note: DBH = Detroit: Become Human.

Table 3. Independent samples t-test comparing means of avatar-emotional connection score of participants who played DBH before the experiment or not.

		Levene's Test for Equality of Variances				t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference		
										Lower	Upper
Av.Em. Con.	Equal variances assumed	2,847	0,101	-1,999	33	0,054	-0,949473	0,474943	-1,915751	0,016806	
	Equal variances not assumed			-4,107	11,829	0,001	-0,949473	0,231174	-1,453968	-0,444977	

Note: Av.Em.Con. = Avatar Emotional Connection scored on a 5-points Lickert Scale.

### Appendix L

#### Correlation Time Playing / Week and Avatar Emotional Connection

Table 4. Spearman's correlation between the time playing video games per week and the Avatar-Emotional Connection Score.

			Average Time Playing Video Games / Week	Avatar-Emotional Connection
Spearman's rho	Average Time	Correlation Coefficient	1,000	-0,045
	Playing Video	Sig. (2-tailed)	.	0,798
	Games / Week	N	35	35
	Avatar-Emotional	Correlation Coefficient	-0,045	1,000
	Connection	Sig. (2-tailed)	0,798	.
		N	35	35



**Appendix M**  
**Correlation Between the Avatar-Emotional Connection Score and Empathy**  
**Score**

Table 5. Spearman's correlation between Empathy Score and the Avatar-Emotional Connection Score.

			Avatar-Emotional Connection	Empathy Score
Spearman's rho	Avatar-Emotional Connection	Correlation		
		Coefficient	1,000	0,354*
		Sig. (2-tailed)	.	0,037
			N	35
	Empathy Score	Correlation		
		Coefficient	0,354*	1,000
Sig. (2-tailed)		0,037	.	
		N	35	

\*p < .05

**Appendix N**  
**Avatar-Emotional Connection Score Per Gender**

Table 6. Group statistics of avatar-emotional connection score between genders.

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Score Avatar-Emotional Connection	Male	19	3,052631	0,9112679	0,209059
	Female	16	3,833333	0,7888106	0,197204

Note: Avatar Emotional Connection scored on a 5-points Lickert Scale.

Table 7. Independent samples t-test comparing means of avatar-emotional connection score between genders.

		Levene's Test for Equality of Variances				t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference		
										Lower	Upper
Av.Em. Con.	Equal variances assumed	1,118	0,298	-2,682	33	0,011*	-0,780702	0,291052	-1,372852	-0,188552	
	Equal variances not assumed			-2,716	32,965	0,01	-0,780702	0,287393	-1,365431	-0,195973	

\*p < .05

Note: Av.Em.Con. = Avatar Emotional Connection scored on a 5-points Lickert Scale.

## Appendix O

### Avatar-Emotional Connection per Condition

Table 8. Group statistics of avatar-emotional connection score between conditions.

	Condition	N	Mean	Std. Deviation	Std. Error Mean
Score Avatar-Emotional Connection	Control	17	3,058823	1,1070186	0,268491
	Experimental	18	3,740740	0,5891786	0,138870

Table 9. Independent samples t-test comparing means of avatar-emotional connection score between conditions.

	Levene's Test for Equality of Variances				t-test for Equality of Means					
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference		
								Lower	Upper	
Av.Em. Con.	Equal variances assumed	16,307	0,000	-2,293	33	0,028	-0,681917	0,297347	-1,286874	-0,076960
	Equal variances not assumed			-2,256	24,084	0,033*	-0,681917	0,302279	-1,305676	-0,058158

\*p < .05

Note: Av.Em.Con. = Avatar Emotional Connection scored on a 5-points Lickert Scale.

**Appendix P**  
**General Changes in the Beliefs**

Table 10. Descriptive statistics scores per belief item pre- and post- playing.

Belief Items		Mean	N	Std. Deviation	Std. Error Mean
1. Would you consider having a relationship with an android that looks like a human?	Pre-	0,63	35	0,843	0,143
	Post-	0,80	35	0,901	0,152
2. Do you think that technology could become a threat to mankind?	Pre-	0,57	35	0,850	0,144
	Post-	0,69	35	0,867	0,147
3. Would you let an android take care of your children?	Pre-	0,54	35	0,817	0,138
	Post-	1,11	35	0,867	0,147
4. If you needed emergency surgery, would you agree to be operated on by a machine?	Pre-	1,57	35	0,778	0,131
	Post-	1,69	35	0,676	0,114
5. Do you think one day machines could develop consciousness?	Pre-	1,06	35	0,873	0,147
	Post-	1,29	35	0,825	0,139

Note. Belief item is scored over 2 points. Yes = 2 points. Don't Know = 1 point. No = 2 points. Item 2 was reversed scored.

Table 11. Paired-samples correlation in between beliefs scores pre- and post- playing.

Belief Items		N	Mean	Sig
1. Would you consider having a relationship with an android that looks like a human?	Pre- & Post-	35	0,829	0,000
2. Do you think that technology could become a threat to mankind?	Pre- & Post-	35	0,890	0,000
3. Would you let an android take care of your children?	Pre- & Post-	35	0,574	0,000
4. If you needed emergency surgery, would you agree to be operated on by a machine?	Pre- & Post-	35	0,855	0,000
5. Do you think one day machines could develop consciousness?	Pre- & Post-	35	0,794	0,000

Note. Belief item is scored over 2 points. Yes = 2 points. Don't Know = 1 point. No = 2 points. Item 2 was reversed scored.

Table 12. Paired-samples t-test of the difference beliefs scores pre- and post- gaming.

		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Pre - Post	-0,171	0,514	0,087	-0,348	0,005	-1,974	34	0,056509
Pair 2	Pre - Post	-0,114	0,404	0,068	-0,253	0,024	-1,675	34	0,103198
Pair 3	Pre - Post	-0,571	0,778	0,131	-0,839	-0,304	-4,346	34	0,000119**
Pair 4	Pre - Post	-0,114	0,404	0,068	-0,253	0,024	-1,675	34	0,103198
Pair 5	Pre - Post	-0,229	0,547	0,092	-0,416	-0,041	-2,472	34	0,018585**

\*p < 0.5, \*\*p < .01

Note. Pair 1 = « Would you consider having a relationship with an android that looks like a human? ». Pair 2 = « Do you think that technology could become a threat to mankind? ». Pair 3 = « Would you let an android take care of your children? ». Pair 4 = « If you needed emergency surgery, would you agree to be operated on by a machine? ». Pair 5 = « Do you think one day machines could develop consciousness? ». Note. Belief item is scored over 2 points. Yes = 2 points. Don't Know = 1 point. No = 2 points. Item 2 was reversed scored.

**Appendix Q**  
**Changes in the Beliefs per Condition**

Table 13. Descriptive statistics scores per belief item pre- and post- playing depending on the condition (Control, Experimental).

Type	Belief Items		Mean	N	Std. Deviation	Std. Error Mean
Control	1. Would you consider having a relationship with an android that looks like a human?	Pre-	0,76	17	0,903	0,219
		Post-	1,00	17	0,935	0,227
	2. Do you think that technology could become a threat to mankind?	Pre-	0,41	17	0,712	0,173
		Post-	0,53	17	0,717	0,174
	3. Would you let an android take care of your children?	Pre-	0,29	17	0,588	0,143
		Post-	0,82	17	0,883	0,214
	4. If you needed emergency surgery, would you agree to be operated on by a machine?	Pre-	1,35	17	0,862	0,209
		Post-	1,53	17	0,800	0,194
	5. Do you think one day machines could develop consciousness?	Pre-	1,12	17	0,928	0,225
		Post-	1,35	17	0,862	0,209
Experimental	1. Would you consider having a relationship with an android that looks like a human?	Pre-	0,50	18	0,786	0,185
		Post-	0,61	18	0,850	0,200
	2. Do you think that technology could become a threat to mankind?	Pre-	0,72	18	0,958	0,226
		Post-	0,83	18	0,985	0,232
	3. Would you let an android take care of your children?	Pre-	0,78	18	0,943	0,222
		Post-	1,39	18	0,778	0,183
	4. If you needed emergency surgery, would you agree to be operated on by a machine?	Pre-	1,78	18	0,647	0,152
		Post-	1,83	18	0,514	0,121
	5. Do you think one day machines could develop consciousness?	Pre-	1,00	18	0,840	0,198
		Post-	1,22	18	0,808	0,191

Note. Belief item is scored over 2 points. Yes = 2 points. Don't Know = 1 point. No = 2 points. Item 2 was reversed scored.

Table 14. Paired-samples correlation in between beliefs scores pre- and post- playing split per condition (Control, Experimental).

Type	Belief Items		N	Correlation	Sig.
Control	1. Would you consider having a relationship with an android that looks like a human?	Pre - Post	17	0,814	0,000
	2. Do you think that technology could become a threat to mankind?	Pre - Post	17	0,892	0,000
	3. Would you let an android take care of your children?	Pre - Post	17	0,468	0,058
	4. If you needed emergency surgery, would you agree to be operated on by a machine?	Pre - Post	17	0,800	0,000
	5. Do you think one day machines could develop consciousness?	Pre - Post	17	0,727	0,001
Experimental	1. Would you consider having a relationship with an android that looks like a human?	Pre - Post	18	0,837	0,000
	2. Do you think that technology could become a threat to mankind?	Pre - Post	18	0,883	0,000
	3. Would you let an android take care of your children?	Pre - Post	18	0,606	0,008
	4. If you needed emergency surgery, would you agree to be operated on by a machine?	Pre - Post	18	0,943	0,000
	5. Do you think one day machines could develop consciousness?	Pre - Post	18	0,866	0,000

Note. Belief item is scored over 2 points. Yes = 2 points. Don't Know = 1 point. No = 2 points. Item 2 was reversed scored.

Table 15. Paired-samples t-test of the difference beliefs scores pre- and post- gaming depending on the condition (Control, Experimental).

			Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
						Lower	Upper			
Con.	Pair 1	Pre - Post	-0,235	0,562	0,136	-0,524	0,054	-1,725	16	0,104
	Pair 2	Pre - Post	-0,118	0,332	0,081	-0,288	0,053	-1,461	16	0,163
	Pair 3	Pre - Post	-0,529	0,800	0,194	-0,941	-0,118	-2,729	16	0,015*
	Pair 4	Pre - Post	-0,176	0,529	0,128	-0,448	0,095	-1,376	16	0,188
	Pair 5	Pre - Post	-0,235	0,664	0,161	-0,577	0,106	-1,461	16	0,163
Exp.	Pair 1	Pre - Post	-0,111	0,471	0,111	-0,346	0,123	-1,000	17	0,331
	Pair 2	Pre - Post	-0,111	0,471	0,111	-0,346	0,123	-1,000	17	0,331
	Pair 3	Pre - Post	-0,611	0,778	0,183	-0,998	-0,224	-3,335	17	0,004**
	Pair 4	Pre - Post	-0,056	0,236	0,056	-0,173	0,062	-1,000	17	0,331
	Pair 5	Pre - Post	-0,222	0,428	0,101	-0,435	-0,009	-2,204	17	0,042*

\* $p < 0.5$ , \*\* $p < .01$

Note. Pair 1 = « Would you consider having a relationship with an android that looks like a human? ». Pair 2 = « Do you think that technology could become a threat to mankind? ». Pair 3 = « Would you let an android take care of your children? ». Pair 4 = « If you needed emergency surgery, would you agree to be operated on by a machine? ». Pair 5 = « Do you think one day machines could develop consciousness? ». Con. = Control. Exp. = Experimental. Note. Belief item is scored over 2 points. Yes = 2 points. Don't Know = 1 point. No = 2 points. Item 2 was reversed scored.



**Appendix R**  
**Changes in Beliefs per Gender**

Table 16. Descriptive statistics scores per belief item pre- and post- playing depending on the Gender (Male, Female).

Gender	Belief Items		Mean	N	Std. Deviation	Std. Error Mean
Male	1. Would you consider having a relationship with an android that looks like a human?	Pre-	,68 <sup>a</sup>	19	0,885	0,203
		Post-	,68 <sup>a</sup>	19	0,885	0,203
	2. Do you think that technology could become a threat to mankind?	Pre-	0,32	19	0,749	0,172
		Post-	0,47	19	0,841	0,193
	3. Would you let an android take care of your children?	Pre-	0,74	19	0,872	0,200
		Post-	1,16	19	0,898	0,206
	4. If you needed emergency surgery, would you agree to be operated on by a machine?	Pre-	1,58	19	0,769	0,176
		Post-	1,68	19	0,671	0,154
	5. Do you think one day machines could develop consciousness?	Pre-	1,21	19	0,918	0,211
		Post-	1,37	19	0,831	0,191
Female	1. Would you consider having a relationship with an android that looks like a human?	Pre-	0,56	16	0,814	0,203
		Post-	0,94	16	0,929	0,232
	2. Do you think that technology could become a threat to mankind?	Pre-	0,88	16	0,885	0,221
		Post-	0,94	16	0,854	0,213
	3. Would you let an android take care of your children?	Pre-	0,31	16	0,704	0,176
		Post-	1,06	16	0,854	0,213
	4. If you needed emergency surgery, would you agree to be operated on by a machine?	Pre-	1,56	16	0,814	0,203
		Post-	1,69	16	0,704	0,176
	5. Do you think one day machines could develop consciousness?	Pre-	0,88	16	0,806	0,202
		Post-	1,19	16	0,834	0,209

Note. a. The correlation and t cannot be computed because the standard error of the difference is 0. Note. Belief item is scored over 2 points. Yes = 2 points. Don't Know = 1 point. No = 2 points. Item 2 was reversed scored.

Table 17. Paired-samples correlation in between beliefs scores pre- and post- playing split per gender (Male, Female).

Gender	Belief Items		N	Correlation	Sig.
Male	2. Do you think that technology could become a threat to mankind?	Pre - Post	19	0,807	0,000
	3. Would you let an android take care of your children?	Pre - Post	19	0,694	0,001
	4. If you needed emergency surgery, would you agree to be operated on by a machine?	Pre - Post	19	0,805	0,000
	5. Do you think one day machines could develop consciousness?	Pre - Post	19	0,840	0,000
Female	2. Do you think that technology could become a threat to mankind?	Pre - Post	16	0,959	0,000
	3. Would you let an android take care of your children?	Pre - Post	16	0,409	0,116
	4. If you needed emergency surgery, would you agree to be operated on by a machine?	Pre - Post	16	0,909	0,000
	5. Do you think one day machines could develop consciousness?	Pre - Post	16	0,731	0,001
	1. Would you consider having a relationship with an android that looks like a human?	Pre - Post	16	0,667	0,005

Note. Belief item is scored over 2 points. Yes = 2 points. Don't Know = 1 point. No = 2 points. Item 2 was reversed scored.

Table 18. Paired-samples t-test of the difference beliefs scores pre- and post- gaming depending on the gender (Male, Female).

			Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
						Lower	Upper			
Male	Pair 2	Pre - Post	-0,158	0,501	0,115	-0,400	0,084	-1,372	18	0,187
	Pair 3	Pre - Post	-0,421	0,692	0,159	-0,755	-0,087	-2,650	18	0,016*
	Pair 4	Pre - Post	-0,105	0,459	0,105	-0,326	0,116	-1,000	18	0,331
	Pair 5	Pre - Post	-0,158	0,501	0,115	-0,400	0,084	-1,372	18	0,187
Female	Pair 5	Pre - Post	-0,062	0,250	0,062	-0,196	0,071	-1,000	15	0,333
	Pair 2	Pre - Post	-0,750	0,856	0,214	-1,206	-0,294	-3,503	15	0,003**
	Pair 3	Pre - Post	-0,125	0,342	0,085	-0,307	0,057	-1,464	15	0,164
	Pair 4	Pre - Post	-0,312	0,602	0,151	-0,633	0,008	-2,076	15	0,055
	Pair 1	Pre - Post	-0,375	0,719	0,180	-0,758	0,008	-2,087	15	0,054

\*p < 0.5, \*\*p < .01

Note. Pair 1 = « Would you consider having a relationship with an android that looks like a human? ». Pair 2 = « Do you think that technology could become a threat to mankind? ». Pair 3 = « Would you let an android take care of your children? ». Pair 4 = « If you needed emergency surgery, would you agree to be operated on by a machine? ». Pair 5 = « Do you think one day machines could develop consciousness? ». Note. Belief item is scored over 2 points. Yes = 2 points. Don't Know = 1 point. No = 2 points. Item 2 was reversed scored.