

**“Animals are friends, not food”:  
Anthropomorphism leads to less favorable attitudes toward meat consumption  
by inducing feelings of anticipatory guilt**

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**Abstract**

Why do people befriend animals, yet don't feel conflicted about eating some of them? Previous research on the “meat paradox” suggests that the dehumanization of meat animals plays a crucial role in attenuating the negative affective states that consumers may experience when consuming meat. However, relatively little is known about how the converse process, namely anthropomorphism, influences meat consumption. The current research provides evidence that anthropomorphizing meat animals through the friendship metaphor, “animals are friends”, can alter (omnivorous) consumers' attitudes and behavioral intentions toward meat eating, and induce feelings of guilt. More specifically, our experimental findings reveal that anthropomorphism has a negative effect on consumers' attitudes toward the food served in a restaurant and their intentions to patronize it when (pork) meat is on offer. This effect holds whether consumers are invited to consider themselves (Study 1a) or staff members (Study 1b) as taking part in a friendly human-animal interaction. We also demonstrate a similar effect of anthropomorphism on attitudes toward a (pork) meat product and their intentions to buy it, when consumers consider animal-animal friendship or human-animal friendship (Study 2). Last, we show that the negative effect of anthropomorphism on consumers' attitudes and behavioral intentions toward (pork) meat consumption is mediated by increased feelings of anticipatory guilt (Studies 3a and 3c). Nevertheless, no such effect was found with another kind of meat (beef), which indicates that anthropomorphizing meat animals through the friendship metaphor cannot be successfully applied to all commonly eaten species (Study 3b). Implications of these results for meat consumption are discussed.

Keywords: anthropomorphism, anticipatory guilt, meat consumption, meat paradox, metaphor.

## **Introduction**

“Animals are friends, not food” has become an increasingly popular slogan commonly used by animal rights organizations such as People for the Ethical Treatment of Animals [PETA] (2011, 2013), and is heard beyond the vegan and the vegetarian communities. In this article, we argue that this friendship metaphor anthropomorphizes meat animals, which is the inverse of dehumanizing, a psychological process that attenuates the negative affective states that could be associated with their consumption (Bastian, Loughnan, Haslam, & Radke, 2012b; Haslam & Loughnan, 2014). Across six experimental studies, our main results support this view and show that anthropomorphism leads to less favorable attitudes toward (pork) meat consumption because of increased feelings of guilt.

## **Theoretical background**

### **Meat paradox and dehumanization**

Eating meat is considered to be part of our human evolutionary heritage (Smil, 2002). Our early ancestors began eating meat more than 2 million years ago (Stanford, 1999). Unsurprisingly, meat consumption is thus usually considered natural, normal, necessary, and nice (Piazza et al., 2015) and justified by carnism, a specific subset of speciesist beliefs and practices (Caviola, Everett, & Faber, 2018), according to which humans are unique and superior to other species (Monteiro, Pfeiler, Patterson, & Milburn, 2017; Singer, 1995). However, people in Western societies also show great love and care for some animals, exemplified by high levels of pet ownership (American Pet Products Association [APPA], 2017; McConnell, Lloyd & Buchanan, 2016) and a growing concern for farm animal welfare (Bayvel & Cross, 2010; Ingenbleek, Immink, Spoolder, Bokma, & Keeling, 2012).

On one hand, people enjoy eating meat; on the other hand, they do not want to hurt animals and even cherish some of them like friends or family members (Hirschman, 1994; McConnell, Brown, Shoda, Stayton, & Martin, 2011). This curious phenomenon is known as the “meat paradox” in psychology (Bastian et al., 2012b; Loughnan, Bratanova, & Puvia, 2012). It provides a striking illustration of cognitive dissonance (Bastian & Loughnan, 2017), which describes the state of psychological discomfort that arises when people hold contradictory attitudes and engage in inconsistent behaviors (Festinger, 1962). Evidence indicates that people tend to resolve this

dissonance by spontaneously dehumanizing meat animals to deny their capacity for pain, suffering or understanding, and to justify their consumption (Bastian et al., 2012b; Haslam & Loughnan, 2014). For instance, it has been experimentally demonstrated that when people had just consumed meat (Loughnan, Haslam, & Bastian, 2010), or were merely told that they were going to consume meat in a while (Bastian et al., 2012b), they ascribed diminished mental capacities to the animal they had eaten or expected to eat. Correlational evidence further indicates that the perceived mental capacities of different animals are negatively associated with their perceived edibility (Ruby & Heine, 2012) and that omnivores attribute less humanlike emotional capacities to animals than vegetarians do (Bilewicz, Imhoff, & Drogosz, 2011).

In this article, we examine if the converse is true. Namely, we propose to test whether people are more reluctant to eat and buy meat when they are induced to think about meat animals in anthropomorphic terms, i.e. if they are prompted to humanize them.

### **Anthropomorphism and metaphorical thinking**

Anthropomorphism is essentially about attributing humanlike characteristics to non-human agents (Epley, Waytz, & Cacioppo, 2007), which plays a crucial role in determining how a person interacts with those agents (Epley, Waytz, Akalis, & Cacioppo, 2008). Applied to human-animal interaction, past research consistently showed that anthropomorphizing animals promotes pro-animal attitudes. For instance, it has been demonstrated that people reported more willingness to help dogs in need and more support for animal rights when canines were described in anthropomorphic (vs. non-anthropomorphic) language (Butterfield, Hill, & Lord, 2012). Thinking or reading about how animals are similar to humans (vs. how humans are similar to animals) increased the perceived mental capacities of animals, which in turn reduced speciesism and raised moral concerns about their welfare (Bastian, Costello, Loughnan, & Hodson, 2012a). Correlational evidence also shows that a higher individual tendency to anthropomorphize animals predicts greater empathic concern for animals, which is also associated with lower meat consumption (Niemyjska, Cantarero, Byrka, & Bilewicz, 2018).

Epley and colleagues (2007) further suggest that one could differentiate between a strong and a weak version of anthropomorphism, which might help understand an important boundary condition of the effect of anthropomorphism on attitudes toward animals. Contrary to weaker ones, strong forms of anthropomorphism require an explicit endorsement of anthropomorphic beliefs.

For example, dog owners can hold beliefs that their pet experiences love towards them or knows when something is wrong (McConnell et al., 2016). However, it seems that people are relatively impervious to the strong form of anthropomorphism when the animals involved are currently used as food in their own culture, which tends to limit the practical implications of this strong form of anthropomorphism (namely, mind attribution) on reducing meat consumption. Indeed, when they manipulated the perceived intelligence of three different animals (pigs, tapirs, and a fictional animal), Piazza and Loughnan (2016) found that this manipulation had no significant effect on attitudes toward eating pigs whereas eating the other two animals was judged significantly more morally wrong when they were depicted as highly intelligent (vs. unintelligent).

In the present research, we thus propose to study an alternative strategy: investigating the effect of a weaker form of anthropomorphism on attitudes toward meat eating. This form of anthropomorphism does not require conscious endorsement that the agent actually possesses humanlike traits but “may only entail ‘as if’ metaphorical reasoning” and the tendency to behave toward the agent as if it were human (Epley et al., 2007, p. 867). This view echoes Lakoff and Johnson’s (1980) conceptual metaphor theory, which posits that an ontological metaphor makes us understand experiences with non-human entities in terms of human motivations, characteristics, and activities, and shapes our attitude and behavior accordingly. In this vein, it has been shown that the friendship metaphor induces people to think about non-human entities in anthropomorphic terms, and, for instance, makes them less willing to replace objects because one does not replace friends when they get old (Chandler & Schwarz, 2010). More generally, friendship can be seen as a paradigmatic relationship between human beings that involves emotional sharing, caring, and concern for another person, and is a source of interpersonal morality (Keller, 1994). When applied to animals, we suggest that friendship should make people less willing to consume meat because one does not harm friends (or friendly beings) to “eat” them.

### **Anthropomorphism, meat consumption and anticipatory guilt**

Literature suggests that dehumanizing meat animals may reduce the negative affective states that could be associated with their consumption (Bastian et al., 2012b; Haslam & Loughnan, 2014). Among these negative states, qualitative and quantitative studies find that meat consumption often causes feelings of guilt (Berndsen & van der Pligt, 2004; Serpell, 1986). Guilt is defined as “an aroused form of emotional distress that is distinct from fear and anger and based on the possibility

that one may be in the wrong” (Baumeister, Stillwell, & Heatherton, 1994, p. 245). It can be experienced either after one has really caused harm or suffering to others (such as friends; Keller, 1994), or prior to a potential act of transgression (Burnett & Lunsford, 1994). The latter type is often referred to as anticipatory (or anticipated) guilt, which has been well documented to facilitate prosocial behavior and ethical consumer choice (e.g., Massi, 2005; Renner, Lindenmeier, Tscheulin, & Drevs, 2013; Steenhaut & Van Kenhove, 2006; Tam, Lee, & Chao, 2013). Interestingly, research further shows that anthropomorphizing a social cause increased compliance with it and that feelings of anticipatory guilt mediated this effect (Ahn, Kim, & Aggarwal, 2014). Consistently, we hypothesized that anticipatory guilt will mediate the effect of anthropomorphizing meat animals on consumers’ attitudes toward meat consumption. Indeed, the feeling of guilt resulting from eating meat, and incidentally from harming animals, is likely to be amplified when meat animals are anthropomorphized, and the motivation to avoid this negative moral feeling may thus lead to less favorable attitudes toward meat consumption.

## **Predictions**

We tested the following two main hypotheses across six studies (Study 1a-3c):

H<sub>1</sub>: Exposure to anthropomorphism through the friendship metaphor results in less favourable attitudes toward meat consumption.

H<sub>2</sub>: Exposure to anthropomorphism through the friendship metaphor lowers intentions to consume meat.

We also tested the following hypothesis across three of these six studies (Studies 3a-3c):

H<sub>3</sub>: The negative effect of anthropomorphism on attitudes toward meat consumption is mediated by increased anticipatory guilt feelings.

## **Overview**

In a nutshell, we expect that, when they are prompted by the friendship metaphor to think about meat animals in anthropomorphic terms, people will have less favorable attitudes and lower behavioral intentions toward meat consumption and will experience more guilt feelings. Six studies test these predictions. In a first set of two studies, we show that anthropomorphism leads to less favorable attitudes toward (pork) meat and lower intentions to patronize the restaurant where (pork) meat is on offer, when consumers are induced to imagine themselves (Study 1a) or

other people (Study 1b) taking part in a friendly human-animal interaction. In a subsequent study, our findings reveal that exposure to anthropomorphism also results in less positive attitudes toward a (pork) meat product and lower intentions to purchase it, whether consumers are prompted to think about either animal-animal friendship or human-animal friendship (Study 2). In the last three studies, we find that the negative effect of anthropomorphism on attitudes toward meat consumption is mediated by increased feelings of anticipatory guilt about eating (pork) meat (Studies 3a and 3c), but that it may not be extended to all species of meat animals (Study 3b).

### **Ethics statement, data availability and quality control**

This series of studies received the approval of the Department of Psychological and Behavioural Science (DPBS) Ethics Committee of the London School of Economics (LSE), and the full dataset has been made available on the Open Science Framework at <https://osf.io/7wjmz/>.

Across all studies, we used adapted specific quality control techniques for online research (Mason & Suri, 2012). First, at the end of each study, participants completed a manipulation check (described below). A voluntary withdrawal question also asked whether they answered with care and diligence. It was explicitly stated that there would be no penalty for answering no. Moreover, a timer (ranging from 5 to 10 seconds) was added to each page (but not displayed on the screen) to ensure that participants read all the stimuli carefully. Last, duplicate IP addresses were reviewed and systematically removed. Studies collected after the EU General Data Protection Regulation (GDPR) became applicable in May 2018 used Unique Turker (<https://uniqueturker.myleott.com/>) to avoid duplicates.

### **Study 1a**

Study 1a tested  $H_1$  and  $H_2$  in the context of a restaurant. Namely, it tested whether exposure to anthropomorphism through consumer-animal friendship results in less favorable attitudes toward the food served in a restaurant ( $H_1$ ) and lowers intentions to patronize it ( $H_2$ ) when meat (vs. non-meat) is on offer.

### **Material and methods**

#### **Participants**

Study 1a was a two-group between-subjects design. The number of participants recruited was based on an *a priori* power analysis using G\*Power 3.1 (Faul, Erdfelder, Lang, & Buchner, 2007), which indicated that a sample size of 64 per condition would be needed to detect a medium size effect ( $d = .50$ ) with an alpha level of .05 and a desired power of .80 (Cohen, 1992). One hundred and sixty-three participants from the United States were recruited online through Amazon's Mechanical Turk (Buhrmester, Kwang, & Gosling, 2011) and completed the study in exchange for \$0.30. Of those, 25 were excluded for the following reasons: duplicate IP addresses (1), failed manipulation check (9), dietary practices: vegan, vegetarian, fish only omnivore and do not eat pork for religious or other reasons (14); allergic to animals and unable to interact with them (1); leaving 138 participants (Female = 64;  $M_{\text{age}} = 37.51$ ,  $SD_{\text{age}} = 12.00$ ).

### **Procedure and measures**

Participants were first exposed to anthropomorphism by being presented with web pages describing a piglet café ("Mr. Piggy's Café") that offered a unique experience where customers could play with cute piglets whilst enjoying food and drink: "*Piglets are like dogs. They love to play lots of interactive games such as fetch. So try tossing a stick to see if our piglets will retrieve it. Piglets also enjoy pushing balls around with their noses. Try giving them a big bouncy ball to push around their pens or around the yard of our café! You'll love it!*" Participants were then randomly assigned to one of two conditions: those assigned to the meat condition ( $N = 72$ ) read that the café served "*pork sausages and [our] famous smoked bacon rolls*" as breakfast specials, whereas those assigned to the non-meat condition ( $N = 66$ ) read that the café served "*spinach omelette and [our] famous baked egg rolls*" (see Appendix A1 for all materials used in this study). Last, participants were asked to report their intentions to patronize the restaurant and their attitudes toward the food served in the restaurant.

Intentions to patronize the restaurant were measured using a three-item scale adapted from Bohner, Einwiller, Erb and Siebler (2003): "*Based on your general impression, Mr. Piggy's Café is...*" (1 = "*very bad*" to 7 = "*very good*"); "*You would very much like to visit Mr. Piggy's Café...*" (1 = "*not true at all*" to 7 = "*exactly true*"); and "*The likelihood that you would visit a restaurant providing services similar to Mr. Piggy's Café during the next 12 months is...*" (1 = "*very low*" to 7 = "*very high*").



Attitudes toward the food served in the restaurant were measured using a two-item scale adapted from Raghunathan, Naylor and Hoyer (2006): “*How tasty do you think the food at Mr. Piggy’s Café would be?*” and “*How much do you think you would enjoy eating at Mr. Piggy’s Café?*” (1 = “*not at all*” to 7 = “*very*”). This particular measure combines inferred tastiness and enjoyment of food and was chosen because the gustatory enjoyment of meat was found to be the most salient barrier to adopting a vegetarian diet (Lea & Worsley, 2003; Pohjolainen, Vinnari, & Jokinen, 2015).

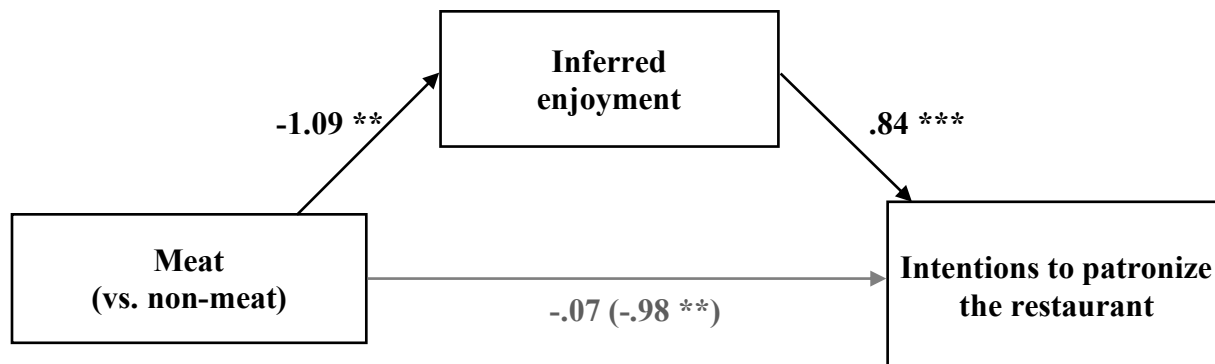
Last, participants were required to complete the manipulation check. They were asked to recall: “*What breakfast specials does Mr. Piggy’s Café offer?*” and were presented with three options: (1) “*Spinach omelette and baked egg rolls*”, (2) “*Pork sausages and smoked bacon rolls*”, (3) “*I do not remember*”. Participants who did not pass this check (because they selected either the incorrect option or reported that they did not remember) were excluded from subsequent analyses. Information with regard to dietary practice (Piazza & Loughnan, 2016) was collected afterwards, along with demographic data, the voluntary withdrawal question and space for comments (e.g., on food allergies).

## Results

***Intentions to patronize the restaurant.*** The items used to measure consumers’ intentions to patronize the restaurant were highly correlated (Cronbach’s  $\alpha = .94$ ) and were thus averaged. As predicted, an independent samples *t*-test revealed that consumers had lower intentions to patronize the restaurant that provided meat ( $M = 3.38, SD = 1.98$ ) (vs. non-meat;  $M = 4.36, SD = 1.93$ ),  $t(136) = -2.93, p = .004, d = -.50$ .

***Attitudes toward the food served in the restaurant.*** Given the low reliability of the scale in this study (Cronbach’s  $\alpha = .63$ ), inferred tastiness and enjoyment of food were analyzed separately. Independent samples *t*-test analyses revealed that consumers inferred that eating food was less enjoyable in the restaurant that provided meat ( $M = 3.51, SD = 2.12$ ) (vs. non-meat;  $M = 4.61, SD = 2.07$ ),  $t(136) = -3.06, p = .003, d = -.52$ . Unexpectedly, there was no significant difference in inferred tastiness of the food served between the meat ( $M = 5.14, SD = 1.45$ ) and the non-meat ( $M = 4.92, SD = 1.30$ ) conditions,  $t(136) = .912, p = .363, d = .16$ .

**Mediation analyses.** In the absence of significant direct effect of our experimental manipulation on inferred tastiness, we only tested whether inferred enjoyment of food mediated the effect on consumers' intentions to patronize the restaurant providing meat (vs. non-meat). We conducted this mediation analysis using the PROCESS Model 4 macro for SPSS (Hayes, 2013). We dummy coded the conditions as follows: 0 = non-meat, 1 = meat, and we entered inferred enjoyment of food as potential mediator and intentions to patronize the restaurant as dependent variable. A bias-corrected bootstrap analysis with 5,000 samples indicated that the indirect effect was negative and significant ( $\beta = -.91$ ,  $SE = .29$ , 95%  $CI [-1.47, -.33]$ ), whereas the direct effect was not significant ( $\beta = -.07$ ,  $SE = .16$ , 95%  $CI [-.37, .24]$ ,  $p = .668$ ), showing that inferred enjoyment of food fully mediated the negative effect of anthropomorphism on intentions to patronize the restaurant (see Figure 1). The model accounted for 81% of the variance in intentions to patronize the restaurant ( $R^2 = 0.81$ ).



**Figure 1.** Mediation model showing that providing meat (vs. non-meat) in a restaurant where animals are friends reduces inferred enjoyment of food which in turn leads to decreased intentions to patronize the restaurant in Study 1a (\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ ). The model accounted for 81% of the variance in intentions to patronize the restaurant ( $R^2 = 0.81$ ).

## Discussion

As predicted by  $H_2$ , consumers had lower intentions to patronize a restaurant where they can have friendly interactions with animals when meat (vs. non-meat) was on offer. However, contrary to  $H_1$ , only one dimension of attitudes toward the food served, namely the enjoyment of food, but not its tastiness, was reduced in the meat condition. Interestingly, though, the inferred enjoyment of food fully mediated the negative effect of anthropomorphism on consumers' behavioral intentions.

This suggests that when they are prompted to think about meat animals in anthropomorphic terms, participants would have less pleasure eating meat, such pleasure being the most salient barrier to adopting a vegetarian diet (Lea & Worsley, 2003; Pohjolainen, Vinnari, & Jokinen, 2015)

One might speculate that, unexpectedly, the taste associated with meat (vs. non-meat) was not significantly affected by anthropomorphism because participants were presented with different types of food (meat vs. non-meat), of which tastiness is likely to have a different reference point (or initial baseline value). Along this line of argument, even if anthropomorphism actually decreased the taste associated with meat (bacon) and conversely enhanced the taste associated with a non-meat item (omelette), its effect was statistically non-significant when both conditions were compared with each other, because the taste scores associated with meat (bacon) might have had a reference point higher than the non-meat item (omelette). We thus conducted Study 1b to address this limitation and improve several features of this study.

### **Study 1b**

Study 1b also tested H<sub>1</sub> and H<sub>2</sub> in the context of a restaurant. More specifically, it examined whether exposure (vs. non-exposure) to anthropomorphism through staff-animal friendship results in less favorable attitudes toward the food served in a meat restaurant (H<sub>1</sub>) and lowers intentions to patronize it (H<sub>2</sub>).

Unlike Study 1a, in this study, meat was on offer in both conditions but anthropomorphism was induced in one condition only. Study 1b also used a different and more realistic scenario, where staff members rather than consumers played with meat animals. Indeed, while pet cafés are becoming increasingly popular around the world, they are still rare, and involve mostly cats or dogs (Giannitrapani, 2018). Moreover, in order to protect animal health and welfare and to reduce boredom, some regulations require farmers to provide meat animals (e.g., pigs) with “proper investigation and manipulation activities” (e.g., European Directive 2001/93/EC), which could be achieved with games (Bracke, 2018). Focusing Study 1b on a more realistic farm context where staff members play with the pigs they rear also allowed us to remove any explicit reference (word or picture) to piglets’ cuteness, which could have, to some extent, influenced participants’ willingness to eat meat (Zickfeld, Kunst, & Hohle, 2018). Last, Study 1b allowed us to be more specific with small adjustments in the wording of the scales measuring the intentions to patronize

the restaurant (to specify the likelihood of “*eating at*” rather than “*visiting*” the restaurant) and the attitudes toward meat (to specify that “*pork dishes*” were served in the restaurant).

## **Material and methods**

### **Participants**

Study 1b was a two-group between-subjects design. As in Study 1a, a target sample size of 64 participants per condition was determined to detect a medium size effect ( $d = .50$ ) with an alpha level of .05 and a desired power of .80 (Cohen, 1992). One hundred and fifty-seven participants from the United States who had not participated in the previous study were recruited online through Amazon’s Mechanical Turk and completed this study in exchange for \$0.30. Of those, 40 were excluded for the following reasons: duplicate IP addresses (2), failed manipulation check (21), did not answer with care and diligence (2), dietary practices: vegan, vegetarian, fish only omnivore and do not eat pork for religious or other reasons (15); leaving 117 participants (Female = 52;  $M_{age} = 33.23$ ,  $SD_{age} = 9.58$ ).

### **Procedure and measures**

Participants were presented with web pages describing a meat restaurant (“Mr. Piggy’s”) that offered delicious pork dishes. They were then randomly assigned to one of two conditions. In the anthropomorphism condition, participants ( $N = 53$ ) read that pigs were playing games with staff: *“Our meat is unique because our team entertains our farm pigs, which keeps them in good emotional and physical health! Pigs love to play the games that man's best friends, dogs, enjoy too. They like interactive games such as fetch. As soon as they see our team member with a Frisbee, they are ready to run and retrieve it. They also enjoy pushing a big bouncy ball around the green yard with their noses, which allows them to be active all day long!”*

In the control condition, participants ( $N = 64$ ) read that pigs were raised in a free-range environment: *“Our meat is unique because our farm pigs grow in a free-range natural environment, which keeps them in good emotional and physical health! Born and living outdoors for their whole lives, our farm pigs are reared to the highest welfare standards. Free access to a green yard adjacent to their shelter provides them with more room and a continuous supply of fresh air, spring water and nutritious feed. It also allows them to be active all day long!”* (see Appendix A2 for all materials used in this study).

Participants were then asked to report their intentions to patronize the meat restaurant and their attitudes toward meat. The scales were adapted from those used in Study 1a to be more specific. Intentions to patronize the meat restaurant were measured using the following three-item scale: “Based on your general impression, Mr. Piggy’s is...” (1 = “very bad” to 7 = “very good”); “You would very much like to eat at Mr. Piggy’s...” (1 = “not true at all” to 7 = “exactly true”); and “The likelihood that you would eat at a restaurant providing services similar to Mr. Piggy’s during the next 12 months is...” (1 = “very low” to 7 = “very high”). Attitudes toward the food served in the restaurant were measured using the following two-item scale: “How tasty do you think the pork dishes at Mr. Piggy’s would be?” and “How much do you think you would enjoy eating pork dishes at Mr. Piggy’s?” (1 = “not at all” to 7 = “very”).

Last, before collecting information about dietary practice along with demographic data, the voluntary withdrawal question and space for comments, participants were required to complete the manipulation check (“According to them, what makes the meat at Mr. Piggy’s so unique?”: (1) “Their farm pigs are reared to the highest welfare standards”, (2) “Their farm pigs can play interactive games”, (3) “I do not remember”).

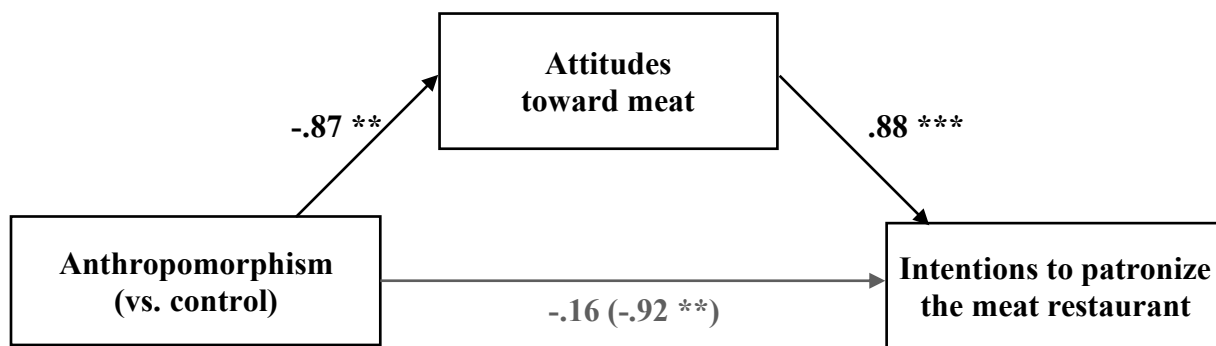
## Results

**Intentions to patronize the meat restaurant.** The items used to measure consumers’ intentions to patronize the meat restaurant were highly correlated (Cronbach’s  $\alpha = .87$ ) and were thus averaged. As predicted, an independent samples *t*-test revealed that consumers had lower intentions to patronize the meat restaurant in the anthropomorphism condition ( $M = 4.85$ ,  $SD = 1.90$ ) (vs. control;  $M = 5.77$ ,  $SD = 1.04$ ),  $t(115) = -3.33$ ,  $p = .001$ ,  $d = -.62$ .

**Attitudes toward meat.** The items used to measure consumers’ attitudes toward meat were highly correlated (Cronbach’s  $\alpha = .81$ ) and were thus averaged. As predicted, an independent samples *t*-test revealed that consumers had less favorable attitudes toward meat in the anthropomorphism condition ( $M = 5.33$ ,  $SD = 1.86$ ) (vs. control;  $M = 6.20$ ,  $SD = .85$ ),  $t(115) = -3.36$ ,  $p = .001$ ,  $d = -.62$ .

**Mediation analysis.** We then conducted a mediation analysis using the PROCESS Model 4 macro for SPSS (Hayes, 2013) to test whether consumers’ attitudes toward meat mediated the effect of anthropomorphism on their intentions to patronize the restaurant. We dummy coded the conditions

as follows: 0 = control, 1 = anthropomorphism, and we entered attitudes toward meat as potential mediator and intentions to patronize the restaurant as dependent variable. A bias-corrected bootstrap analysis with 5,000 samples indicated that the indirect effect was negative and significant ( $\beta = -.76$ ,  $SE = .23$ ,  $95\% CI [-1.23, -.33]$ ), whereas the direct effect was not significant ( $\beta = -.16$ ,  $SE = .17$ ,  $95\% CI [-.49, .17]$ ,  $p = .346$ ), showing that the negative effect of anthropomorphism on intentions to patronize the meat restaurant was fully mediated by attitudes toward meat (see Figure 2). The model accounted for 70% of the variance in intentions to patronize the restaurant ( $R^2 = 0.70$ ).



**Figure 2.** Mediation model showing that anthropomorphism (vs. control) leads to less favorable attitudes toward meat which in turn leads to decreased intentions to patronize the meat restaurant in Study 1b (\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ ). The model accounted for 70% of the variance in intentions to patronize the restaurant ( $R^2 = 0.70$ ).

## Discussion

As predicted, anthropomorphism (vs. control) decreased consumers' intention to patronize the meat restaurant (supporting H<sub>2</sub>) by reducing the inferred tastiness and enjoyment of meat (supporting H<sub>1</sub>). Together with Study 1a, these findings indicate that anthropomorphism has a negative effect on consumers' attitudes toward meat, which in turn reduces their intentions to patronize a meat restaurant. This effect holds whether consumers consider themselves (Study 1a) or staff members (Study 1b) to be taking part in a friendly human-animal interaction. However, one might argue that such friendly consumer- and staff-animal interactions could also have prompted participants to think about piglets and pigs as pets, and therefore inedible animals

(Bekker, Tobi, & Fischer, 2017). Study 2 thus tested whether our previous effect would be observed when anthropomorphism through animal-animal friendship is under consideration.

## **Study 2**

We had one main goal for Study 2: applying the friendship metaphor to animal-animal interactions in order to avoid any potential implicit reference to petting. We set out to test if describing animals as friends of each other (animal-animal friendship) would have the same effects as describing animals as friends of humans (human-animal friendship). In addition, we sought an additional replication of the negative effect of anthropomorphism on attitudes toward meat consumption in a different consumption context (buying a meat product rather than patronizing a meat restaurant). Study 2 thus tested whether exposure (vs. non-exposure) to anthropomorphism through staff-animal friendship or animal-animal friendship results in less favorable attitudes toward a meat product ( $H_1$ ) and decreases intentions to buy it ( $H_2$ ).

## **Material and methods**

### **Participants**

Study 2 was a three-group between-subjects design. Based on an *a priori* power analysis using G\*Power 3.1 (Faul et al., 2007), the target sample size was set at 159 participants in total to detect a medium size effect ( $f = .25$ ) with an alpha level of .05 and a desired power of .80 (Cohen, 1992). Two hundred and eleven participants from the United States who had not participated in the previous studies were recruited online through Amazon's Mechanical Turk and completed this study in exchange for \$0.30. Of those, 49 were excluded for the following reasons: failed manipulation check (25), did not answer with care and diligence (4), dietary practices: vegan, vegetarian, fish only omnivore and do not eat pork for religious or other reasons (20); leaving 162 participants (Female = 95;  $M_{\text{age}} = 33.44$ ,  $SD_{\text{age}} = 11.25$ ).

### **Procedure and measures**

Participants were presented with web pages describing a pork brand ("Mr. Piggy's") that offered delicious pork chops. They were then randomly assigned to one of three following conditions: animal-animal friendship ( $N = 52$ ) vs human-animal friendship ( $N = 52$ ) vs. control ( $N = 58$ ).

Participants read the same vignettes as Study 1b in the control condition where pigs were raised in a free-range environment and in the human-animal friendship condition where pigs were playing games with staff. In the animal-animal friendship condition, participants read that pigs were friends with each other: *“Healthy pigs are delicious, nutritious pigs. Our farm pigs play games with each other, which keeps them in good emotional and physical health. Pigs are social animals, so they need each other to feel well just as we need friends. They require other pigs as companions with whom to eat, sleep, play and sort out group dynamics. They always enjoy pushing a big bouncing ball together around the green yard with their noses, which allows them to be active all day long!”* (see Appendix A3 for all materials used in this study).

Subsequently, as in previous studies, participants were asked to report their attitudes toward meat (*“How tasty do you think the pork produced by Mr. Piggy’s would be?”* and *“How enjoyable do you think the pork produced by Mr. Piggy’s would be?”*; 1 = *“not at all”* to 7 = *“very”*). They were also required to rate the likelihood of purchasing the meat product that was featured on the web page on the following scale: *“How likely would you be to purchase pork chops from Mr. Piggy’s?”* (1 = *“not at all likely”* to 7 = *“very likely”*). Last, before collecting information about dietary practice along with demographic data, the voluntary withdrawal question and space for comments, participants completed the manipulation check (*“How does Mr. Piggy’s keep their farm pigs in good health?”*): (1) *“Their pigs grow in a free-range natural environment”*, (2) *“Their pigs play games with each other”*, (3) *“Their team plays interactive games with their pigs”*, (4) *“I do not remember”*).

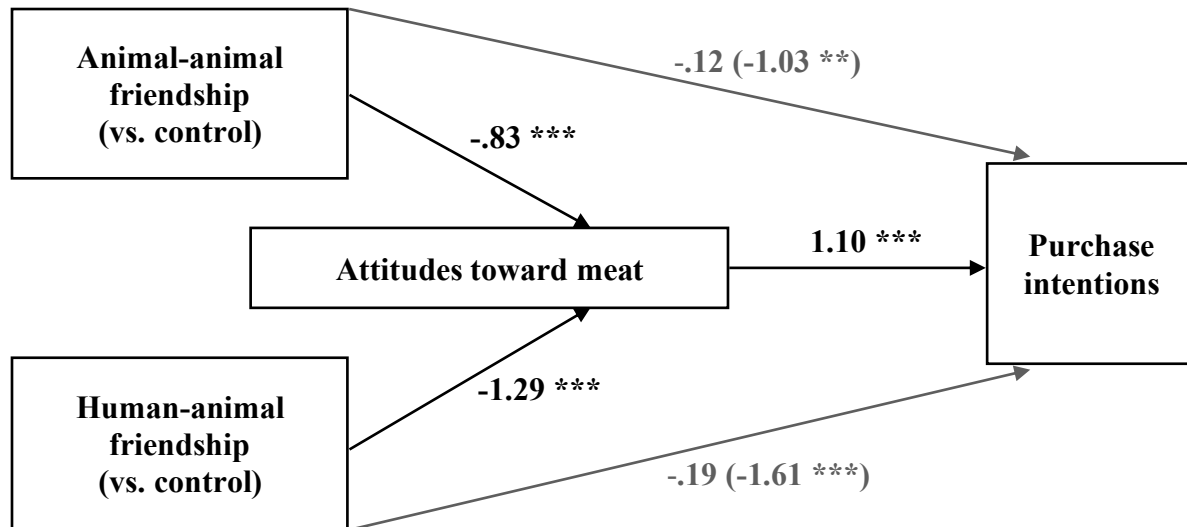
## Results

**Attitudes toward meat.** The items used to measure consumers’ attitudes toward meat were highly correlated (Cronbach’s  $\alpha = .84$ ) and were thus averaged. A one-way analysis of variance (ANOVA) indicated significant differences in attitude scores between the three conditions ( $F(2, 159) = 15.18, p < .001, \eta^2 = .16$ ). As expected, Bonferroni-corrected post-hoc *t*-tests indicated that the mean scores of attitudes toward meat were significantly lower in both anthropomorphism conditions (animal-animal friendship condition:  $M = 5.40, SD = 1.31, p = .002, d = -.76$ ; human-animal friendship condition:  $M = 4.94, SD = 1.54, p < .001, d = -1.06$ ) than in the control condition ( $M = 6.23, SD = .83$ ); and that the difference between the two anthropomorphism conditions was not significant ( $p = .184, d = -.32$ ).



**Purchase intentions.** Likewise, a one-way ANOVA indicated significant differences in purchase intentions between the three conditions ( $F(2, 159) = 11.92, p < .001, \eta^2 = .13$ ). As expected, Bonferroni-corrected post-hoc  $t$ -tests indicated that purchase intentions were significantly lower in both anthropomorphism conditions (animal-animal friendship condition:  $M = 4.67, SD = 1.99, p = .007, d = -.60$ ; human-animal friendship condition:  $M = 4.10, SD = 1.82, p < .001, d = -.98$ ) than in the control condition ( $M = 5.71, SD = 1.46$ ). Post-hoc analyses further indicated that the difference in purchase intentions between the two anthropomorphism conditions was not significant ( $p = .289, d = -.30$ ).

**Mediation analysis.** We then conducted a mediation analysis using the PROCESS Model 4 macro for SPSS (Hayes, 2013) to test whether consumers' attitudes toward meat mediated the effect of anthropomorphism on their purchase intentions. The mediation model included experimental manipulation as the multi-categorical independent variable (indicator coding; Hayes & Preacher, 2014), attitudes toward meat as mediator, and purchase intentions as dependent variable. A bias-corrected bootstrap analysis with 5,000 samples indicated that the indirect effect of animal-animal friendship (vs. control) on purchase intentions through attitudes toward meat was significant ( $\beta = -.91, SE = .23, 95\% CI [-1.37, -.46]$ ). Likewise, the indirect effect of human-animal friendship (vs. control) on purchase intentions through attitudes toward meat was significant ( $\beta = -1.42, SE = .26, 95\% CI [-1.95, -.93]$ ). The direct effects were both non-significant ( $\beta = -.12, SE = .22, 95\% CI [-.55, .31], p = .576$ ;  $\beta = -.19, SE = .23, 95\% CI [-.64, .26], p = .404$ ), which indicated a full mediation (see Figure 3). The model accounted for 66% of the variance in purchase intentions ( $R^2 = 0.66$ ).



**Figure 3.** Model testing that attitudes toward meat mediate the negative effect of anthropomorphism on purchase intentions in Study 2 (\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ ). The model accounted for 66% of the variance in purchase intentions ( $R^2 = 0.66$ ).

### Manipulation check for anthropomorphism

An additional study was conducted to check whether the meat animals (pigs) in the two anthropomorphism conditions were perceived as more humanlike than those in the control condition. We performed this manipulation check separately from Study 2 because asking about anthropomorphic beliefs primes anthropomorphism and could impact people's follow-up attitudes toward meat eating (Ruby & Heine, 2012). Moreover, reflecting on one's own meat consumption could also change people's subsequent anthropomorphic beliefs and motivate them to dehumanize meat animals (Bastian et al., 2012b). Thus, measuring anthropomorphic beliefs could have influenced consumers' attitudes toward meat and purchase intentions.

Two hundred and forty-two participants from the United States who had not participated in the previous studies were recruited online through Amazon's Mechanical Turk and completed this study in exchange for \$0.30. Of those, 68 were excluded for the following reasons: failed manipulation check (25), did not answer with care and diligence (8), dietary practices: vegan, vegetarian, fish only omnivore and do not eat pork for religious or other reasons (35); leaving 174 participants (Female = 81, Other = 1;  $M_{\text{age}} = 39.98$ ,  $SD_{\text{age}} = 13.64$ ).

Participants were randomly assigned to one of the three following conditions (further detailed in

Study 2): animal-animal friendship ( $N = 58$ ) vs. human-animal friendship ( $N = 55$ ) vs. control ( $N = 61$ ), where they were instructed to read the web pages describing the pork brand (“Mr. Piggy’s”) and then to evaluate the pigs described on three anthropomorphic traits: “*thoughtful*”, “*sympathetic*” and “*considerate*” (1 = “*not at all true*”, 7 = “*completely true*”), identified as especially relevant to social connection (Epley, Waytz, & Cacioppo, 2007; McConnell, Brown, Shoda, Stayton, & Martin, 2011). Additionally, participants were asked to report on two separate 7-point Likert scales the extent to which the pork produced by “Mr. Piggy’s” is “organic” and is “ecological” (these results are discussed in Appendix B).

The three items used to measure consumers’ anthropomorphic beliefs were highly correlated (Cronbach’s  $\alpha = .93$ ) and were thus averaged. A one-way ANOVA indicated significant differences in anthropomorphic beliefs between the three conditions ( $F(2, 171) = 5.41, p = .005, \eta^2 = .06$ ). In line with our expectations, Bonferroni-corrected post-hoc  $t$ -tests indicated that anthropomorphic beliefs were significantly higher in both anthropomorphism conditions (animal-animal friendship condition:  $M = 4.14, SD = 1.82, p = .008, d = .54$ ; human-animal friendship condition:  $M = 4.00, SD = 1.60, p = .036, d = .49$ ) than in the control condition ( $M = 3.18, SD = 1.73$ ). Post-hoc analyses further indicated that the difference in anthropomorphic beliefs between the two anthropomorphism conditions was not significant ( $p > .999, d = .09$ ).

Overall, these results confirmed that, when compared with consumers in the control condition, consumers exposed to the friendship metaphor (applied to animal-animal interactions and human-animal interactions) were more likely to anthropomorphize the meat animals (pigs) by endowing them with humanlike traits that are associated with social connection.

## **Discussion**

As predicted, whether expressed through animal-animal friendship or human-animal friendship, anthropomorphism (vs. control) decreased consumers’ intentions to buy a meat product (supporting  $H_2$ ) by leading to less favorable attitudes toward it (supporting  $H_1$ ). This finding suggests that the negative effect of anthropomorphism on attitudes toward meat consumption is not contingent on human-animal interaction that could be implicitly associated with petting, but is generated by the friendship metaphor even when applied to animal-animal interaction. The subsequent series of studies was designed to replicate these results and to explore their underlying psychological mechanism.

## Study 3a

The purpose of Study 3a was twofold. First, we sought to replicate the negative effect of anthropomorphism through animal-animal friendship on consumers' attitudes toward meat ( $H_1$ ) and purchase intentions ( $H_2$ ). Second, we wanted to test whether this negative effect was mediated by feelings of anticipatory guilt ( $H_3$ ).

## Material and methods

### Participants

Study 3a was a two-group between-subjects design. An *a priori* power analysis conducted in G\*Power 3.1 (Faul et al., 2007) and based on an estimated effect size  $d = .60$  (i.e. the weakest significant effect observed in Study 2) indicated that a sample size of 45 participants per condition would be needed to have a desired power of .80 with an alpha level of .05 (Cohen, 1992). One hundred forty-eight participants from the United States who had not participated in the previous studies were recruited online through Amazon's Mechanical Turk and completed this study in exchange for \$0.30. Of those, 37 were excluded for the following reasons: duplicate IP addresses (1), failed manipulation check (15), did not answer with care and diligence (7), dietary practices: vegan, vegetarian, fish only omnivore and do not eat pork for religious or other reasons (14); leaving 111 participants (Female = 62;  $M_{age} = 37.53$ ,  $SD_{age} = 10.67$ ).

### Procedure and measures

Instructions and procedure were similar to Study 2 but included only two conditions: animal-animal friendship ( $N = 56$ ) vs. control ( $N = 55$ ), to which participants were randomly assigned (see Appendix A4 for all materials used in this study). After being asked to report their attitudes toward meat and to rate the likelihood of purchasing the meat product, they were instructed to complete an additional four-item measure of anticipatory guilt adapted from Ahn, Kim and Aggarwal (2014). Participants were required to imagine eating the pork chops produced by Mr. Piggy's and to indicate how strongly they would feel "guilty", "responsible", "accountable" and "ashamed" on a 7-point scale (1 = "not at all" to 7 = "very strongly"). Last, before collecting information about dietary practice along with demographic data, the voluntary withdrawal question and space

for comments, participants completed the manipulation check (“*How does Mr. Piggy’s keep their farm pigs in good health?*”): (1) “*Their pigs grow in a free-range natural environment*”, (2) “*Their pigs play interactive games with each other like friends*”, (3) “*I do not remember*”).

## Results

**Attitudes toward meat.** The items used to measure consumers’ attitudes toward meat were highly correlated (Cronbach’s  $\alpha = .77$ ) and were thus averaged. As predicted, an independent samples *t*-test revealed that consumers had less favorable attitudes toward meat in the anthropomorphism condition ( $M = 5.59, SD = 1.28$ ) (vs. control;  $M = 6.24, SD = 0.90$ ),  $t(109) = -3.08, p = .003, d = -.59$ .

**Purchase intentions.** Consistently, an independent samples *t*-test indicated that purchase intentions were significantly lower in the anthropomorphism condition ( $M = 4.95, SD = 1.99$ ) (vs. control;  $M = 5.76, SD = 1.60$ ),  $t(109) = -2.39, p = .019, d = -.45$ .

**Anticipatory guilt.** Whereas Ahn and colleagues (2014) treated the scale as unidimensional, Pinto and Priest (1991) demonstrated that “responsible” and “accountable” did not load on the same factor as the other two items. A factor analysis of item scores, using principal axis factoring extraction with varimax rotation, confirmed that there were two distinct factors that we labeled anticipatory guilt and anticipatory responsibility. Both the scree plot and parallel analysis suggested this two-factor solution that explained 92.99% of the total variance (anticipatory guilt, 66.28%; anticipatory responsibility, 26.71%). Individual factors also demonstrated adequate internal consistency (anticipatory guilt, Cronbach’s  $\alpha = .94$ ; anticipatory responsibility, Cronbach’s  $\alpha = .90$ ). As expected, an independent samples *t*-test indicated that anticipatory guilt was significantly higher in the anthropomorphism condition ( $M = 3.02, SD = 2.22$ ) (vs. control;  $M = 1.65, SD = 1.15$ ),  $t(109) = 4.08, p < .001, d = .77$ . To the contrary, additional analyses did not reveal any significant difference in anticipatory responsibility between the anthropomorphism condition ( $M = 4.05, SD = 2.02$ ) and the control condition ( $M = 3.67, SD = 2.10$ ),  $t(109) = .97, p = .332, d = .19$ . A summary of the results is presented in Table 1.

	Study 3a (Pigs)		Study 3b (Cows)		Study 3c (Pigs)	
	Anthropomorphism (animal-animal friendship)	Control	Anthropomorphism (animal-animal friendship)	Control	Anthropomorphism (human-animal friendship)	Control
Attitudes toward meat	<b>5.59 **</b> (1.28)	<b>6.24 **</b> (0.90)	<b>5.90</b> (1.30)	<b>6.12</b> (0.99)	<b>5.43 ***</b> (1.31)	<b>6.24 ***</b> (0.81)
Purchase intentions	<b>4.95 *</b> (1.99)	<b>5.76 *</b> (1.60)	<b>5.37</b> (1.90)	<b>5.68</b> (1.18)	<b>4.87 ***</b> (1.88)	<b>5.93 ***</b> (1.16)
Anticipatory guilt	<b>3.02 ***</b> (2.22)	<b>1.65***</b> (1.15)	<b>2.28</b> (1.89)	<b>1.84</b> (1.06)	<b>3.36 ***</b> (2.26)	<b>2.12 ***</b> (1.50)
Anticipatory responsibility	<b>4.05</b> (2.02)	<b>3.67</b> (2.10)	<b>3.95</b> (2.04)	<b>4.11</b> (1.56)	<b>4.04</b> (1.91)	<b>4.24</b> (1.74)

**Table 1.** Means and standard deviations (in parentheses) of dependent variables by condition in Studies 3a-3c (\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ ).

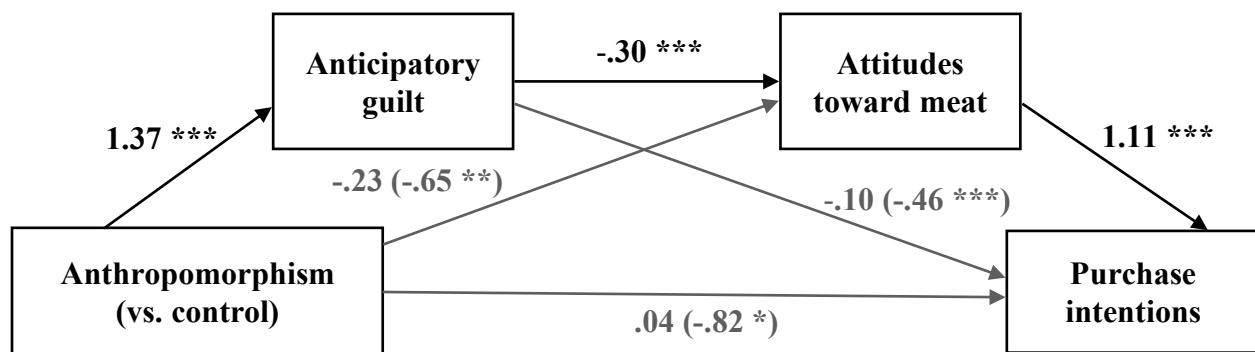
**Mediation analysis.** We then conducted a mediation analysis using the PROCESS Model 6 macro for SPSS (Hayes, 2013) to test whether consumers' purchase intentions were mediated by anticipatory guilt and attitudes toward meat. We dummy coded the conditions as follows: 0 = control, 1 = anthropomorphism, and we entered anticipatory guilt as first mediator, attitudes toward meat as second mediator and purchase intentions as dependent variable. A bias-corrected bootstrap analysis with 5,000 samples indicated a significant indirect effect of anthropomorphism on purchase intentions through anticipatory guilt and attitudes toward meat ( $\beta = -.46$ ,  $SE = .17$ ,  $95\% CI [-.89, -.19]$ ), with no other pathways significant (see Table 2, Table 3, and Figure 4). Therefore, being exposed to anthropomorphism (vs. control) increased consumers' feelings of anticipatory guilt about eating meat, which led to less favorable attitudes toward meat, and eventually, to lower purchase intentions. The model accounted for 56% of the variance in purchase intentions ( $R^2 = 0.56$ ).

<i>Pathways</i>	$\beta$	<i>SE</i>	<i>95% CI</i>
Anthropomorphism -> Purchase intentions (Direct effect)	0.04	0.25	[-.46, .54]
Anthropomorphism -> Attitudes toward meat -> Purchase intentions	-0.25	0.21	[-.67, .13]
Anthropomorphism -> Anticipatory guilt -> Purchase intentions	-0.14	0.15	[-.48, .10]
<b>Anthropomorphism -&gt; Anticipatory guilt -&gt; Attitudes toward meat -&gt; Purchase intentions</b>	<b>-0.46</b>	<b>0.17</b>	<b>[-.89, -.19]</b>

**Table 2.** Direct and indirect effects of anthropomorphism (vs. control) on consumers' purchase intentions through anticipatory guilt and attitudes toward meat in Study 3a. Significant pathways are in bold text.

<i>Phases</i>	$\beta$	<i>SE</i>	<i>95% CI</i>
Anthropomorphism -> Anticipatory guilt -> Attitudes toward meat	-0.42	0.16	[-.79, -.17]
Anticipatory guilt -> Attitudes toward meat -> Purchase intentions	-0.36	0.08	[-.53, -.22]

**Table 3.** Two phases of the serial mediation through anticipatory guilt and attitudes toward meat to purchase intentions in Study 3a.



**Figure 4.** Model testing the negative effect of anthropomorphism (vs. control) on purchase intentions through anticipatory guilt and attitudes toward meat in Study 3a (\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ ). The model accounted for 56% of the variance in purchase intentions ( $R^2 = 0.56$ ).

## Discussion

Replicating the previous experiment with the friendship metaphor applied to animal-animal interactions, anthropomorphism (vs. control) decreased consumers' intentions to buy a meat product (supporting H<sub>2</sub>). As expected, the current study also showed that this effect was mediated by increased feelings of anticipatory guilt (supporting H<sub>3</sub>) which led to less favorable attitudes toward meat (inferred tastiness and enjoyment of meat) (supporting H<sub>1</sub>). This finding supports our assumption: anthropomorphizing meat animals amplifies the negative moral feelings associated with eating meat. In Study 3b, we tried to replicate and extend these results to a meat animal other than pigs.



## **Study 3b**

Thus far, four studies showed, in two different consumption contexts (meat restaurant and meat product), that, through the friendship metaphor, anthropomorphism had a negative effect on attitudes toward meat consumption. Our previous study further showed that this effect might be explained by increased guilt feelings. While these results strongly support our assumptions, our studies only considered pork, the most widely eaten meat in the world according to the Food and Agriculture Organization (2017). In Study 3b, we sought to replicate and extend our previous findings to another popular meat, beef.

### **Material and methods**

#### **Participants**

Study 3b was a two-group between-subjects design. As in Study 3a, a target sample size of 45 participants per condition was determined to detect an estimated size effect of  $d = .60$  with an alpha level of .05 and a desired power of .80. One hundred and forty-three participants from the United States who had not participated in the previous studies were recruited online through Amazon's Mechanical Turk and completed this study in exchange for \$0.30. Of those, 35 were excluded for the following reasons: duplicate IP addresses (3), failed manipulation check (11), did not answer with care and diligence (5), dietary practices: vegan, vegetarian, fish only omnivore and do not eat beef for religious or other reasons (16); leaving 108 participants (Female = 53, Other = 1;  $M_{\text{age}} = 35.12$ ,  $SD_{\text{age}} = 9.16$ ).

#### **Procedure and measures**

Procedure and instructions were similar to Study 3a with two conditions: anthropomorphism ( $N = 51$ ) vs. control ( $N = 57$ ), except that the stimuli were about a beef brand ("Mr. Moo's") that offered delicious beef steaks (see Appendix A5 for all materials used in this study).

#### **Results**

The items used to measure consumers' attitudes toward meat were highly correlated (Cronbach's  $\alpha = .88$ ) and were thus averaged, and a principal axis factor analysis with varimax rotation yielded

two factors for the anticipatory guilt scale as in Study 3a. The two factors (anticipatory guilt, 59.86%; anticipatory responsibility, 32.07%) explained 91.93% of the total variance and demonstrated adequate internal consistency (anticipatory guilt, Cronbach's  $\alpha = .93$ ; anticipatory responsibility, Cronbach's  $\alpha = .89$ ). However, contrary to our expectations, independent samples *t*-tests did not reveal any significant difference in attitudes toward meat ( $t(106) = -1.00, p = .320, d = -.19$ ), purchase intentions ( $t(106) = -1.04, p = .303, d = -.20$ ), anticipatory guilt ( $t(106) = 1.52, p = .130, d = .29$ ), or anticipatory responsibility ( $t(106) = -.47, p = .640, d = -.09$ ) between the anthropomorphism condition and the control condition, even though the trend was similar to that of Study 3a. A summary of the results is presented in Table 1.

## Discussion

Contrary to our expectations ( $H_1$ - $H_3$ ), the negative effect of anthropomorphism on attitudes toward meat consumption was not significant in this study. In other words, results from Study 3a on pork meat did not extend to beef meat in Study 3b. This lack of significance is possibly due to the metaphorical association of cows with anger and irritability in English (e.g., “*to have a cow*”, “*a red flag to a bull*”), which is, to some extent, in contradiction to the friendship metaphor. This may have hindered consumers from thinking of cows as friendly beings. In line with this explanation, literature documents that a new metaphor can actually be unsuccessful (or even backfire) when its association is too incongruous (Basso & Oullier, 2011). In light of these results, the effect of the friendship metaphor may be limited to animals associated with positive expressions (e.g., “*happy as a pig in mud*”).

A complementary explanation could be that unlike cows, which are usually portrayed as somewhat idiotic (e.g., “*stupid cow*”), pigs are commonly considered more highly intelligent than other species produced for food in the United States (Davis & Cheeke, 1998). Past results in the literature also showed that cows were in general perceived as less cute than pigs (Zickfeld, Kunst & Hohle, 2018). This could be due to popular stories and movies such as *Animal Farm*, *Charlotte's Web* and *Babe* that anthropomorphized pigs exceptionally well. In support of this argument, evidence documents that, to some extent, a short fictional narrative can have an impact on attitudes toward animals (Małecki, Pawłowski, Cieński, & Sorokowski, 2018; Małecki, Pawłowski, & Sorokowski, 2016) and it is claimed that a significant number of young people became vegetarians after watching *Babe* (Nobis, 2009).

## Study 3c

Since no significant effects of anthropomorphism on beef consumption were detected in Study 3b, we tested whether the mediating role of guilt feelings could be replicated on pork consumption with another instantiation of anthropomorphism. Namely, in Study 3c, we tested whether staff-animal friendship would discourage pork consumption ( $H_1$  and  $H_2$ ) by inducing anticipatory guilt feelings ( $H_3$ ).

### Material and methods

#### Participants

Study 3c was a two-group between-subjects design. A target sample size of 79 participants per condition was determined with an estimated effect size of  $d = .45$  (i.e. the weakest significant effect observed in Study 3a), an alpha level of .05 and a desired power of .80. Two hundred participants from the United States who had not participated in the previous studies were recruited online through Amazon's Mechanical Turk and completed this study in exchange for \$0.30. Of those, 33 were excluded for the following reasons: failed manipulation check (11), did not answer with care and diligence (2), dietary practices: vegan, vegetarian, fish only omnivore and do not eat beef for religious or other reasons (20); leaving 167 participants (Female = 85;  $M_{age} = 38.93$   $SD_{age} = 13.05$ ).

#### Procedure and measures

Instructions and procedure were similar to Study 3a with two conditions: anthropomorphism ( $N = 78$ ) vs. control ( $N = 89$ ), except that the anthropomorphism condition was the human-animal friendship condition from Study 2 (see Appendix A3 for all materials used in this study).

### Results

*Attitudes toward meat.* Reliability of this scale for the present sample was somewhat low but acceptable (Cronbach's  $\alpha = .68$ )<sup>1</sup> and items were thus averaged. As predicted, an independent samples  $t$ -test revealed that consumers had less favorable attitudes toward meat in the

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<sup>1</sup> Additional analyses showed that the effects of the experimental manipulation were statistically significant on both items (inferred tastiness:  $t(165) = -2.96, p = .004, d = -.45$ ; enjoyment of meat,  $t(165) = -5.24, p < .001, d = -.81$ ).

anthropomorphism condition ( $M = 5.43, SD = 1.31$ ) (vs. control;  $M = 6.24, SD = .81$ ),  $t(165) = -4.90, p < .001, d = -.76$ .

**Purchase intentions.** Similarly, an independent samples  $t$ -test indicated that purchase intentions were significantly lower in the anthropomorphism condition ( $M = 4.87, SD = 1.88$ ) (vs. control;  $M = 5.93, SD = 1.16$ ),  $t(165) = -4.45, p < .001, d = -.69$ .

**Anticipatory guilt.** A principal axis factor analysis with varimax rotation yielded two factors for the anticipatory guilt scale as in the previous studies. The two factors (anticipatory guilt, 55.80%; anticipatory responsibility, 36.89%) explained 92.68% of the total variance and demonstrated adequate internal consistency (anticipatory guilt, Cronbach's  $\alpha = .95$ ; anticipatory responsibility, Cronbach's  $\alpha = .88$ ). As expected, an independent samples  $t$ -test indicated that anticipatory guilt was significantly higher in the anthropomorphism condition ( $M = 3.36, SD = 2.26$ ) (vs. control;  $M = 2.12, SD = 1.50$ ),  $t(165) = 4.21, p < .001, d = .65$ . To the contrary, additional analyses did not reveal any significant difference in anticipatory responsibility between the anthropomorphism condition ( $M = 4.04, SD = 1.91$ ) and the control condition ( $M = 4.24, SD = 1.74$ ),  $t(165) = -.70, p = .486, d = -.11$ . A summary of the results is presented in Table 1.

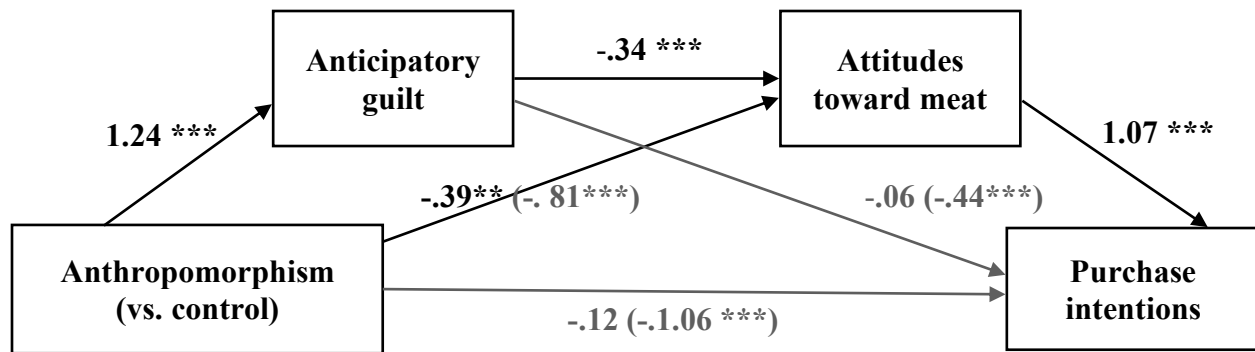
**Mediation analysis.** We then conducted a mediation analysis using the PROCESS Model 6 macro for SPSS (Hayes, 2013) to test whether consumers' purchase intentions were mediated by anticipatory guilt and attitudes toward meat. We dummy coded the conditions as follows: 0 = control, 1 = anthropomorphism, and we entered anticipatory guilt as first mediator, attitudes toward meat as second mediator and purchase intentions as dependent variable. A bias-corrected bootstrap analysis with 5,000 samples indicated two significant indirect pathways (see Table 4, Table 5, and Figure 5). As shown below, exposure to anthropomorphism (vs. control) increased consumers' feelings of anticipatory guilt about eating meat, which partially mediated the effects on attitudes toward meat, and eventually, on purchase intentions. The model accounted for 67% of the variance in purchase intentions ( $R^2 = 0.67$ ).

<i>Pathways</i>	$\beta$	<i>SE</i>	<i>95% CI</i>
Anthropomorphism -> Purchase intentions (Direct effect)	-0.12	0.16	[-.43, .20]
<b>Anthropomorphism -&gt; Attitudes toward meat -&gt; Purchase intentions</b>	<b>-0.42</b>	<b>0.16</b>	<b>[-.78, -.14]</b>
Anthropomorphism -> Anticipatory guilt -> Purchase intentions	-0.07	0.09	[-.28, .06]
<b>Anthropomorphism -&gt; Anticipatory guilt -&gt; Attitudes toward meat -&gt; Purchase intentions</b>	<b>-0.45</b>	<b>0.12</b>	<b>[-.71, -.22]</b>

**Table 4.** Direct and indirect effects of anthropomorphism (vs. control) on consumers' purchase intentions through anticipatory guilt and attitudes toward meat in Study 3c. Significant pathways are in bold text.

<i>Phases</i>	$\beta$	<i>SE</i>	<i>95% CI</i>
Anthropomorphism -> Anticipatory guilt -> Attitudes toward meat	-0.42	0.12	[-.69, -.22]
Anticipatory guilt -> Attitudes toward meat -> Purchase intentions	-0.38	0.04	[-.46, -.29]

**Table 5.** Two phases of the serial mediation through anticipatory guilt and attitudes toward meat to purchase intentions in Study 3c.



**Figure 5.** Model testing the negative effect of anthropomorphism (vs. control) on purchase intentions through anticipatory guilt and attitudes toward meat in Study 3c (\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ ). The model accounted for 67% of the variance in purchase intentions ( $R^2 = 0.67$ ).

## Discussion

Replicating Study 3a with the friendship metaphor applied to staff-animal interactions instead of animal-animal interactions, Study 3c shows that the negative effect of anthropomorphism on consumers' attitudes toward meat (supporting H<sub>1</sub>) and purchase intentions (supporting H<sub>2</sub>) is mediated by increased feelings of anticipatory guilt (supporting H<sub>3</sub>). However, anticipatory guilt feelings only partially mediated the negative effect of exposure to anthropomorphism on attitudes toward meat in the current study, which suggests that there might be other psychological mechanisms contributing to consumers' attitudes change. Implicit references to cuteness could remain present in this study due to playful human-animal interaction detailed in the vignette (Steinnes, 2017). Moreover, empathic concern and disgust could have been induced by anthropomorphism and contributed to reducing positive attitudes toward meat consumption (e.g., Hartmann & Siegrist, 2018; Kunst & Hohle, 2016; Niemyjska et al., 2018; Signal & Taylor, 2007).

## General discussion

Taken together, these results show that anthropomorphizing meat animals (pigs) through human-animal or animal-animal friendship can alter omnivorous consumers' attitudes toward (pork) meat consumption and lead to lower intentions to patronize a (pork) meat restaurant or to buy (pork) meat products. Moreover, our results indicate that the negative effect of anthropomorphism on

these attitudes is mediated by increased feelings of anticipatory guilt experienced when consumers consider eating (pork) meat. It is worth noting though, that these results do not extend beyond pork meat, as they failed to replicate with beef meat.

The current article thus complements the literature by adding feelings of guilt to cuteness response (Zickfeld et al., 2018) and empathic concern toward animals (Niemyjska et al., 2018) as mediators of the negative effect of anthropomorphism (or humanization) on meat consumption. Further studies can also explore how those psychological factors may correlate or interact with each other, and be moderated by participants' individual dispositions to anthropomorphize animals (Niemyjska et al., 2018) or display general dissociation tendencies (Kunst & Hohle, 2016).

Through the friendship metaphor, this article also documents the effect of the weak form of anthropomorphism on attitudes (Chandler & Schwarz, 2010; Epley et al., 2007; Lakoff & Johnson, 1980). When meat animals are friends, whom one can play with, seek comfort from and share both a mutual love and concern for welfare with, eating meat can be implicitly understood and experienced as harming friends (or friendly beings). This leads to feelings of guilt (Baumeister et al., 1994; Keller, 1994) and, in turn, discourages meat consumption. Our findings suggest that, by anthropomorphizing meat animals, the friendship metaphor thus contributes to re-framing the human-animal divide that revolves around dehumanization (Bastian et al., 2012a; Haslam & Loughnan, 2014) and reminds people that calling something food is a moral act in itself (Liao & Meskin, 2018; see also Feinberg et al., 2019).

Additionally, we might speculate that our findings illustrate that metaphors, as weak forms of anthropomorphism, can succeed where stronger forms of anthropomorphism might have failed. For instance, Piazza and Loughnan's (2016) manipulation of mind attribution did not influence the moral standing of meat animals, possibly because consumers are so accustomed to eating these animals, that they lack motivation to engage in reasoning against it, which renders their knowledge of animals' humanlike traits futile. By relying on the experiential system (Epstein, Pacini, Denes-Raj, & Heier, 1996; Lakoff & Johnson, 2003; Oullier & Basso, 2010), metaphors have heuristic value (Cornelissen, 2004). More specifically, here, we suggest that the "animal are friends" metaphor has affect heuristic value (Slovic, Finucane, Peters, & MacGregor, 2007). It provides a mental shortcut through which affective experience (guilt feelings attached to friendship; Keller, 1994), rather than knowledge and reasoning (mind attribution), plays a leading role in judgments and decision-making (eating meat). The current research thus has valuable implications for

organizations, driven by animal welfare advocacy, that promote the reduction of meat intake. In tandem with spreading scientific knowledge about how sentient and intelligent meat animals are, organizations may be well advised to consider anthropomorphizing meat animals through the “animals are friends” metaphor. This metaphor could help craft a communication strategy to challenge carnism (Monteiro et al., 2017), speciesism (Caviola et al., 2018) and the traditional human-animal divide (Adams, 2018; Bastian et al., 2012a), and, hence, facilitate animal protection, reduce meat consumption and, incidentally, promote a more sustainable plant-based diet worldwide (Springmann et al., 2018).

On a concluding note, the friendship metaphor illustrates the use of a new (or novel) metaphor rather than a conventional one. Conventional metaphors existing in our culture (e.g. TIME IS MONEY or LOVE IS A JOURNEY) structure our conceptual system by highlighting and coherently organizing certain aspects of our experience (Lakoff & Johnson, 1980; Landau, Meier, & Keefer, 2010). As discussed, new metaphors such as “animals are friends” function in a similar way but give new meaning and understanding to our past experience and current activities, guiding our future actions to fit the new metaphorical associations. Given their “*power to create a new reality*” (Lakoff & Johnson, 1980, p. 146), new metaphors are frequently used by marketers (Basso et al., 2014; Hirschman, 2007) and activists (Bouillé, Basso, & Robert-Demontrond, 2016) to cultivate positive or negative emotions (e.g., anger) respectively toward corporations (Gopaldas, 2014). In this perspective, this study finds that the metaphor “animals are friends” used by vegan and vegetarian activists evokes guilt feelings against meat consumption in the marketplace.

### **Perspectives and limitations**

While our empirical findings demonstrate that anthropomorphizing meat animals reduces intentions to patronize a meat restaurant or to buy meat products, they come with limitations that could serve as a basis for future research.

First of all, in light of our results, it appears that one cannot expect anthropomorphism through the friendship metaphor to be applicable to all types of meat animals. Unexpectedly, as found and discussed in Study 3b, the effects of this metaphor are largely attenuated for cows, even though it works on pigs, as illustrated through five studies (Studies 1a, 1b, 2, 3a and 3c). Future research could investigate whether the “animals are friends” metaphor has a significant impact on



consumers' attitudes when it comes to meat animals other than pigs, such as poultry and fish, even though people tend to attribute less mental capacities (for pain, pleasure, affection, etc.) to these non-mammals than mammals (Kupsala, Vinnari, Jokinen & Räsänen, 2016). It could also be explored whether, as aforementioned, pre-existing (positive or negative) stereotypes about these animals (mammals or non-mammals) interact with the effects of anthropomorphism. Additionally, another metaphor "animals are family members" could appear to be more suitable than the friendship metaphor to anthropomorphize certain animals in some cultures (Amiot & Bastian, 2017; Belk, 1996; Gray & Young, 2011; Hirschman, 1994). Using more subtle forms of anthropomorphism by simply calling the restaurant or company "Mr. Piggy's" or "Mr. Moo's" could also further document weak forms of anthropomorphism.

Second, the present research measured attitudes and behavioral intentions rather than actual behavior. It would be worthwhile to test in field experiments (involving for instance restaurants or cafés) whether the less favorable attitudes toward meat-eating and the anticipatory guilt feelings experienced after exposure to the friendship metaphor would translate into corresponding meal or snack choices. It could also be interesting to test whether the effects of this metaphor could be extended to attitudes and behaviors toward non-food animal products. The consumption of leather and fur may indeed be considered an immoral act of cruelty against animals that could be associated with feelings of guilt but also of disgust and anger (Rosenfeld & Burrow, 2017).

Last, these studies were conducted with English-speaking participants living in the United States who seem to be more likely to humanize animals than other cultures. For instance, research documents that US students perceived animals as more intelligent than did Japanese students (Nakajima, Arimitsu & Lattal, 2002) and that the negative effect of cuteness on willingness to consume meat consistently observed among US participants was not observed in a Norwegian sample (Zickfeld, Kunst & Hohle, 2018). Furthermore, food choice is a complicated behavior highly intertwined with culture (Köster, 2009; Rozin, Fischler, Imada, Sarubin, & Wrzesniewski, 1999), and metaphors and metaphorical thinking are also fundamentally grounded in culturally specific practices (Kövecses, 1995, 2004). More research in other sociocultural contexts is therefore needed. Recent studies in Chinese and French cultural contexts suggest that cognitive dissonance in response to the meat paradox seems to generalize across cultures (Tian, Hilton, & Becker, 2016), which paves the way for cross-cultural investigations into the metaphorical framing of the human-animal divide.

## **Conclusion**

To our knowledge, this is the first set of studies assessing the extent to which weak forms of anthropomorphism can affect meat consumption. We have provided evidence that exposure to the metaphor “animals are friends”, applied to human-animal or animal-animal interactions, generates moral (guilt) feelings in meat consumers, which negatively influences their attitudes toward meat consumption and their behavioral intentions to eat meat.

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## **Authors' contributions**

Both authors contributed equally to this work.

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## Appendix A: Stimuli

### Appendix A1 – Stimuli used in Study 1a

Meat condition	Non-meat condition
<p data-bbox="256 415 743 436"><a href="#">HOME</a> <a href="#">ABOUT US</a> <a href="#">WHAT WE OFFER</a> <a href="#">RESERVATIONS</a> <a href="#">EVENTS</a> <a href="#">F.A.Q</a></p> <div data-bbox="256 457 295 592">  </div> <p data-bbox="344 445 685 508"><i>Mr. Piggy's Café</i></p> <div data-bbox="435 520 555 625"></div> <p data-bbox="272 688 743 877"><i>Welcome to Mr. Piggy's Café. We offer a unique café experience where customers can play with our cute piglets whilst enjoying a hot drink and any of our famous breakfast specials, such as the smoked bacon rolls!</i></p>	<p data-bbox="857 415 1344 436"><a href="#">HOME</a> <a href="#">ABOUT US</a> <a href="#">WHAT WE OFFER</a> <a href="#">RESERVATIONS</a> <a href="#">EVENTS</a> <a href="#">F.A.Q</a></p> <div data-bbox="857 457 896 592">  </div> <p data-bbox="945 445 1286 508"><i>Mr. Piggy's Café</i></p> <div data-bbox="1036 520 1156 625"></div> <p data-bbox="873 688 1344 877"><i>Welcome to Mr. Piggy's Café. We offer a unique café experience where customers can play with our cute piglets whilst enjoying a hot drink and any of our famous breakfast specials, such as the baked egg rolls!</i></p>



## ABOUT US

*The concept of pet café, such as cat café and dog café, is gaining popularity across the world, and we are proud to be the first piglet themed café in North America!*



*Piglets are like dogs. They love to play lots of interactive games such as fetch. So try tossing a stick to see if our piglets will retrieve it. Piglets also enjoy pushing balls around with their noses. Try giving them a big bouncy ball to push around their pens or around the yard of our café!  
You'll love it!*



## WHAT WE OFFER

- *As if piglets weren't enough, we offer a selection of teas, coffees and hand-baked pastries.*
- *We also feature a number of breakfast specials including our pork sausages and our famous smoked bacon rolls.*

VANILLA LATTE



SMOKED BACON ROLLS



## WHAT WE OFFER

- *As if piglets weren't enough, we offer a selection of teas, coffees and hand-baked pastries.*
- *We also feature a number of breakfast specials including our spinach omelette and our famous baked egg rolls.*

VANILLA LATTE



BAKED EGG ROLLS






Appendix A2 – Stimuli used in Study 1b

Introduction	
<p style="text-align: center;"> <a href="#">HOME</a>   <a href="#">ABOUT US</a>   <a href="#">WHAT WE OFFER</a>   <a href="#">RESERVATIONS</a>   <a href="#">EVENTS</a>   <a href="#">F.A.Q.</a> </p> <div style="text-align: center;">  </div> <h2 style="text-align: center;">From Farm to Fork</h2> <p style="text-align: center;">             Our motto is Farm to Fork because we take fresh meat seriously. Our goal is to serve high quality free-range meat, and to share the enjoyment of eating great pork dishes.         </p>	
Anthropomorphism condition	Control condition
<p style="text-align: center;"> <a href="#">HOME</a>   <a href="#">ABOUT US</a>   <a href="#">WHAT WE OFFER</a>   <a href="#">RESERVATIONS</a>   <a href="#">EVENTS</a>   <a href="#">F.A.Q.</a> </p> <div style="text-align: center;">  </div> <h3 style="text-align: center;">What makes our meat so unique?</h3> <p style="text-align: center;">             Our meat is unique because our team entertains our farm pigs, which keeps them in good emotional and physical health! Pigs love to play the games that man's best friends, dogs, enjoy too. They like interactive games such as fetch. As soon as they see our team member with a Frisbee, they are ready to run and retrieve it. They also enjoy pushing a big bouncy ball around the green yard with their noses, which allows them to be active all day long!         </p>	<p style="text-align: center;"> <a href="#">HOME</a>   <a href="#">ABOUT US</a>   <a href="#">WHAT WE OFFER</a>   <a href="#">RESERVATIONS</a>   <a href="#">EVENTS</a>   <a href="#">F.A.Q.</a> </p> <div style="text-align: center;">  </div> <h3 style="text-align: center;">What makes our meat so unique?</h3> <p style="text-align: center;">             Our meat is unique because our farm pigs grow in a free-range natural environment, which keeps them in good emotional and physical health! Born and living outdoors for their whole lives, our farm pigs are reared to the highest welfare standards. Free access to a green yard adjacent to their shelter provides them with more room and a continuous supply of fresh air, spring water and nutritious feed. It also allows them to be active all day long!         </p>

Appendix A3 – Stimuli used in Study 2

Introduction		
<p>HOME <u>ABOUT US</u> OUR PRACTICES PRODUCTS RECIPES WHERE TO BUY</p>  <h2>About Us</h2> <p>Mr. Piggy's produces a wide range of meat products made to customer specifications and our boneless pork chops are among our customers' all-time favorites.</p>		
Human-animal friendship condition	Animal-animal friendship condition	Control condition
<p>HOME ABOUT US <u>OUR PRACTICES</u> PRODUCTS RECIPES WHERE TO BUY</p>  <h3>What Makes Our Pork Chops So Tasty?</h3> <p>Healthy pigs are delicious, nutritious pigs. Our team entertains our farm pigs, which keeps them in good emotional and physical health! Pigs love to play the games that man's best friends, dogs, enjoy too. They like interactive games such as fetch. As soon as they see our team member with a Frisbee, they are ready to run and retrieve it. They also enjoy pushing a big bouncy ball around the green yard with their noses, which allows them to be active all day long!</p> 	<p>HOME ABOUT US <u>OUR PRACTICES</u> PRODUCTS RECIPES WHERE TO BUY</p>  <h3>What Makes Our Pork Chops So Tasty?</h3> <p>Healthy pigs are delicious, nutritious pigs. Our farm pigs play games with each other, which keeps them in good emotional and physical health! Pigs are social animals, so they need each other to feel well just as we need friends. They require other pigs as companions with whom to eat, sleep, play and sort out group dynamics. They always enjoy pushing a big bouncy ball together around the green yard with their noses, which allows them to be active all day long!</p> 	<p>HOME ABOUT US <u>OUR PRACTICES</u> PRODUCTS RECIPES WHERE TO BUY</p>  <h3>What Makes Our Pork Chops So Tasty?</h3> <p>Healthy pigs are delicious, nutritious pigs. Our farm pigs grow in a free-range natural environment, which keeps them in good emotional and physical health! Born and living outdoors for their whole lives, our farm pigs are reared to the highest welfare standards. Free access to a green yard adjacent to their shelter provides them with more room and a continuous supply of fresh air, spring water and nutritious feed. It also allows them to be active all day long!</p> 

Appendix A4 – Stimuli used in Study 3a

Introduction	
<p style="text-align: center;"> <a href="#">HOME</a> <a href="#">ABOUT US</a> <a href="#">OUR PRACTICES</a> <a href="#">PRODUCTS</a> <a href="#">RECIPES</a> <a href="#">WHERE TO BUY</a> </p> <div style="text-align: center;">  </div> <h2 style="text-align: center;">About Us</h2> <p style="text-align: center;">             Mr. Piggy's produces a wide range of meat products made to customer specifications and our boneless pork chops are among our customers' all-time favorites.         </p>	
Anthropomorphism condition	Control condition
<p style="text-align: center;"> <a href="#">HOME</a> <a href="#">ABOUT US</a> <a href="#">OUR PRACTICES</a> <a href="#">PRODUCTS</a> <a href="#">RECIPES</a> <a href="#">WHERE TO BUY</a> </p> <div style="text-align: center;">  </div> <h3 style="text-align: center;">What Makes Our Pork Chops So Tasty?</h3> <p style="text-align: center;">             Healthy pigs are delicious, nutritious pigs. Our farm pigs play games with each other, which keeps them in good emotional and physical health! Pigs are social animals, so they need each other to feel well just as we need friends. They require other pigs as companions with whom to eat, sleep, play and sort out group dynamics. They always enjoy pushing a big bouncy ball together around the green yard with their noses, which allows them to be active all day long!         </p> <div style="text-align: center;">  </div>	<p style="text-align: center;"> <a href="#">HOME</a> <a href="#">ABOUT US</a> <a href="#">OUR PRACTICES</a> <a href="#">PRODUCTS</a> <a href="#">RECIPES</a> <a href="#">WHERE TO BUY</a> </p> <div style="text-align: center;">  </div> <h3 style="text-align: center;">What Makes Our Pork Chops So Tasty?</h3> <p style="text-align: center;">             Healthy pigs are delicious, nutritious pigs. Our farm pigs grow in a free-range natural environment, which keeps them in good emotional and physical health! Born and living outdoors for their whole lives, our farm pigs are reared to the highest welfare standards. Free access to a green yard adjacent to their shelter provides them with more room and a continuous supply of fresh air, spring water and nutritious feed. It also allows them to be active all day long!         </p> <div style="text-align: center;">  </div>



Appendix A5 – Stimuli used in Study 3b

Introduction	
<p>HOME <a href="#">ABOUT US</a> OUR PRACTICES PRODUCTS RECIPES WHERE TO BUY</p> <p>☰</p>  <h2>About Us</h2> <p>Mr. Moo's produces a wide range of meat products made to customer specifications and our beef steaks are among our customers' all-time favorites.</p>	
Anthropomorphism condition	Control condition
<p>HOME <a href="#">ABOUT US</a> <a href="#">OUR PRACTICES</a> PRODUCTS RECIPES WHERE TO BUY</p> <p>☰</p>  <h3>What Makes Our Beef Steaks So Tasty?</h3> <p>Healthy cows are delicious, nutritious cows. Our farm cows play games with each other, which keeps them in good emotional and physical health! Cows are social animals, so they need each other to feel well just as we need friends. They require other cows as companions with whom to eat, sleep, play and sort out group dynamics. They always enjoy chasing and head-butting around the green yard adjacent to their shelter, which allows them to be active all day long!</p> 	<p>HOME <a href="#">ABOUT US</a> <a href="#">OUR PRACTICES</a> PRODUCTS RECIPES WHERE TO BUY</p> <p>☰</p>  <h3>What Makes Our Beef Steaks So Tasty?</h3> <p>Healthy cows are delicious, nutritious cows. Our farm cows grow in a free-range natural environment, which keeps them in good emotional and physical health! Born and living outdoors for their whole lives, our farm cows are reared to the highest welfare standards. Free access to a green yard adjacent to their shelter provides them with more room and a continuous supply of fresh air, spring water and nutritious feed. It also allows them to be active all day long!</p> 

## Appendix B: Complementary data analyses

In Studies 1b-3c, the control condition indicates that animals grow in a “*free-range environment*”, are “*reared to the highest welfare standards*” and have “*free access to a green yard*”. Such description might have primed organic or ecological aspects (although not explicitly mentioned), which could result in higher liking of meat products.

Indeed, even though research with US participants showed that an organic label did not lead to more positive evaluation of product taste or higher purchase intentions in between-subjects experiments (Ellison, Duff, Wang, & White, 2016; Schuldt & Hannahan, 2013), Napolitano and colleagues (2010) demonstrated in a within-subjects experiment that Italian consumers rated organic beef more positively than conventional beef both before and after actually tasting it.

Thus, the purpose of the couple of studies reported below in Appendix B1 and B2 was twofold. First, a manipulation check tested whether there was a significant difference in terms of perception of the “organic” attribute in pork meat between anthropomorphism and control conditions. Second, in order to rule out the potential confounding effect of organic and ecological attributes on attitudes toward meat and intentions to buy meat, a follow-up study tested whether the negative impact of anthropomorphism (vs. control) on meat consumption could be replicated when the meat products were explicitly described as “organic” in both conditions.

### Appendix B1 – Manipulation check for organic and ecological attributes

As explained in the manipulation check for anthropomorphism (reported in Study 2), after completing items measuring anthropomorphic beliefs, participants were also required to indicate on a two-item Likert scale whether: “*The pork produced by ‘Mr. Piggy’s’ is organic*” and “*The pork produced by ‘Mr. Piggy’s’ is ecological*” (1 = “*strongly disagree*” to 7 = “*strongly agree*”).

The two items were highly correlated (Cronbach’s  $\alpha = .73$ ) and thus averaged. A one-way ANOVA revealed significant differences in terms of perception of the organic attribute in meat products between the three conditions ( $F(2, 171) = 6.96, p = .001, \eta^2 = .08$ ).

Bonferroni-corrected post-hoc  $t$ -tests showed that consumers rated the pork as significantly more organic in the control condition ( $M = 5.44, SD = 1.05$ ) as compared to the animal-animal condition ( $M = 4.69, SD = 1.34, p = .003, d = .63$ ) and the human-animal condition ( $M = 4.76, SD = 1.24, p$

= .009,  $d = .59$ ). The difference between the two anthropomorphism conditions was not significant ( $p > .999$ ,  $d = .06$ ).

One-sample  $t$ -tests showed that, in all three conditions, consumers' perceptions of the organic attribute in pork meat were significantly higher than the midpoint (= 4.00) of the scale (control,  $t(60) = 10.70$ ,  $p < .001$ ; animal-animal,  $t(57) = 3.92$ ,  $p < .001$ ; human-animal,  $t(54) = 4.57$ ,  $p < .001$ ).

On one hand, these results show that, in both anthropomorphism conditions (human-animal friendship and animal-animal friendship), pork products were rated significantly higher than the midpoint of the two-item Likert scale measuring the perception of the organic attribute-in meat, which indicates that these products were not perceived as conventional (i.e. non-organic) meat. On the other hand, the differences in terms of perception of the organic attribute in pork meat between anthropomorphism and control conditions reveal a potential confounding effect of organic and ecological attributes on attitudes toward meat and intentions to buy meat in our studies. In order to rule out this potential confounding effect, we conducted a replication study (see Appendix B2). In this study, the meat products were explicitly described as "organic" in both control and anthropomorphism conditions.

### **Material and methods**

**Participants.** This follow-up study was a two-group between-subjects design. A target sample size of 64 participants per condition was determined with an estimated effect size of  $d = .50$ , an alpha level of .05 and a desired power of .80. One hundred and sixty participants from the United States who had not participated in the previous studies were recruited online through Amazon's Mechanical Turk and completed this study in exchange for \$0.30. Of those, 37 were excluded for the following reasons: failed manipulation check (6), did not answer with care and diligence (10), dietary practices: vegan, vegetarian, fish only omnivore and do not eat beef for religious or other reasons (21); leaving 123 participants (Female = 71;  $M_{\text{age}} = 40.55$   $SD_{\text{age}} = 12.98$ ).

**Procedure and measures.** Instructions and procedure were similar to Study 2 except that we included only two conditions: human-animal friendship ( $N = 61$ ) vs. control ( $N = 62$ ), to which participants were randomly assigned. We also specified “organic” in two sentences which were presented identically across conditions: “*Mr. Piggy's produces a wide range of **organic** meat products made to customer specifications...*” and “*What Makes Our **Organic** Pork Chops So Tasty?*” (see Appendix B3 for all materials used in this study).

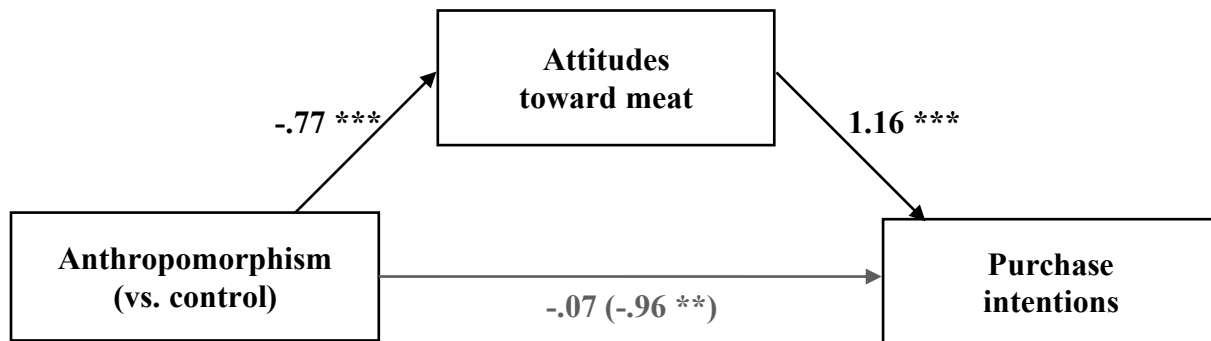
### **Results**

**Attitudes toward meat.** The items used to measure consumers' attitudes toward meat were highly correlated (Cronbach's  $\alpha = .79$ ) and were thus averaged. As predicted, an independent samples  $t$ -test revealed that consumers had less favorable attitudes toward meat in the anthropomorphism condition ( $M = 5.36$ ,  $SD = 1.37$ ) (vs. control;  $M = 6.13$ ,  $SD = .98$ ),  $t(121) = -3.58$ ,  $p < 0.001$ ,  $d = -.65$ .

**Purchase intentions.** Likewise, an independent samples  $t$ -test indicated that purchase intentions were significantly lower in the anthropomorphism condition ( $M = 4.64$ ,  $SD = 2.10$ ) (vs. control;  $M = 5.60$ ,  $SD = 1.45$ ),  $t(121) = -2.95$ ,  $p = .004$ ,  $d = -.53$ .




**Mediation analysis.** We then conducted a mediation analysis using the PROCESS Model 4 macro for SPSS (Hayes, 2013) to test whether consumers' attitudes toward meat mediated the effect of anthropomorphism on their purchase intentions. We dummy coded the conditions as follows: 0 = control, 1 = anthropomorphism, and we entered attitudes toward meat as potential mediator and purchase intentions as dependent variable. A bias-corrected bootstrap analysis with 5,000 samples indicated that the indirect effect was negative and significant ( $\beta = -.89$ ,  $SE = .24$ , 95%  $CI [-1.35, -.42]$ ), whereas the direct effect was not significant ( $\beta = -.07$ ,  $SE = .22$ , 95%  $CI [-.51, .37]$ ,  $p = .754$ ), showing that the negative effect of anthropomorphism on purchase intentions was fully mediated by attitudes toward meat (see Figure B1). The model accounted for 61% of the variance in intentions to patronize the restaurant ( $R^2 = 0.61$ ).

The negative effect of exposure to anthropomorphism on attitudes toward meat ( $H_1$ ) and purchase intentions ( $H_2$ ) remained significant when we controlled for the potential confounding effect of organic attribute on meat consumption. In other words, these results suggest that the negative effect of anthropomorphism (vs. control) on consumers' attitudes and behavioral intentions toward meat consumption is not due to a confounding effect of organic or ecological attributes in our studies.



**Figure B1.** Mediation model showing that anthropomorphism (vs. control) leads to less favorable attitudes toward meat which in turn leads to decreased purchase intentions in the follow-up study reported in Appendix B2 (\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ ). The model accounted for 61% of the variance in intentions to patronize the restaurant ( $R^2 = 0.61$ ).

Appendix B3 – Stimuli used in the follow-up study reported in Appendix B2

Introduction	
<p style="text-align: center;"> <a href="#">HOME</a> <a href="#">ABOUT US</a> <a href="#">OUR PRACTICES</a> <a href="#">PRODUCTS</a> <a href="#">RECIPES</a> <a href="#">WHERE TO BUY</a> </p> <div style="text-align: center;">  </div> <h2 style="text-align: center;">About Us</h2> <p style="text-align: center;">             Mr. Piggy's produces a wide range of organic meat products made to customer specifications and our boneless pork chops are among our customers' all-time favorites.         </p>	
Anthropomorphism condition	Control condition
<p style="text-align: center;"> <a href="#">HOME</a> <a href="#">ABOUT US</a> <a href="#">OUR PRACTICES</a> <a href="#">PRODUCTS</a> <a href="#">RECIPES</a> <a href="#">WHERE TO BUY</a> </p> <div style="text-align: center;">  </div> <h3 style="text-align: center;">What Makes Our Organic Pork Chops So Tasty?</h3> <p>             Healthy pigs are delicious, nutritious pigs. Our farm pigs grow in a free-range natural environment, which keeps them in good emotional and physical health! Born and living outdoors for their whole lives, our farm pigs are reared to the highest welfare standards. Free access to a green yard adjacent to their shelter provides them with more room and a continuous supply of fresh air, spring water and nutritious feed. It also allows them to be active all day long!         </p> 	<p style="text-align: center;"> <a href="#">HOME</a> <a href="#">ABOUT US</a> <a href="#">OUR PRACTICES</a> <a href="#">PRODUCTS</a> <a href="#">RECIPES</a> <a href="#">WHERE TO BUY</a> </p> <div style="text-align: center;">  </div> <h3 style="text-align: center;">What Makes Our Organic Pork Chops So Tasty?</h3> <p>             Healthy pigs are delicious, nutritious pigs. Our team entertains our farm pigs, which keeps them in good emotional and physical health! Pigs love to play the games that man's best friends, dogs, enjoy too. They like interactive games such as fetch. As soon as they see our team member with a Frisbee, they are ready to run and retrieve it. They also enjoy pushing a big bouncy ball around the green yard with their noses, which allows them to be active all day long!         </p> 