

Lowering barriers to plant-based diets : The effect of human and non-human animal self-similarity on meat avoidance intent and sensory food satisfaction

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Note: This is a review paper of the original written by Attila Pohlmann

1 Introduction

Diets are broadly classified into two types- vegetarian and meat inclusive. Vegetarianism involves abstinence from some animal products, whereas meat inclusive diets involve no such abstinence. Vegetarianism ranges from veganism to flexitarianism based on the type of animal products avoided. The popular opinion of the meat eating majority is that vegetarians miss out on the sensory pleasures of animal products—only for the ostensible benefit of avoiding moral conflict and being considered as virtuous.

This is suggestive of a zero-sum game as vegetarian diets are chosen if ethics are valued more than aesthetics. Taste is given up for peace of mind since no animals were harmed in the production process. This viewpoint rejects the possibility that vegetarians could actually be deriving the same sensory pleasure from their food stuffs as the meat eaters from meat. The perception of inferior taste of vegetarian food items forms a barrier to vegetarian diets.

Moreover, there are clashes between the vegetarian and meat eating communities in commonality. The difference in dietary practices, often have some negative effects on the mindsets of both meat eaters and vegetarians.

For instance, a few studies find that, in the presence of vegetarians, meat eaters feel scrutinized.

Meat consumption in the global scale is increasing. It not only has negative environmental impacts, but is also has negative impacts to physical health as it can increase the risk of cancer, cardiovascular disease.

This research is aimed at investigating the effects of the moral conflict that is connected with the consumption of meat. These are expected to change the subjective pleasure derived from meat-containing and meat-less foodstuffs. Also, the concept of interspecies self-similarity to non-human animals—the similarity that one perceives between himself and the non-human animal—is expanded upon (Amiot, C. E., Sukhanova, K., and Bastian, B. (2020). Social identification with animals: Unpacking our psychological connection with other animals. *Journal of Personality and Social Psychology*, 118(5), 991–1017.) and its mediating role between compassion and meat avoidance explored. The main theme of this investigation is whether higher levels of compassion lead to more sensory food satisfaction from the consumption of meat-free food items, which can potentially help in reducing the barrier towards vegetarian diets.

2 Methods

The goal of the following studies is to look at the psychological process of how compassion—both as a psychological characteristic and as a state—has the ability to improve taste and lessen obstacles to meatless diet adoption. The major study question is if higher levels of compassion lead to improved sensory food pleasure from meat-free meal options, thus decreasing the barrier for adopting meat free diet. Theorization is based on studies into the psychology of meat intake, as well as the practises and identities associated with meat avoidance. Because of documented discrepancies between identification labels and related behaviour, experimental designs were used to test real behaviours such as trait compassion, dietary preference, and desire to avoid meat.

Trait Compassion: There are several psychological scales that tend to measure compassion and the Santa Clara Brief Compassion Scale (SCBCS), (see Figure 1), was chosen because of its high correlation ($r=0.65$) with the empathic concern subscale of the Interpersonal Reactivity Index, which predicts concern for animals.

The Santa Clara Brief Compassion Scale employs five-point scale, in which 1 corresponds to “not at all true of me,” and 5 corresponds to “very true of me”, where greater value imply that respondent has higher level of compassion. Six statements (or items) in SCBCS include “I tend to feel compassion for people, even though I do not know them,” “I would rather engage in actions that help others, even though they are strangers, than engage in actions that would help me,” and “It is easy for me to experience the pain (and joy) experienced by others.” These items were randomly interspersed among general measures of personality traits to make the objective of the questionnaire less evident

	Not at all true of me	Rarely true of me	Sometimes true of me	Mostly true of me	Very true of me
When I hear about someone (a stranger) going through a difficult time, I feel a great deal of compassion.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I tend to feel compassion for people, even though I do not know them.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
One of the activities that provide me with the most meaning to my life is helping others in the world when they need help.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would rather engage in actions that help others, even though they are strangers, than engage in actions that would help me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I often have tender feelings toward people (strangers) when they seem to be in need.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is easy for me to experience the pain (and joy) experienced by others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am interested in people.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I sympathize with others' feelings.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have excellent ideas.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am quiet around strangers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure 1:

Meat Avoidance Intent: Several studies refer to the research issues related with the ambiguous definition of vegetarianism when it comes to meat avoidance. According to one survey, over 40% of self-identified teen vegetarians consume fish, and about 25% to 50% eat chicken. Furthermore, according to a survey, vegetarian Australian teens consume more chicken than their non-vegetarian counterparts. (This misunderstanding regarding the vegetarian diet may stem from the cultural idea of a vegetarian as someone who abstains from eating red meat only.) Based on this understanding, the experimental design encapsulates participants’ dichotomous choice between meatless and meat-containing stimuli where meat avoidance intent (MAI) of the respondent is measured as a continuous variable. This method three advantages: first it

avoids the pitfall of adopting the self-categorizations discussed above, which may or may not match to behaviour. Second, it takes into consideration flexitarians, or those who want to consume less meat but not fully avoid it, and who don't fit neatly into either the omnivore or vegetarian categories. Third, this approach allows a closer investigation of the effect caused by discrepancy between actual choice and stated intentions on taste.

Participants responded to three yes/no (1 = yes, 0 = no) statements about meat consumption, to capture their meat avoidance intent (MAI); (which include "I avoid eating red meat," "I avoid eating meat: any animal flesh, e.g., beef, pork, seafood, chicken, etc.," and "I avoid eating any product that comes from an animal") (see figure 2). The aforementioned questions were adapted from Rozin et al. (2012) and distributed at random among the Food Involvement Scale items in order to disguise the study's meat avoidance emphasis. The positive responses of the statements were added together to create the MAI variable. The answers were evaluated for logical consistency, with a score of '0' indicating no intention to avoid meat and a score of '3' indicating the maximum level of intent to avoid not only meat but all animal-derived consumables.

I avoid eating red meat.	<input type="checkbox"/>
I avoid eating meat.	<input type="checkbox"/>
I am vegan: I avoid eating any product that comes from an animal.	<input type="checkbox"/>
What I eat represents who I am.	<input type="checkbox"/>
Food is a symbol of status and power for me.	<input type="checkbox"/>
I notice when the food I eat affects my emotional state.	<input type="checkbox"/>

Figure 2:

Composite Taste: The challenge in measuring the taste of stimuli lies in the broader distance between linguistics and psychology. People use different adjectives to connote to the same emotional attitude or psychological state. The occurrence of many of adjectives in all languages is an attestation of the subtleties in description of "objects". To get the connotative meaning of emotional attitudes, psychological states or concepts, we need to get insight into the connection between linguistics and psychology. Surveys or questionnaires which use the semantic differential scale is the most reliable way to get insight on people's emotional attitude or psychological state towards a topic of interest. The respondent is asked to choose the position he or she lies in, on a scale between two polar adjectives, for example: "Awesome-Awful", "Good-Bad" or "Valuable-Worthless".

To capture the taste of the stimuli (jerky), participants were asked to rate the taste of the jerky stimulus on five 7-point semantic differentials, (see Figure 3), (7 = tastes good, 1 = tastes bad), which were generated from a dictionary search for food-related adjectives (flavourful/flavourless, yum/ yuck, delicious/disgusting, scrumptious/unpalatable). The jerky liking scores of the individual semantic differentials were evaluated for scale reliability and averaged into a composite taste measure of the participant.

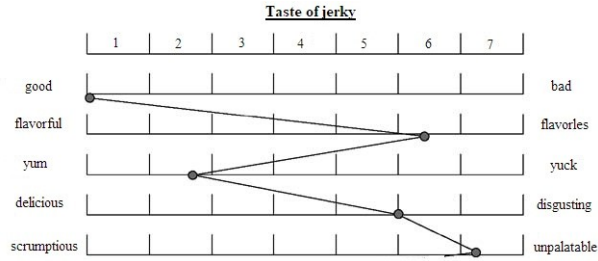


Figure 3:

Using the questionnaires type scales leads to other challenges of how well the questions in the scales are understood to the responders and how serious is the responder in his/her answer. For example, if in MAI scale the participant answers no to the question “I avoid eating red meat”; and answers yes to questions “I avoid eating meat” and “I avoid eating any product that comes from an animal”, then the response is not reliable because there is no internal consistency in it. In order to test for internal consistency, the statistic, called Cronbach’s alpha (α), is calculated from the pairwise correlations between items of the scale.

Let X_i be the observed score of item i , and $X = \sum_{i=1}^k X_i$ denotes sum of all elements in a test consisting of k items. Let σ_i^2 be variance of item i and σ_X^2 be variance of X , then Cronbach’s alpha is given as:

$$\alpha = \frac{k}{k-1} \left(1 - \frac{\sum_{i=1}^k \sigma_i^2}{\sigma_X^2} \right)$$

For example., Consider the following two test scores for test with three items. In the first table the responses for three similar items are not identical, and in second table the responses for three items are identical.

	Item 1	Item 2	Item 3	X
	5	3	1	9
	3	3	3	9
	2	1	1	4
σ_i^2	2.33	1.33	1.33	6.66

	Item 1	Item 2	Item 3	X
	5	5	5	15
	3	3	3	9
	2	2	2	6
σ_i^2	2.33	2.33	2.33	21

For the first table, $\alpha = \frac{3}{3-1} \left(1 - \frac{2.33+1.33+1.33}{6.66} \right) = 0.6$; and for the second table, $\alpha = \frac{3}{3-1} \left(1 - \frac{2.33+2.33+2.33}{21} \right) = \frac{3}{2} \left(1 - \frac{7}{3(7)} \right) = 1$. Thus, Cronbach’s alpha is 1, when the respond has maximum internal consistency; and it is less than 1 when the response is not perfectly consistent.

Since, for $X_1 = X_2 = \dots = X_k$, $\sigma_X^2 = k^2\sigma_1^2$, thus;

$$\alpha = \frac{k}{k-1} \left(1 - \frac{k\sigma_1^2}{k^2\sigma_1^2} \right) = 1$$

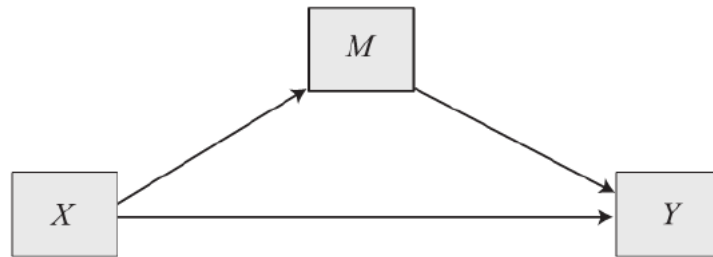
Therefore, the response is most reliable when the Cronbach’s alpha is equal to 1, irrespective to the number of items in the test, and it decreases up to as the reliability of test response

decreases. The common accepted rule of thumb for the internal consistencies is given in Table 1.

Cronbach's alpha	Internal consistency
$0.9 \leq \alpha$	Excellent
$0.8 \leq \alpha < 0.9$	Good
$0.7 \leq \alpha < 0.8$	Acceptable
$0.6 \leq \alpha < 0.7$	Questionable
$0.5 \leq \alpha < 0.6$	Poor
$\alpha < 0.5$	Unacceptable

Table 1:

Mediation Analysis : A mediation model seeks to identify and explain the mechanism or process that underlies an observed relationship between an independent variable and a dependent variable via the inclusion of a third hypothetical variable, known as a mediator variable. Rather than a direct causal relationship between the independent variable and the dependent variable, a mediation model proposes that the independent variable influences the (non-observable) mediator variable, which in turn influences the dependent variable. Mediation analysis can contribute to better understanding the relationship between an independent variable and a dependent variable when these variables do not have an obvious direct connection. The *Simple mediation model* contains three variables X, Y & M (mediator variable). In such a model, there are two pathways by which X can influence Y . One pathway, the direct effect, leads from X to Y without passing through M . The other one i.e the indirect effect leads from X to Y via M .



Direct effect:

$$\hat{Y} = m\hat{X} + n ; Y \text{ regressed on } X$$

where m and n are slope and constant of regression respectively

Indirect effect :

$$\hat{M} = a\hat{X} + c_1 ; M \text{ regressed on } X$$

$$\hat{Y} = b\hat{M} + c_2 ; Y \text{ regressed on } M$$

$$\implies \hat{Y} = b(a\hat{X} + c_1) + c_2$$

$$\implies \hat{Y} = ab\hat{X} + (bc_1 + c_2)$$

with ab being the regression slope and $bc_1 + c_2$, the regression constant.

Bootstrapping : Bootstrapping is a statistical procedure that resamples a single dataset to create many simulated samples called bootstraps. Calculation of standard errors, confidence intervals, and hypothesis testing of various test statistics can be done by the method of bootstrapping without much hassle. This method does not assume normality of the sample. Studies 2B and 2C which deploy mediation models use the method of bootstrapping. Procedure of Bootstrapping for a *Simple Mediation model*, for a sample size N , for regression slope as test statistic is as follows:

1. For each bootstrap, N data points are drawn with equal probability from the sample with replacement.
2. We draw, say K bootstraps. (K is usually taken to be 1000 to 5000 depending on the computational resources)
3. For each bootstrap, we compute ab , the regression slope for the indirect effect.
4. Plotting all the K estimates of ab with their frequency on y-axis gives the distribution of ab , with standard deviation as the standard error.
5. The bootstrapped confidence interval is found by selecting the appropriate percentiles of this distribution of ab

The procedure for bootstrapping in the *Serial Mediation model* (used in Study 2B) is similar to the one described above. Instead of ab , we compute a_1a_2b . The rest of the process remains same.

3 Studies

Study 1: Trait compassion enhances the taste of meatless food item. (*Data not available*)

The aim of this study is to test whether people who internalize compassion by choosing a vegetarian lifestyle get more sensory satisfaction from meatless foods. As compassion is not exclusive to vegetarians, it is not expected to diminish the subjective taste of meat products for an omnivore. Formally stated as:

H1: Trait compassion is positively correlated with taste ratings of a meat-free snack (soy jerky). Trait compassion has no effect on the taste ratings of meat jerky (beef or turkey).

To see if trait compassion corresponds with subjective taste, a two-level (jerky choice: meat vs. soy) between subjects' design is utilised, where trait compassion is used as the measured variable. 215 participants, of which 121 were female, with an average age of 22 years were invited to a university event room to conduct a taste test for jerkies. Participants were screened for allergies to any of the ingredients of jerky stimuli. The effect of hunger on subjective taste was controlled statistically, participants reported when they had last eaten a meal, the response of "less than an hour ago," was given the value of '0'; "one hour ago," was given the value '1' and so on, up to 5 h. Participants completed the Santa Clara Brief Compassion Scale (SCBCS) and answered demographic questions. Following that, participants looked at the components and nutritional information for three different types of jerkies (beef, turkey, and soy), which were presented in three typical FDA tables in a random sequence, however they all appeared on the same survey page. The three jerkies were presented as being nutritionally equivalent, with the same quantities of calories (70 kcal), carbohydrates (5 g), fat (0 g), and protein (12 g). Participants rated the taste of the jerky stimulus on five 7-point semantic differentials to capture the dependent variable. The scale reliability of the liking scores of the distinct semantic differentials was examined before they were aggregated into a composite taste measure. The

leftover jerky was weighed (initial weight 28g) and correlated with the survey replies after the debriefing and dismissal. The survey included checks to guarantee that all participants received the jerky of their choice.

Results:

Due to unavailability of the data corresponding to this study, results given in the original paper are mention after being checked for logical consistencies.

Hypothesis H1 is tested by entering jerky choice (0 = meat, 1 = vegetarian), the SCBCS variable (5 items, Cronbach’s Alpha = 0.91; M = 3.55, SD = 0.74), and their interaction term in a regression model on the composite taste variable, which was measured by averaging the five 7-point semantic differential pairs (5 items, Cronbach’s Alpha = 0.92; M = 3.44, SD = 1.08). In which participants biological sex (0 = female, 1 = male) and hunger level (M = 2.47, SD = 1.57) during the response were included in the model as covariates. Figure 4 shows the plot of participants’ taste ratings with respect to measured trait compassion. The interaction term is significant (B = 0.44, SE = 0.17, 95% CI 0.10 to 0.77, t = 2.59, p-value = .010). More specifically, planned contrasts show that compassion has a positive effect on the taste ratings of participants who chose the soy jerky (B = 0.46, SE = 0.15, 95% CI 0.17 to 0.75, t = 3.15, p-value = .002), but there is no significant effect of compassion on the taste ratings of meat jerky (B = 0.02, SE = 0.08, 95% CI -0.14 to 0.19, t = 0.28, p-value = .781, N.S.). Thus, it can be concluded that H1 is supported by the data; the soy jerky tastes subjectively better to the people with high levels of trait compassion whereas the effect of compassion on the subjective taste of meat remains unaffected.

It was also found that the jerky consumption (M = 16.09, SD = 10.70), is significantly predicted by taste rating of jerkies, keeping the experimental factors and covariates in the regression model, (B = 4.46, SE = 0.61, 95% CI 3.24 to 5.68, t = 7.04, p-value < .001).

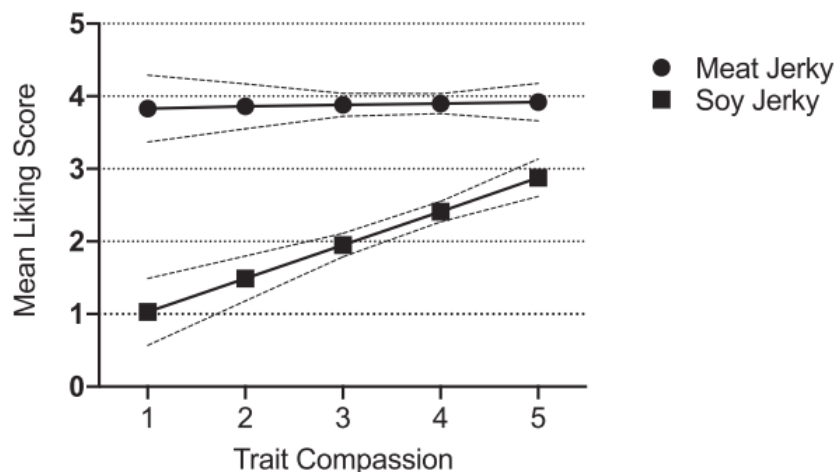


Figure 4: *Estimated marginal means of the effect of trait compassion on taste for meat jerky and soy jerky. The mean liking score was derived by averaging five taste-related semantic differentials. Dotted lines represent the standard error of the mean.*

Study 2A: Correlation between trait compassion and meat avoidance intent.

This study explores the relation between compassion and meat avoidance intent motivated by prior research (Cameron and Payne, 2012; Hamilton and McCabe, 2016; Rozuel, 2011) which demonstrates people who deny animal suffering are also less capable of feeling compassionate

to human suffering, leading us to the following hypothesis:

H2: Trait compassion and meat avoidance intent are positively correlated.

Prolific Academic was used to recruit 372 individuals (124 female) with an average age of 34 and a domicile in the United States. The online survey consisted of measuring trait compassion using the SCBCS items (mixed with irrelevant personality questionnaire items to make the purpose of study less obvious) and capturing participants' meat avoidance intent (MAI). Participants answered yes or no to three items about meat intake (1 = yes, 0 = no). The affirmative statements were added together to measure the MAI variable. Answers were examined for logical consistency, where a score of zero indicates no intention to avoid meat and a score of three indicating the highest level of intent to avoid all animal-derived food items.

Results:

The results given in original paper were found to have statistical errors, so they were discarded. New results were obtained from data set 'mmc10.csv', using R programming language. The MAI variable (3 items, Cronbach's Alpha = 0.63; M = 0.30, SD = 0.66) was found be questionable with respect to its reliability. It was regressed onto trait compassion variable (6 items, Cronbach's Alpha = 0.90; M = 3.56, SD = 0.82) and biological sex variables (0 = female, 1 = male) was included as covariate. It was found that trait compassion significantly predicts MAI (B = 0.13; SE = 0.04, 95% CI 0.05 to 0.22, t = 3.03; p-value = .003), (see Figure 5). Thus, trait compassion and intent to avoid meat are positively correlated; hence, H2 is supported.

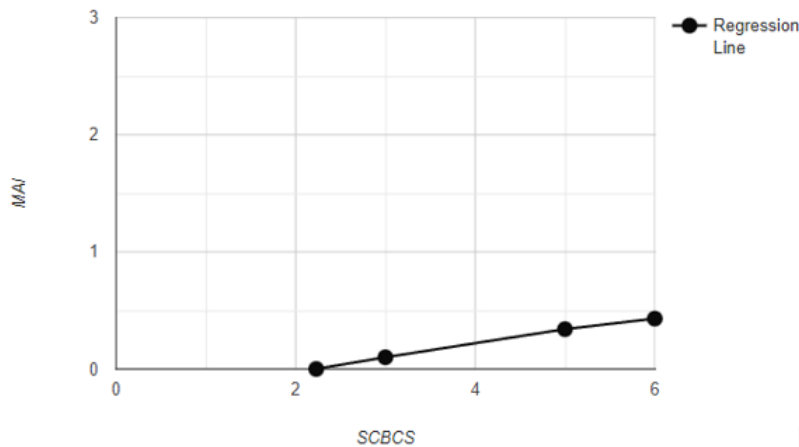


Figure 5: *Trait compassion significantly predicts the meat avoidance intend in participants.*

Study 2B: Human and non-human animal self-similarity mediate the effect of compassion on meat avoidance intent.

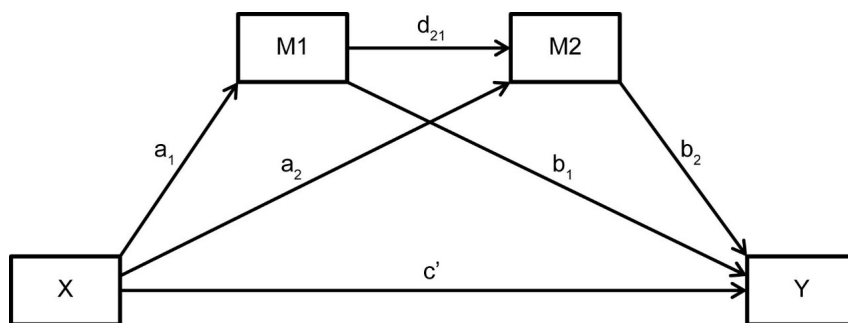
Studies on compassion (Oveis, 2010; Angrew, 2004, Aron 1992) show that individuals tend to feel higher compassion levels for others whom they feel close to or perceive to be similar. Whether this translates to higher levels of compassion for animals or not, which in turn is related to meat avoidance intent or not is the purpose of this study.

H3 : Trait compassion is positively associated with human animal self-other similarity, which is positively associated with non-human animal self-other similarity, which is positively associated with meat avoidance intent.

Experiment design: Through Prolific Academic, 131 participants (68 female) with a average age of 30 years, living in USA were recruited. The psycoogical trait compassion was measured

(using SCBCS) at the beginning of the survey and the dependent MAI variable was measured at the end. The mediating constructs, human- and non-human animal self-similarity, were measured using a series of heat-map type questionnaire items. During 14 trials total, a white square with a fixed width of 400 pixels was presented before participants, its boundaries outlined with a thin black border. At center, displayed an emoji of either human- or non-human animals. The instructions before the trials employed a static visual of the square with a spider emoji in the center and a representation of the cursor far away from the center. Participants read that the emoji represented another entity and the cursor represented the self. Next, they were to point and click close to the center—where the emoji was displayed—if they felt closeness to what the emoji depicted or far away from the center, towards the boundaries, if they felt a high degree of distance. The emoji were 55 pixels wide. Two practice runs, with a blue dot emoji and a red dot emoji, during which participants were asked to click as close or as far away from the center, ensured that they had properly understood the task. To measure human animal self-similarity (HASOS), three trials with emoji of people’s faces without skin tone modifiers were shown in random succession. Three additional, unrelated emoji were interspersed to obscure the nature of the measurement instrument. For non-human animal self-similarity (NHASOS), three trials with emoji showing the heads of a cow, a pig, and a chicken were displayed in random order. Three additional, unrelated emoji were randomly in the mix. The distance from the center could range between zero and 282 pixels. To adjust the scale of the self-other similarity scores to the other variables in the model, their averages were divided by 100.

Results: The experiment employs a serial mediation model with independent variable - SCBCS; Dependent variable - MAI; mediator 1 - human distance; mediator 2 - animal distance; covariate - biological sex;



perceived self-other similarity is expressed inversely as distance, i.e HASOS=1/human distance and NHASOS=1/animal distance

SCBCS (Cronbach’s Alpha = 0.86, total item average M = 3.39, SD = 0.86)

MAI score (M = 0.38, SD = 0.77)

human animal distance score (i.e human distance) (total item average M = 0.41, SD = 0.51)

No data to calculate Cronbach’s alpha of human distance.

non-human animal distance score (i.e animal distance) (total item average M = 1.04, SD = 0.61)

No data to calculate Cronbach’s alpha of animal distance.

The bootstrapped results indicate that the effect of compassion on MAI is serially mediated by HASOS and NHASOS ($a_1 \times a_2 \times b$ path = 0.0104, SE = 0.0076, 95% CI 0.0007 to 0.0288)

Trait compassion is associated with lower distance to other human animals (i.e. increased closeness).

This indicates high levels of perceived self-other similarity

($a_1 = -0.13$, SE = 0.05, 95% CI - 0.22 to - 0.04, $t = -2.45$, $p = .016$).

Distance to human animals in turn is positively associated with distance to non-human animals ($a_2 = 0.26$, SE = 0.11)

Distance To non-human animals which is negatively associated with MAI ($b = -0.30$, $SE = 0.11$).

Since perceived self-other similarity is expressed inversely as distance, the a_1 and b coefficients are negative, but ultimately result in the expected positive indirect effect, which lends support to our hypothesis.

Indirect effect via human animal distance only ($a_1 \times b$ path = -0.0121 , $SE = 0.0194$, 95% CI $-0.0592, 0.0171$) This is non-significant.

Indirect effect via non-human animal distance only ($a_2 \times b$ path = 0.0130 , $SE = 0.0220$, 95% CI -0.0271 to 0.0629) Non-significant.

The total effect ($B = 0.0809$, $SE = 0.0766$, 95% CI -0.0689 to 0.2317) Non-significant.

the direct effect ($B = 0.0696$, $SE = 0.0759$, 95% CI -0.0717 to 0.2257) Non-significant.

These indicate indirect only mediation

Hence, HASOS and NHSOS mediate the effect of compassion on MAI.

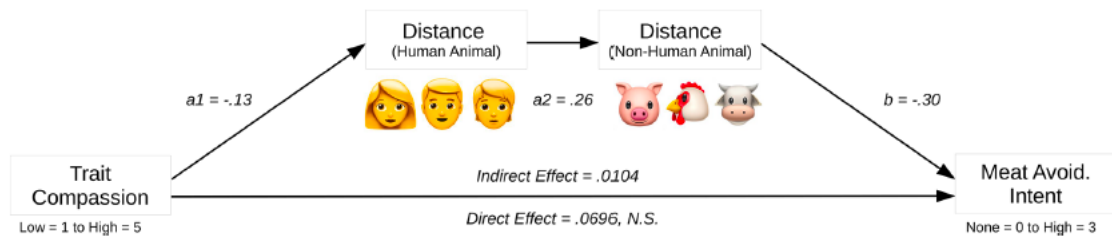


Figure 6: Results for Study 2B (*This figure has been sourced from the original*)

Study 2C: State compassion increases probability to choose a meatless vs. meat-containing wrap (*Data not available*)

Motivated by the results of Studies 2A and 2B, the question has to asked whether increasing compassion manually by the means of visual stimuli increases meat avoidance intent or not. Stated formally as:

H4 : Increasing state compassion with visual stimuli increases the probability to choose a meatless wrap rather than a meat-containing wrap. This effect is mediated by meat avoidance intent.

Experiment design: A two-level between-subjects design was used where compassion is manipulated using a state compassion prime (treatment vs. control) adapted from Oveis et al., 2010. 83 participants out of which 36 were female took part in this experiment. The subjects were screened for allergies to any ingredients contained in the wraps. Participants' choice between a BLT or a Chicken (Meat wraps) and a Falafel (Veg) wrap was recorded as the dependent variable. Participants completed demographics measures and were asked to view pretested photographs that increase compassion. The treatment group was asked to view a slideshow of 15 pictures of vulnerability, care-giving, human connection and emotional distress. The pictures displayed female and male adults, children and the elderly, all of them belonging to diverse ethnicities. In the control group, the slideshow consisting of 15 slides of geometric shapes starting with a black square and then the pictures were presented in a randomized order. All participants completed the MAI items mentioned in Study 2A. The participants then reviewed ingredients and nutritional information for the three wraps. All three wraps had similar calorie content to control for the choice bias based on nutritional information (Total Calories - 440kcal; Carbohydrates - 59g; Protein - 14g; Fat -16g). After the participants choice was notes in the survey, they were served their choice of wrap. Participants were also asked to assign a 0-5 taste rating to make the taste test more credible and then dismissed.

Results (from Original paper): The variables here are Compassion induction (1 = treatment, 0 = control), MAI score (M = 0.37, SD = 0.76), which is the mediator variable and Wrap choice (1 = Falafel, 0 = BLT or chicken, M = 0.24, SD = 0.43) with biological sex (0 = female, 1 = male) as covariate. These were entered into Hayes' (2017) PROCESS macro configured for model 4 in SPSS. The boot-strapped (10,000 bootstraps).The results are as follows :

Indirect effect : a = 0.34, SE = 0.16, 95% CI 0.07 to 0.61, t = 2.07, p = .041; Implying that the compassion manipulation is positively associated with MAI.

b = 0.93, SE = 0.34, 95% CI 0.37 to 1.50, z = 2.71, p = .007; which translates into an increased probability to choose a meatless wrap

a × b path = 0.31, SE = 0.27, 95% CI 0.04 to 0.81.; These results suggest that the effect of compassion manipulation on wrap choice mediated by MAI is significant, which supports of H4.

Direct effect : m = -0.12, SE = 0.57, 95% CI -1.06 to 0.83, z = -0.20, p = .838; Which is not significant.

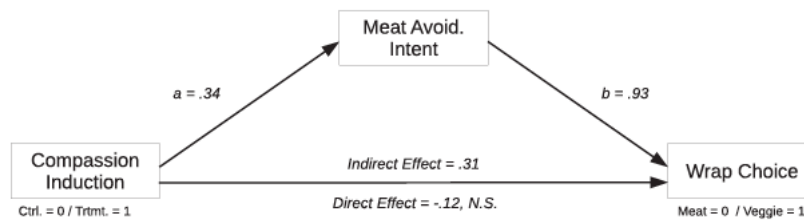


Figure 7: Results for Study 2C (*This figure has been sourced from the original*)

The result is questionable for the indirect effect as a 95% CI is approximately $ab \pm 2SE$. Although the right limit is acceptable, the left limit is only at 1SE range. When corrected for this, the CI is -0.23 to 0.81, which includes zero. Therefore we cannot reject the null hypothesis, which negates the result given in the paper.

Criticism: A person with high MAI score i.e vegans in irrespective of the Treatment or Control group, will always choose a falafel wrap over one containing meat. Therefore for high MAI score, there is an independence between the proposed dependent(Wrap choice) and independent variables(Compassion Induction), implying uncorrelation. This shows that a vegan in treatment group is a biased data point. To correct for this bias, we have to remove the persons with high MAI score.

Study 3: The taste-enhancing effect of state compassion on meatless foods is moderated by meat avoidance intent (*Data not available*)

As an extension of the previous study i.e Study 2C, here we test the taste of an individual's choice of wrap after manipulating their compassion levels by visual stimuli. On the different end of the spectrum, it is expected that increasing compassion levels for people who choose an omnivorous lifestyle would hamper their experience of the taste of their meat wrap. Motivated by this :

H5 : Increasing state compassion with visual stimuli improves the taste of vegetarian wraps for participants with some level of meat avoidance intent.

H6 : The effect of state compassion on taste is reverse for meat containing wraps for participants with some level of meat avoidance intent.

Experiment design: A $2 \times 2 \times 4$ between subjects design which includes state compassion: treatment vs. control ; wrap choice: meat wrap vs. veggie wrap; MAI: 0 to 3 respectively and subjective taste as the outcome variable was employed. 130 students, with average age of 24 years, which included 58 females were asked to participate in the taste test. Participants were asked to fill a questionnaire, where they specified their hunger level (0 to 5), where 0 is for they had last eaten less than one hour ago; 1 is for one hour ago etc.,. They specified the meat avoidance intent employing the same questionnaire items as of in aforementioned studies. Similar to the Study 2C, participants were now asked to choose among the three wraps namely, falafel wrap or BLT wrap or Chicken wrap which were given with the same nutritional information. Participants indicated their chosen wraps. Concerning about the manipulation of compassion from the biasing choice, the photo slideshow of the treatment or the control condition were randomly allocated to the participants. At the end of the slideshow, participants collected their selected wrap and were asked to rate the taste of the selected wraps. Participants evaluated the taste using five 7-point (1 to 7) semantic differentials which was also employed in Study 1, which says, 7 for tastes good, 1 for tastes bad; flavorful to flavorless; yum to yuck; delicious to disgusting, scrumptious to unpalatable). The five semantic differential scores were averaged and the output is taken as the mean liking score which is the dependant variable.

Results (from Original paper):

• Veg Wrap :

For veggie wrap we have, for MAI = 0, $M_{\text{treatment}} = 4.32$ vs. $M_{\text{ctrl}} = 4.10$, the negative slope of the line(B) = -0.21, standard error (SE) = 0.32 and the 95% confidence interval is (-0.75,0.32) which includes 0, $t = -0.68$, $p = 0.498$, hence not significant. For MAI = 1 (low), $M_{\text{treatment}} = 4.05$ vs. $M_{\text{ctrl}} = 3.63$, the positive slope of the line(B) = 0.42, standard error (SE) = 0.31 and the 90% confidence interval is (0.03,0.93) which doesn't include 0. For MAI = 2 (medium), $M_{\text{treatment}} = 3.99$ vs. $M_{\text{ctrl}} = 2.93$, the positive slope of the line(B) = 1.06, standard error (SE) = 0.54 and the 95% confidence interval is (0.16,1.96) which doesn't include 0. For MAI = 3 (high), $M_{\text{treatment}} = 3.94$ vs. $M_{\text{ctrl}} = 2.24$, the positive slope of the line(B) = 1.70, standard error (SE) = 0.84 and the 95% confidence interval is (0.31,3.09) which doesn't include 0. Here is the plot of mean liking scores of veggie wrap at all MAI = 0 to 3 from the original paper. We can see that the mean liking score of veggie wrap for participants with MAI

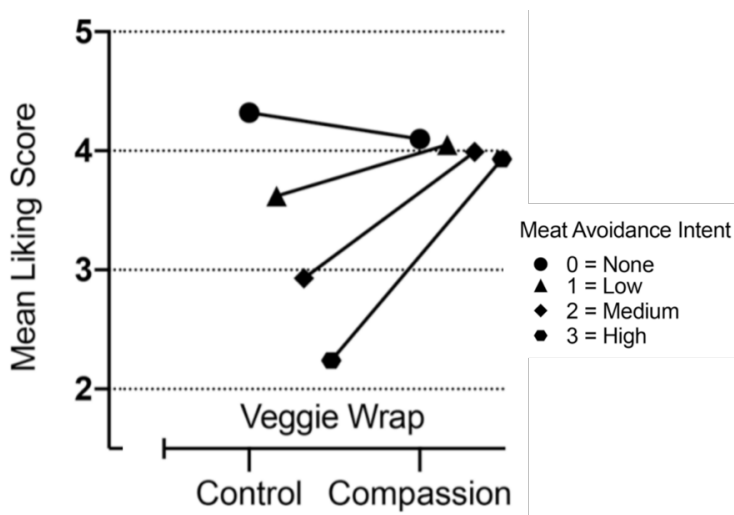


Figure 8: Results of Veggie wrap (*This figure has been sourced from the original*)

= 1(low) to MAI = 3(high) is notably higher if state compassion is manipulated when compared

to the control condition. Hence, we can say that inculcating state compassion with the visual stimuli did improve the taste of vegetarian wraps for the participants with some level of meat avoidance intent, thus supporting H5. For, MAI=0, i.e., the participants with no intentions on avoiding the meat the state compassion manipulation, the state compassion manipulation is ineffective.

- Meat wraps :

For meat wrap we have, for MAI = 0, $M_{\text{treatment}} = 4.17$ vs. $M_{\text{ctrl}} = 4.10$, the negative slope of the line(B) = -0.21, standard error (SE) = 0.32 and the 95% confidence interval is (-0.75,0.32) which includes 0, $t = -0.68$, $p = 0.498$, hence not significant. For MAI=1 (low), $M_{\text{treatment}} = 3.94$ vs. $M_{\text{ctrl}} = 4.35$, the negative slope of the line(B) = -0.41, standard error (SE) = 0.23 and the 95% confidence interval is (-0.79,-0.03) which doesn't include 0. For MAI = 2 (medium), $M_{\text{treatment}} = 3.72$ vs. $M_{\text{ctrl}} = 4.53$, the negative slope of the line(B) = -0.81, standard error (SE) = 0.45 and the 95% confidence interval is (-1.55,-0.07) which doesn't include 0. For MAI = 3 (high), $M_{\text{treatment}} = 3.50$ vs. $M_{\text{ctrl}} = 4.62$, the negative slope of the line(B) = -1.21, standard error (SE) = 0.68 and the 95% confidence interval is (-2.33,-0.10) which doesn't include 0. Here is the plot of mean liking scores of meat wrap at all MAI = 0 to 3 from the original paper. We can see that the mean liking score of meat wrap for participants

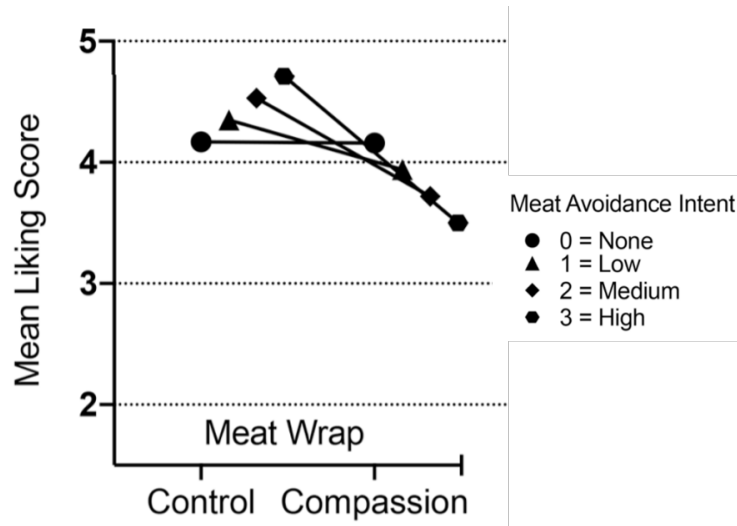


Figure 9: Results of Meat wrap (*This figure has been sourced from the original*)

with MAI=1(low) to MAI=3(high) is notably lesser if state compassion is manipulated when compared to the control condition. Hence, the effect of state compassion on taste is reverse for meat containing wraps for participants with some level of meat avoidance intent, thus supporting H6. For, MAI=0, i.e., the participants with no intentions on avoiding the meat the state compassion manipulation, the state compassion manipulation is ineffective.

4 Conclusion

Let us conclude by discussing about few theoretical and practical implications.

4.1 Theoretical Implications

In theoretical implications, we see our findings are either confirming a theory or it is disproving it.

Study 2A says positive correlation between trait compassion and meat avoidance intent, Study 2B says human and non-human animal self-similarity mediate the effect of compassion on meat avoidance intent and Study 2C says state compassion increases probability to choose a meatless vs. meat containing wrap, so, the outcomes of Study 2A, 2B and 2C produce supporting affirmation for the inseparability between human and animal directed empathy. Where, both of them are conciliating factors in the psychological process between veganism and compassion, where in the general sense, the meat avoidance intent.

Due to the refusal to change ones views on moral self-concept, the moral etiquette in the human domain which is measured by the trait compassion, is naturally linked to moral etiquette in the non-human animal domain. For example, the intentions to diminish the animal hurting by incorporating meatless food diets.

There is a positive effect on participants taste ratings of meatless stimuli for the compassion when it is both manipulated as a trait or measured as a trait. The positive outcome might aid the people who desire to lower their meat diets by welcoming meatless diets and then by tuning up to the moral satisfaction and sensory satisfaction that vegans already obtain from the meatless diets. Moreover, as we discussed in the Study 3, for the people with considerable meat avoidance intent, persuading compassion negatively affected the taste of meat-containing wraps for them.

4.2 Practical Implications

From Study 2C and 3, we find inducing visual stimuli gave reasonably good results, Hence, they can be employed in packaging the product or employed in restaurants to promote customer's perception of taste of meatless foods. Especially for people who are on the temporary zones with respect to consumption of meat, Food traders can gain profit from spotlighting the pleasant sensation of vegetarian food options on the menu. Such things could emphasize the flavour of a vegetarian dish without overemphasizing about obvious health benefits such as with low calorie labels etc. which may be somewhat compelling to the people. Nevertheless, there is no evidence for these implications to be valid on meat eaters as their meat avoidance intent is zero.

The meat avoidance intent (MAI) and the method to measure consumer choice get the better of some of the restrictions of certain labels for example flexitarian, omnivore, vegetarian, vegan, etc, which doesn't have certain boundaries and don't always be in tune with behaviour. Lastly, overall, these observations points in the direction for upgrading the taste viewpoints of vegetarian foods, which can enhance people's physical and mental well-being as well as to minimize the environmental effect of meat usage.

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