Measuring the Meat Paradox:

How Ambivalence Towards Meat Influences Moral Disengagement

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Abstract

Meat consumption elicits highly ambivalent feelings. On the one hand, it is associated with sensory pleasure and tradition; on the other hand, it is linked to moral, ecological, and health-related issues. This conflict is referred to as the meat paradox and it is hypothesized that people who experience the meat paradox resolve resulting discomfort by moral disengagement. However, ambivalence—a central process variable underlying the meat paradox—has never been measured directly, and theorizing on the meat paradox, so far, remains rather elusive. In the present investigation, we assessed meat-related ambivalence by tracking mouse trajectories of people who evaluated meat and plant-based dishes. By using this behavioral measure, our findings support the assumption that omnivores experience greater meat-related ambivalence and use moral disengagement strategies more frequently than non-omnivores. Importantly, our findings also show that experiencing meat-related ambivalence has far-reaching consequences: the larger behavioral ambivalence in omnivores, the higher the use of moral disengagement strategies. Thereby, our findings indicate the importance of ambivalence as a central process variable underlying the meat paradox and highlight how process-orientated research may contribute to our understanding of dietary practices and other potentially harmful behaviors.

Key Words: meat paradox, attitudes, moral disengagement, ambivalence, dissonance

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People's dietary choices have plenty implications for human and non-human life on earth. Specifically, eating meat is highly relevant in moral, ecological, and health-related contexts (Joy, 2010). First of all, meat production is a morally relevant because it causes factory farming and the slaughter of millions of animals[1] per annum (Joy, 2010). Moreover, raising animals for food is detrimental for the environment which is exemplified by its contribution to the emission of greenhouse gases that even exceeds the emissions of the global transportation system (Tilman & Clark, 2014). Finally, eating meat is relevant for human health as people who eat less or no meat have a lower risk to get illnesses like diabetes or coronary heart diseases (Tilman & Clark, 2014).

However, despite an increasing awareness of these negative consequences, meat remains a common ingredient of dietary practices in nearly all cultures around the world (Ruby, 2012). This discrepancy between behavior and attitude leads to an inner conflict called the *meat paradox* (Loughnan, Haslam, & Bastian, 2010). Specifically, the meat paradox describes that most individuals like to eat meat but they do not want to be connected with the morally troublesome aspects of it, like the suffering and killing of animals. Consequently, the meat paradox may be understood as a state of dissonance which elicits aversive arousal. To cope with this arousal, people who eat meat (i.e., omnivores) have to resolve their dissonance in order to maintain their dietary practices (Bastian & Loughnan, 2017).

It is, thus, important to investigate coping strategies to be able to understand why some people adopt non-omnivorous (i.e., vegetarian or vegan) diets whereas others maintain their meat-based diets. According to Bastian and Loughnan (2017), three different coping strategies help to deal with the meat-paradox: First, negative feelings related to the meat paradox may be

decreased by lowering the perceived harm of meat consumption. This may, for example, be achieved by denying animals' emotions and thereby their capability to suffer (e.g., Bastian, Loughnan, Haslam, & Radke, 2012). Second, experienced inconsistencies resulting from the meat paradox may be reduced by avoiding responsibility for the negative aspects of meat consumption, i.e., by justifying or rationalizing meat consumption (e.g., Piazza et al., 2015). Finally, inconsistencies can be resolved by detaching one's identity from the harmful action as indicated by reports of perceived behavioral change (e.g., Rothgerber, 2014). These coping strategies may be interpreted as moral disengagement strategies that prevent the adoption of non-omnivorous diets (Bandura, 1999; Graça, Calheiros, & Oliveira, 2014).

In support of the motivational account proposed by Bastian and Loughnan (2017), there is growing evidence that moral disengagement strategies are crucial to understand how people cope with the meat paradox. For instance, omnivores attribute less mental capacities and emotions to animals and rationalize the consumption of meat more frequently compared to non-omnivores (Bilewicz, Imhoff, & Drogosz, 2011; Piazza et al., 2015). In a similar vein, research demonstrated that omnivores show fewer moral concerns and attribute less mental states to animals if they previously ate meat or expected to eat meat compared to control groups who ate or expected to eat plant-based food (Bastian et al., 2012; Loughnan et al., 2010).

While these and other investigations highlight the importance of the meat paradox and its potential to explain moral disengagement, most research has hitherto not addressed the process variables assumed to drive the effects. In fact, despite being the central component of the process underlying the motivational account by Bastian and Loughnan (2017), the meat paradox has been widely disregarded in most studies. As a rare exception, Berndsen and Van der Pligt (2004) investigated ambivalence—defined as the inconsistency between two opposing evaluations

towards the same attitude object—and demonstrated that meat-related ambivalence is associated with reports of less meat consumption. Although assessing meat-related ambivalence is principally desirable, the study by Berndsen and Van der Pligt (2004) was based on self-reports which are flawed for several reasons, e.g., introspection failures, social desirability, or potential influences on subsequent measures (Schneider et al., 2015). Assumptions about the underlying process of the effects of the meat paradox, therefore, remain elusive and novel ambivalence measures that bypass the issues of self-reports are needed to validate the theoretical framework.

The Present Research

The aim of the current investigation was twofold. First, we wanted to introduce a novel method that allows to investigate meat-related ambivalence by means of a behavioral measure, thus circumventing the limitations of self-reports. Therefore, we tracked mouse trajectories of omnivores and non-omnivores in an evaluation task towards food using the *MouseTracker* paradigm (Freeman & Ambady, 2010). This enabled us to measure ambivalence as expressed by a conflict in motor responses (Schneider et al., 2015). Derived from recent theorizing (Bastian & Loughnan, 2017), we hypothesized that omnivores experience more meat-related ambivalence than non-omnivores as indicated by a greater motoric response conflict.

Second, we aimed to contribute to theorizing on the meat paradox by examining the link between behavioral ambivalence and moral disengagement. Therefore, we assessed moral disengagement via attributions of animal emotions and mind (Rothgerber, 2014), and via rationalizations of meat consumption (Piazza et al., 2015). Based on recent research (e.g., Bilewicz et al., 2011), we assumed that the association between diet (non-omnivores vs. omnivores) and moral disengagement strategies would be moderated by meat-related ambivalence. Specifically, we expected that omnivores who display higher meat-related

ambivalence in the MouseTracker paradigm would use more moral disengagement strategies to cope with their inner conflict.

Method

Participants and Design

We recruited 65 participants at a university campus in Germany via posters and mailing lists without referring specifically to dietary practices at first. To identify participants as omnivores and non-omnivores, they were asked by the experimenter if they eat meat subsequent to the experiment. By doing so, we sampled 32 omnivores, and 8 non-omnivores. After reaching this desired sample of omnivores, we recruited the remaining 24 non-omnivores by specifically referring to their diet during recruitment[2]. One participant's data had to be excluded because he provided inconsistent responses after the experiment towards the question of the experimenter and on the demographic questionnaire. Thus, our final sample consisted of 32 omnivores (26 women, 6 men, M_{Age} = 21.53, age range: 18–46) and 32 non-omnivores (25 women, 7 men, M_{Age} = 22.41, age range: 18–31). Participants received course credits for their participation.

The study was conducted in a 2 (Diet [omnivore, non-omnivore]) x 2 (Dish [plant-based, meat] within-between design with repeated measures on the second factor. Based on previous research, demonstrating a medium effect of $d = 0.45$ [95% *CI*: $0.23 \leq d \leq 0.68$] by comparing mouse trajectories of people who evaluated pictures of ambivalent and non-ambivalent food (Schneider et al., 2015), we used a medium effect size of $d = 0.5$ (Cohen, 1992), a correlation of $r = .5$ for repeated measures[3], and a power of $1\text{-}\beta = .95$ to calculate required sample size a priori via G*Power 3.1 (Faul, Erdfelder, Lang, & Buchner 2007). For the two-way interaction, this power analysis resulted in minimum of $N = 54$. To account for possible outliers, we sampled $N = 64$ participants. All data analyses were conducted following the termination of data collection.

Materials and Procedure

Prior to the start of the investigation, participants were informed that this study examined the "association between their personal style of categorization and different patterns of thought" and that they would, therefore, be asked to categorize different objects as positive or negative, and to answer some questions. Following, participants consented to their participation.

Ambivalence. At the beginning of the study, ambivalence was measured using the MouseTracker paradigm (Freeman & Ambady, 2010). Objects were presented in consecutive trials beginning with the appearance of a start button at the bottom middle of the screen and two response buttons (positive vs. negative) at the top right or top left corner of the screen. After clicking the start button, the cursor of the computer mouse was set to a fixed position at the bottom of the screen while a picture appeared in the middle of the screen. This picture had to be evaluated according to its valence by clicking on one of the two response buttons. There was no time limit for the evaluation; however, if participants took more time than 1000ms to initiate a movement, they were instructed to move the computer mouse earlier, even if they were not sure of their response yet.

Using this procedure and the *Food Pics* Database (Blechert, Meule, Busch, & Ohla, 2015), participants completed five training trials with pictures of neutral objects before they were shown four blocks of randomly presented target and distractor pictures. Each block consisted of 24 pictures of distractors that were unrelated to food (e.g., screws, pens, light bulbs, books, etc.), six target pictures of plant-based dishes (i.e., peas, potatoes, rice), and six target pictures of meat dishes (i.e., salmon, chicken breast, beef steak). These 12 target pictures presented the different dishes either as raw or processed food, which served as a control factor in later analyses[4]. After the first two blocks, the response buttons changed sides; the order of assignment was

counterbalanced across participants[5]. In each of the trials, mouse trajectories on the x- and y-axis, the elapsed time, and the chosen response were recorded. These provide different indicators of ambivalence (for a more detailed description of the method, see Schneider et al., 2015).

Pull. Ambivalent objects elicit a greater pull towards the non-chosen option than univalent objects, which is reflected by a greater curve in mouse trajectories. A quantifiable indicator of this curve is the maximum deviation (MD)[6]. MD measures the distance of the point where the mouse trajectory deviates most from the idealized response trajectory (i.e., the direct line from the start point to end point of an evaluation). In addition to geometric pull, the elapsed time until the maximum deviation is reached (MD-time) may be indicative of pull.

Response Time. Response time (RT) is another indicator of a response conflict due to ambivalence. RT reflects the total time in each trial that elapses from clicking the start button to clicking a response option. However, using RT is of restricted conclusiveness as it only provides aggregated information after the evaluation is completed. Hence, RTs could be influenced not only by the response conflict but also by other factors (Schneider et al., 2015)[7].

Moral Disengagement. After participants finished the evaluation task, two questionnaires on moral disengagement strategies (i.e., denial of harm and obviating responsibility) were administered with E-prime 2.0 (Psychology Software Tools, Pittsburgh, PA); the presentation order was counterbalanced across participants.

Denial of Harm. To assess denial of harm, we included a six-item scale on animal emotions, and a four-item scale on animal mind (Rothgerber, 2014). Participants were asked to indicate whether they believe that animals in general possess certain emotions (nostalgia, happiness, melancholy, excitement, guilt, and panic), and certain mental capacities (self-control, morality, memory, and planning), by setting a slider to a position ranging on a scale from -100

('animals do not possess these emotions/capacities') to 100 ('animals do possess these emotions/capacities'). We collapsed both scales in order to achieve a greater internal consistency ($\alpha = .74$) as compared to each separate scale (emotions: $\alpha = .65$; mental capacities: $\alpha = .62$).

Obviating Responsibility. To investigate obviation of responsibility, we assessed rationalizations of meat consumption using a 16-item measure by Piazza et al. (2015) which consists of several statements that render meat consumption as nice, natural, necessary, and normal ($\alpha = .91$; e.g., "Our human ancestors ate meat all the time."; "Meals without meat would just be bland and boring."). Participants were asked to indicate their agreement ('I do not agree' to 'I totally agree') on a scale from -100 to 100.

Demographics and debriefing. Finally, demographics (age, sex, field of study, handedness) were assessed. Moreover, participants were asked to indicate whether they eat meat in general, and how often they eat meat, fish, and other animal products per week. Subsequently, we assessed when they ate last time in general, and their last meal containing meat. We also provided an opportunity for participants to state current dietary behaviors in an open-ended question (e.g., dietary regimen or allergies). Finally, participants were thanked and debriefed.

Results

Evaluation

To check the validity of the stimulus material, a 2 (Diet [omnivore, non-omnivore]) x 2 (Dish [plant-based, meat]) ANOVA was conducted on the percentage of positively evaluated trials for the different dishes. This analysis revealed significant main effects for the factors Dish, $F(1, 62) = 205.53$, $p < .001$, $\eta^2 = .77$, and the factor Diet, $F(1, 62) = 51.14$, $p < .001$, $\eta^2 = .45$. Most importantly, the predicted two-way interaction between Dish and Diet was also significant, $F(1, 62) = 72.447$, $p < .001$, $\eta^2 = .54$. This indicates that the stimulus material elicited different

evaluations (see Table 1 for descriptive statistics and pairwise comparisons): plant-based dishes elicit univalent (predominately positive) responses in both groups, whereas meat dishes elicit univalent (mostly negative) evaluations in non-omnivores but mixed evaluations in omnivores.

Ambivalence

In line with the procedure of Schneider et al. (2015), we excluded all trials from further analyses with RTs less than 300ms or greater than 3000ms (1.1% of all trials). We also checked for outliers on MD in the remaining trials by using the median absolute deviation procedure (7.4% of the remaining trials; Leys, Ley, Klein, Bernard, & Licata, 2013)[8].

To test our first hypothesis—omnivores show more meat-related ambivalence than non-omnivores—three 2 (Diet [omnivore, non-omnivore]) x 2 (Dish [plant-based, meat] repeated measure ANOVAs were conducted for MD, MD-time, and RT. Descriptive statistics and pairwise comparisons for these two-way ANOVAs are included in Table 1.

Pull. The two-way ANOVA revealed significant main effects for the factors Dish, $F(1, 62) = 7.10$, $p = .010$, $\eta^2 = .10$, and Diet, $F(1, 62) = 5.47$, $p = .023$, $\eta^2 = .08$. As predicted, these main effects were qualified by a significant interaction between Dish and Diet, $F(1, 62) = 9.58$, $p = .003$, $\eta^2 = .13$. This shows that omnivores exhibit more meat-related ambivalence than non-omnivores; however, there is no difference in ambivalence towards plant-based dishes between these groups.

An ANOVA on MD-time revealed no significant effects for the factors Dish, $F(1, 62) = 1.84$, $p = .180$, $\eta^2 = .03$, and Diet, $F(1, 62) = .9$, $p = .347$, $\eta^2 = .01$. Although descriptive statistics for MD-time are similar to MD, the hypothesized interaction between Diet and Dish failed to reach significance, $F(1, 62) = 2.65$, $p = .109$, $\eta^2 = .04$.

Reaction Time. Analyses of RT revealed a marginally significant main effect for the factor Dish, $F(1, 62) = 3.13$, $p = .082$, $\eta^2 = .05$, and no significant main effect for the factor Diet, $F(1, 62) = 1.59$, $p = .212$, $\eta^2 = .03$. In accordance with our hypothesis, the two-way interaction between Diet and Dish was significant, $F(1, 62) = 7.08$, $p = .01$, $\eta^2 = .10$. Although pairwise comparisons were only marginally significant for meat dishes, this seems to indicate that omnivores need more time to evaluate meat dishes than non-omnivores; for plant-based dishes no differences emerged between these groups.

Table 1.

Means, standard deviations, and pairwise comparisons (adjusted Bonferroni) for different measures in the MouseTracker paradigm.

			Omnivore	Non-Omnivore
DV	Dish	*p*-Value	*M (SD)*	*M (SD)*
Response	Meat	< .001	.64 (.30)	.06 (.15)
	Plant-based	.186	.86 (.21)	.92 (.15)
MD	Meat	.002	.10 (.09)	.04 (.06)
	Plant-based	.247	.06 (.08)	.04 (.07)
MD-time	Meat	.155	796.70 (144.18)	760.95 (99.80)
	Plant-based	.838	752.13 (131.27)	755.40 (77.89)
RT	Meat	.054	1434.33 (210.75)	1329.05 (328.68)
	Plant-based	.680	1364.53 (200.52)	1343.08 (212.77)

Note. Response = percentage of positively evaluated trials; MD = maximum deviation; RT = total reaction time; MD-time = moment of occurrence of maximum deviation

Moral Disengagement

To test our second hypothesis—that the association of diet and moral disengagement is moderated by ambivalence—we used hierarchical regression analyses. Attributions of animal emotion and mind, and rationalizations of meat consumption, served as dependent variables in separate regression analyses; diet (coded: omnivores = -0.5; non-omnivores = 0.5) and ambivalence (MD^9; mean centered) served as predictor variables. Both predictor variables were entered separately into the regression equation in steps one and two, and the interaction term was entered in step three (see Table 2).

Table 2.

Hierarchical regression analyses on different dependent variables referring to strategies of moral disengagement including the predictors diet and ambivalence.

	Attributions of Animal Emotion/Mind				Rationalizations of Meat Consumption			
	B	*SE B*	β	ΔR^2	*B*	*SE B*	β	ΔR^2
Step 1				0.15***				0.48***
Diet	18.02	5.37	0.39		-46.28	6.15	-0.69	
Step 2				0.01				0.01
Diet	16.56	5.83	0.36		-43.97	6.66	-0.66	
Ambivalence	-24.01	36.33	-0.08		37.98	41.51	0.09	
Step 3				0.08*				0.01
Diet	18.33	5.64	0.40		-44.80	6.71	-0.67	
Ambivalence	4.97	36.82	0.02		24.31	43.80	0.06	
Interaction	181.80	73.65	0.29		-85.75	87.61	-0.10	

*Note. B-, SE B-, β-, & ΔR2-***v**alues refer to logistic regression coefficients.
* p < .05; *** p <.001.

Denial of Harm. In the first hierarchical regression analysis, we analyzed if the association of diet and attribution of animal emotion and mind was moderated by ambivalence (cf. left panel of Table 2). The connection between dietary practices and attributions of animal emotion and mind can be inferred from step one of the hierarchical regression analysis. Specifically, step one indicated that non-omnivores attributed significantly more emotion and mind to animals than omnivores, $F(1, 62) = 11.28$, $p = .001$, accounting for 15% of the variance of the total model. The addition of ambivalence in step two, however, did not explain a significant proportion of variance, $F(1, 61) = .44$, $p = .511$.

In line with our hypothesis, step three indicated that ambivalence moderated the link between diet and attributions of animal emotion and mind, $F(1, 60) = 6.09$, $p = .016$, explaining 8% of the variance of the total model. To elucidate this interaction, simple slope analyses (Aiken & West, 1991) were conducted probing the interaction at five levels (i.e., very low: 10^{th} percentile; low: 25^{th} percentile; medium: 50^{th} percentile; high: 75^{th} percentile; very high 90^{th} percentile). Figure 1 shows the results of these analyses: omnivores and non-omnivores differed in the attributions of animal emotion and mind, if they exhibit medium ($t = 2.81$, $p = .007$), high ($t = 3.82$, $p < .001$), or very high ($t = 3.68$, $p < .001$) levels of ambivalence; however, they did not differ if they displayed low ($t = 1.22$, $p = .229$) or very low ($t = .12$, $p = .9$) levels of ambivalence. Because simple slope analyses use artificially selected data points to probe the interaction (Hayes, 2013), we additionally used the Johnson-Neyman technique (Johnson & Neyman, 1936) to identify a region of significance. This region of significance points to precise range of the moderator variable where simple slopes do not equal zero. Using the PROCESS macro for SPSS (PROCESS Model 1; Hayes, 2013), we identified .0349 as the point transition of significance ($t =$

2.00, p = .05). Thus, diet was only associated with the attribution of animal emotion and mind if ambivalence exceeded the transition point (see Figure 1).

To scrutinize the moderation more closely, we also conducted simple slope analyses separately for omnivores and non-omnivores. These analyses revealed that omnivores attribute significantly less mind and emotion to animals if ambivalence is heightened, (t = 2.00, p = .05). In non-omnivores, however, there seems to be no significant association between ambivalence and the attribution of animal emotion and mind (t = 1.60, p = .114).

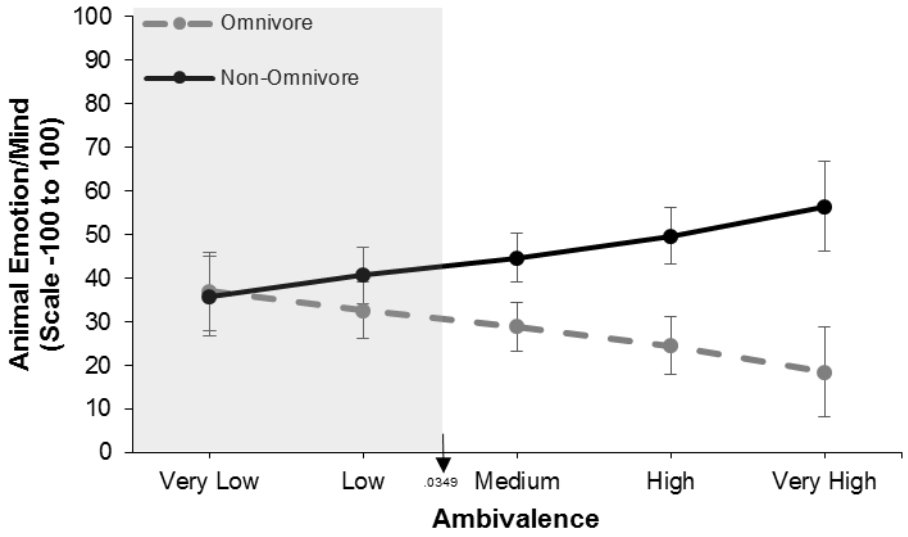

Figure 1. Moderation analysis for attributions of animal emotion and mind including the predictors diet and ambivalence. Error bars denote standard errors. The white panel of the figure indicates the region of significance. The arrow marks the point of transition in significance.

Obviating Responsibility. In a second hierarchical regression analysis, we analyzed if the association of diet and rationalizations of meat consumption was moderated by ambivalence (see right panel of Table 2). Step one reveals that omnivores use significantly more strategies for moral disengagement, F(1, 62) = 56.66, p < .001, explaining 48% of the total variance. However, neither step two, F(1, 62) =.84, p = .36, nor step three, F(1, 62) = .96, p = .332, explained a

significant proportion of variance. Thus, in contrast to attributions of animal emotion and mind, no significant interaction between the predictors was found for rationalizations of meat consumption. Simple slope analyses (see Figure 2) revealed that omnivores use significantly more rationalizations of meat consumption than non-omnivores at all five levels of ambivalence (all *t*s > 3.3, all *p*s < .002); an analysis of the region of significance did not identify a point of transition in significance.

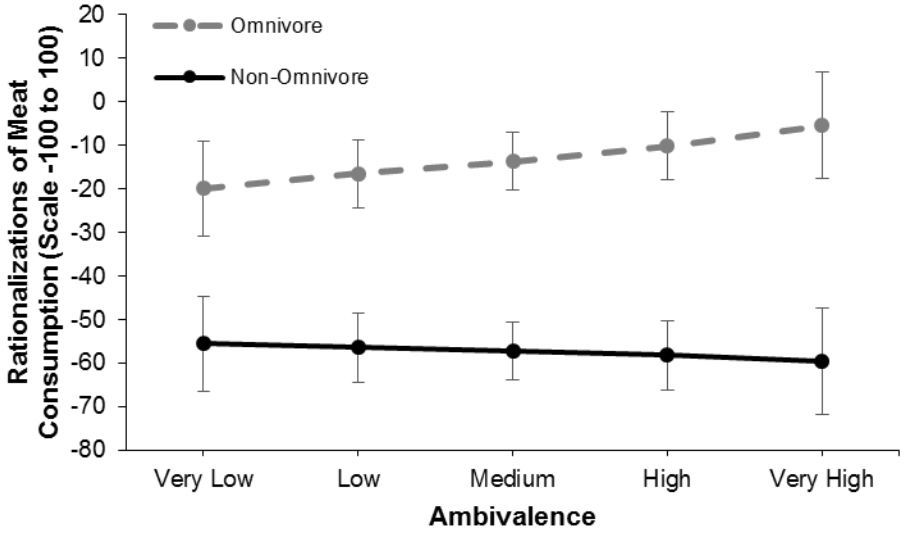

Figure 2. Moderation analysis for rationalizations of meat consumption including the predictors diet and ambivalence. Error bars denote standard errors.

Discussion

Facing the moral, ecological, and health-related consequences of meat consumption (Joy, 2010, Tilman & Clark, 2014), it is important to understand why some people change whereas others maintain their meat-based dietary practices. According to Bastian and Loughnan (2017), omnivores maintain their diets by using moral disengagement strategies. These strategies help to cope with the meat paradox that arises due to meat's negative side-effects. However, because existing research has mostly focused on effects rather than on process variables, the behavioral

consequences of the meat paradox and their association with moral disengagement were not tested yet. The present investigation aimed to close this gap and represents—to the best of our knowledge—the first study in which meat-related ambivalence was assessed directly with a behavioral measure.

In order to provide a measurement for the meat paradox that has strong face validity, and to overcome the disadvantages of self-reports, we used the MouseTracker paradigm (Freeman & Ambady, 2010). With this behavioral measurement for ambivalence (Schneider et al., 2015), we assessed the extent to which evaluations of meat and plant-based dishes are conflicted in omnivores and non-omnivores. As predicted in our first hypothesis, mouse trajectories—that point to response conflicts—indicated that omnivores exhibit greater meat-related ambivalence than non-omnivores while no difference between the groups was found for plant-based dishes. Likewise, response conflicts were reflected in RT: omnivores took more time to evaluate meat dishes than non-omnivores, whereas no difference emerged for plant-based dishes. MD-time also revealed a similar data pattern as the other two variables; however, the differences did not reach conventional levels of significance.

In order to test our second hypothesis, we assessed if MD, which conveys online information about meat-related ambivalence, moderated the association between dietary practices and moral disengagement. Consistent with previous studies, we found that omnivores attribute less emotion and mind to animals (Bilewicz et al., 2011) and exhibited more rationalizations of meat consumption (Piazza et al., 2015) than non-omnivores in step one of two separate hierarchical regression analyses. In accordance with our hypothesis, step three of the regression analysis on animal emotion and mind revealed that the association of diet and moral disengagement is moderated by ambivalence. Simple slope and region of significance analyses

disclosed that diet influences the attribution of animal emotion and mind only in people exhibiting medium or higher levels of ambivalence (i.e., point of transition). In comparison, regression analysis on rationalizations of meat consumption revealed that the association of diet to this particular moral disengagement strategy was not moderated by ambivalence. Instead, rationalizations of meat consumption were highly determined by participants' diets on all levels of ambivalence.

In sum, we found evidence in support of both of our hypotheses by using the MouseTracker paradigm as a novel behavioral measure of meat-related ambivalence. In fact, we were not only able to show individual differences in meat-related ambivalence dependent on dietary practices, but we also illuminated the process underlying the use of moral disengagement strategies. Thereby, this study is the first to convey evidence for the assumed process that omnivores use more moral disengagement strategies (i.e., attribute less emotion and mind to animals) if they exhibit stronger meat-related ambivalence. These findings substantiate the validity of the ascribed method as a research tool that enables scholars to systematically investigate inconsistencies that arise from the meat paradox.

Based on the benefits of investigating a central process variable underlying meat consumption, our findings may provide important practical implications. In fact, our results suggest that the assessed moral disengagement strategies seem to be qualitatively different and may be used for different purposes. That is, we demonstrated that the link between diet and denial of harm was moderated by ambivalence, while the association of diet and rationalizations of meat consumption was not affected. Although omnivores with higher levels of ambivalence use more rationalizations of meat consumptions on a descriptive level, this measure of moral disengagement was strongly determined by diet (explaining 47% of the variance) compared to

measures of attributions of animal emotion and mind (explaining 15% of the variance). One reason for this might be that the rationalization of meat consumption is a well-established routine in omnivores because they need to justify their diet directly (Piazza et al., 2015), especially if they become aware of the conflict that originates from their diet. However, the attribution of animal emotion and mind does not directly defend one's own behavior but is an indirect strategy that helps to resolve meat-related conflicts by denial of harm. Consequently, it may be argued that attributing animal emotion and mind is a less explicit strategy compared to consciously rationalizing meat consumption and, therefore, might have an increased situational sensitivity that helps to cope with subtle conflicts of which omnivores might not even be aware of (i.e., behavioral ambivalence). Future research might address this interesting observation and investigate how direct and indirect strategies are used by omnivores to resolve the meat paradox.

Remarkably, our investigation also highlights the fact that conflicted non-omnivores potentially might have to cope with ambivalence as well. Although the simple slope analysis was not significant for non-omnivores, on a descriptive level, conflicted non-omnivores attributed more emotion and mind to animals. This interesting finding, which is opposite to the pattern of omnivores, might have been overlooked so far because it was hitherto not possible to observe ambivalence in an unobtrusive manner. Based on descriptive data, it might be speculated that individuals who decide to abstain from meat decrease their liking and develop disgust for meat over time in order to uphold their diet (see for example Rozin, Markwirth, & Stoss, 1997). However, people who have not yet developed these coping strategies (e.g., who just started to adopt a non-omnivorous diet) will still experience conflict about meat. Consequently, and in order to resist temptations they would need to develop strategies to sustain and control their new behavior. We argue that this may, for example, be achieved by moral engagement via increased

attributions of animal emotion and mind. Although this line of reasoning remains hypothetical based on our data, it stresses the value of assessing ambivalence as a central process variable and may instigate future research examining how non-omnivores cope with meat-related ambivalence and other interesting research questions.

Limitations

One limitation of this study is based on the fact that we examined omnivores and non-omnivores in order to validate the MouseTracker paradigm as a measurement for the meat paradox. Although this approach has frequently been used in research on the meat paradox (for example in studies of moral disengagement; Bilewicz et al., 2011; Piazza et al., 2015), and has strong face-validity, it is also clear that other variables that are not relevant for the present research go along with these dietary practices. Future research should circumvent this issue by manipulating the meat paradox experimentally.

This experimental approach might also solve another issue of the present investigation. That is, although we did measure two strategies for moral disengagement (i.e., denial of harm and obviating responsibility), we did not examine identity detachment as the third strategy proposed by Bastian and Loughnan (2017). This was not possible in the current investigation because non-omnivores already detach their identity from meat consumption and therefore would not exhibit any variance on self-reports. However, future studies, that use triggers of the meat paradox as manipulations, might include self-report measures to draw conclusions about the relation of ambivalence towards this third strategy for moral disengagement.

Conclusion

"Meat should be of special interest to psychologists, because it is a quintessential example of the interesting and important state of ambivalence" (Rozin, 2007, p. 404). Indeed, we

demonstrated that ambivalence is a crucial process variable indicative of the meat paradox by measuring behavioral ambivalence, and by showing that meat-related ambivalence is important to understand the use of moral disengagement strategies. We hope that this study will inspire further research and promote theorizing on meat consumption and moral disengagement. Going beyond this, these findings may be applied to other areas in which ambivalence is a central process variable—like health and environmental psychology—and help people to overcome other potentially harmful behaviors.

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Foot Notes

[1]We use the term animals to refer to non-human animals.

[2] One-way ANOVAs for moral disengagement strategies and two-way ANOVAs for mouse-tracking data did not indicate significant differences between non-omnivores with and without specific recruitment (all Fs < 1.51 and ps > .229) for all dependent variables (RT, MD, MD-time, rationalizations of meat consumption, and attribution of animal mind and emotion).

[3]The actual correlation among repeated measures for MD was $r = .76$, $p < .001$.

[4]Adding Processing as a factor to all analyses does not moderate the predicted two-way interaction of Diet and Dish.

[5]Results did not differ across blocks. Therefore, we collapsed data for both blocks.

[6]A related index of geometrical pull, is the area under the curve (AUC) which assesses area between the actual mouse trajectory and the idealized response trajectory. As in the protocol used by Schneider et al. (2015), we focus on MD, because AUC and MD correlate highly for both types of dishes (plant-based: $r = .98$, $p < .001$; meat: $r = .96$, $p < .001$).

[7]This is also supported by our data showing low correlations of MD and RT (plant-based: $r = .17$, $p = .176$; meat: $r = .23$, $p = .067$).

[8]The inferential statistics remain unchanged when deviating trials are not removed, except for an increase in p-value for the overall interaction of the hierarchical regression analysis from .016 to .228. However, because simple slope and region of significance analyses still show the predicted effects, we argue that this does not concern the validity of our findings.

[9]MD was used as an indicator of ambivalence due to the outlined limitations that are associated with RT.