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Patterns of affective images of animal-sourced food in Norway: Land versus sea

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ABSTRACT

To get an understanding of drivers of animal-sourced protein consumption, we explored laypeople's affective images of animal-sourced food. A national representative sample of the Norwegian population ($N = 783$) provided free associations to six food products originating either from livestock, capture fishery, aquaculture, or hunting. Subsequently, participants evaluated their own free associations as either positive, negative, or neutral. We found that people show different associative patterns for animal-sourced food from land than from sea. Livestock and hunting are mostly related to traditions and food, whereas capture fishery relates to production, consequences, and evaluations. People reported to have little knowledge about food products in the aquaculture category. Livestock was the most positively evaluated category, followed by hunting and capture fishery; aquaculture elicited the most negative associations. The current findings suggest a need to consider different strategies to encourage consumption of specific categories of food products.

1. Introduction

With the constantly growing human population, there is an increased demand for food, including animal-sourced protein (Henchion et al., 2017). This could have important environmental implications as food consumption is considered one of the most prominent contributors to the environmental impact of households (Tukker & Jansen, 2006). Consumers are so called bottom-up drivers (i.e., influencers from the lowest level of the system) of change in the food industry and the food producing system in general (Richter & Klöckner, 2017). This means that in order to achieve sustainability goals, it is fundamental to get an understanding of consumers' dietary preferences and the behaviours that drive demand for animal-sourced protein (Verain et al., 2021).

There are various factors that can play a role in explaining individual differences in sustainable behaviour. These include psychological predispositions (e.g., environmental values, worldviews, political orientation), framing (i.e., describing an issue in a certain way to achieve a desired response) and the social context in which decisions are made (Newell et al., 2014). Personal factors involved in sustainable food consumption include attitudes (e.g., consuming sustainable products is positively associated with pro-environmental attitudes), habits, and perceived consumer effectiveness (e.g., people who believe their behaviour can have an impact, show an increased intention to consume sustainable food; Richter & Klöckner, 2017; Richter et al., 2018; Vermeir & Verbeke, 2008). Additionally, knowledge about environmental issues and trust in food certifications can have an effect on sustainable food choices (Richter & Klöckner, 2017; Richter et al., 2017). Relevant contextual factors that influence sustainable food consumption include pricing, availability, and social norms (i.e., explicit or implied rules about how people are expected to behave; Klöckner, 2012). All these factors play an interdependent role in the complex decision-making process of consuming sustainable food.

The existing literature on food consumption tends to focus on the cognitive processes involved in decision-making, while research on the role of emotions that are elicited by (or associated with) sustainable food remains limited. Concerning food consumption in general, previous research indicates that emotions and food choices are deeply intertwined and that the relationship is likely to be bi-directional (Köster & Mojet, 2015). Different foods can evoke certain emotions that in turn influence the liking of the product (e.g., eating chocolate makes you feel more positive and happy; Gutjar et al., 2015). Meanwhile, certain emotions or affective states (e.g., stress or worry) could also influence food choices (e.g., being stressed suppresses food intake; Greeno & Wing, 1994; Köster & Mojet, 2015). These findings illustrate the

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importance of including emotions in the search for a better understanding of the decision-making processes concerning sustainable food. Moreover, emotions seem to fulfil several fundamental functions in decision-making such as providing information, increasing the speed of action, directing attention to relevant aspects of the decision situation, and increasing commitment to a chosen decision option (Pfister & Böhm, 2008).

Investigating the role of emotions in the context of sustainable behaviour is interesting because affect and emotions have been shown to heavily influence human behaviour (Brosch & Steg, 2021). Typically, affect is defined as the overall positive or negative evaluation of a stimulus, and emotion refers to more intense and specific states such as fear, anger, pride, or guilt (e.g., Lorenzoni et al., 2006; Slovic et al., 2007). These subjective evaluations and states can play a crucial role in a change towards more sustainable behaviours. For example, Brosch (2021) showed that affective and emotional reactions towards climate change are among the most prominent drivers of sustainable behaviour intentions. All this implies that affect and emotions can potentially be key factors in promoting sustainable food consumption.

To investigate the role of affect and emotions, and to identify factors that might hinder or foster sustainable food consumption, the current study employs a mental model approach in combination with affective valence evaluations. Mental models are personal, internal representations of an external reality based on a person's unique life experiences, perceptions, and understandings of the world (Jones et al., 2011). It is generally assumed that these subjective mental representations serve to reason, make decisions, and are at the basis of individual behaviours (Jones et al., 2011). Mental models have been previously investigated in the context of environmental issues (e.g., Bostrom, 2017; Wong-Parodi & Bruine de Bruin, 2017) and it has been shown that mental models influence individual responses to these issues (e.g., policy support; Bostrom et al., 2012).

Gaining insights into people's mental models about environmentally related issues, such as food consumption, will help with developing effective behaviour change interventions. For example, knowledge about mental models makes tailoring of communication possible and might steer people towards increased engagement in pro-environmental behaviour (Bruine de Bruin & Bostrom, 2013). Tailoring risk communication accordingly to people's beliefs has been shown to be an effective strategy to change attitudes and behaviours (Bostrom et al., 2013). Verneau et al. (2016), for example, illustrate that framing information in a specific manner (e.g., highlighting societal benefits) can be beneficial in promoting acceptance of alternative proteins such as insects. Additionally, it has been found that providing prospective consumers with more specific information on the environmental benefits of sustainable foods increases the willingness to pay for these foods (Lombardi et al., 2019).

One method of obtaining insights into mental representations as well as affective connotations is through using affective image analysis (Leiserowitz, 2006; Leiserowitz & Smith, 2017). Affective images refer to mental representations with attached affective evaluations. Affective imagery is based on spontaneous associations that quickly come to people's minds when they think of the stimulus. This method has been effectively used to map people's mental models and the valence of their emotional experiences, for example with respect to global warming and climate change (Lorenzoni et al., 2006) and to different activities and policies underlying sustainable energy transition (Böhm et al., 2018).

However, despite the relatively large amount of research on mental models and affective images of environmental issues, little is known about this in the context of animal-sourced food. So far, it has been found that people regularly associate seafood with overfishing and other unsustainable practices (Schlag & Ystgaard, 2013). Meat is commonly associated with 'maleness' (Rozin et al., 2012), and alternative animal protein sources such as edible insects are associated with high nutritional value and are evaluated as 'good for the environment' (Pambo et al., 2017). Nevertheless, the affective connotations of these associations remain unknown. Specifically, to our knowledge, no research has explored people's affective images regarding different animal-sourced food categories.

1.1. Research aims

Given the substantial environmental impact of animal-sourced food (Henchion et al., 2017), it would be of great value to gain more insights into affective images that people have of animal-sourced food. The current study aims to accomplish this with an exploratory approach in the form of affective imaging that is based on analysing free associations and affective valence evaluations of different animal-sourced food categories (livestock, capture fishery, aquaculture, hunting). The animal-sourced food categories used in this study cover both the origin dimension (land versus sea) and the production dimension (farmed versus wild). Employing affective imagery, in combination with the comparison between different categories, is to our knowledge novel to the field of sustainable food consumption.

2. Methods

2.1. Participants

A national representative sample from Norway (N = 783; 50.2% women, 49.7% men, 0.1% other; M_{age} = 46.6, SD_{age} = 17.2) was recruited for this study. Participant recruitment was conducted by commercial research company Flycatcher, who distributed an invitation to an online survey among members of their panel within the target population. The highest education completed for most participants was upper secondary education (43.2%), followed by university or university college (39.7%) and lastly no education or elementary school (17.1%). Participants were informed about the topic and aims of the study and gave consent to participate.

2.2. Materials

2.2.1. Stimulus materials

To compare different types of animal-sourced food categories, we selected food products that represent these categories (livestock, capture fishery, aquaculture, hunting). The specific food products in each of the categories were chosen based on a combination of the sustainability literature, indicating average greenhouse gas emissions (Hilborn et al., 2018) and data on the average Norwegian dietary intake, indicating what products best represent the diet of Norwegians (Helsedirektoratet, 2012; Kearney, 2010). The logic behind was to select food products that are prototypical for the respective categories whilst at the same time fitting the national context where this study was conducted. Ultimately, we selected six food products per food category, which resulted in a total of 24 food products (see Table 1).

2.2.2. Measures

The free associations were measured by asking participants to describe what comes to mind when thinking about the presented food product. This was done for each food product independently. Participants received the following instruction "Please describe, in a few words, the first thing that comes to mind when you think of these foods", and responses were written in an open text field. To give participants the opportunity to fully express themselves and to increase the likelihood of capturing the richness of an individual's associative network (Schmitt, 1998), there was no restriction on the number of words participants were able to use. The approach where participants are asked to use a few words or even full sentences has been previously used to explore public perceptions about other environmentally related issues, like for instance microplastics (Felipe-Rodriguez et al., 2022).

After providing free associations for all presented food products, the participants indicated for each association whether they thought it was

Table 1
Food products used in this study as stimulus material, sorted per food category.

Food category	Food product
Livestock	Beef
	Pork
	Chicken
	Eggs
	Dairy
	Lamb
Capture fishery	Wild-caught molluscs
	Wild-caught salmon
	Wild-caught mackerel
	Wild-caught herring
	Wild-caught shrimp
	Wild-caught cod
Aquaculture	Farm-raised molluscs
	Farm-raised salmon
	Farm-raised catfish
	Farm-raised carp
	Farm-raised shrimp
	Farm-raised tilapia
Hunting	Moose
	Reindeer
	Deer
	Hare
	Grouse
	Duck

something negative, neutral, or positive. These affective valence evaluations were afterwards respectively coded as −1 (*negative*), 0 (*neutral*), or +1 (*positive*), in line with procedures described by Leiserowitz (2006) and Leiserowitz and Smith (2017).

In addition to demographic variables like age, gender, and education, the survey included several more questions relating to the public perception of food consumption. Here, we only report findings on affective images that are associated with animal-sourced food.

2.2.3. Coding

The free associations were content analysed (Bos & Tarnai, 1999) using a bottom-up coding scheme. To develop the coding scheme, the lead researcher was assisted by two research assistants in reading through the free associations stated by participants. All three individuals separately proposed a selection of categories that they considered reflective of the themes that can be inferred from the text responses. Based on these initial proposals and following discussion, a preliminary coding scheme was developed. The research assistants then used this to code 50 randomly selected responses to test the usability of the coding scheme. After another round of discussion, some final adjustments were made, and a final coding scheme was agreed that was subsequently used to code all the free associations.

The final coding scheme consists of nine superordinate categories (Level 1), that were further divided into subcategories (Level 2 and Level 3). The levels represent differences in specificity, ranging from relatively unspecific responses at Level 1 (e.g., "has consequences") to more detailed responses at Level 2 (e.g., "influences your health") to the most detailed responses at Level 3 (e.g., "healthy and nutritious food that is good for your health"). The superordinate categories are: (i) animal (i.e., response contains a description of it being an animal/living being or describes characteristics of the animal), (ii) production (i.e., response contains information about the production of food), (iii) evaluation (i.e., response contains a general evaluation), (iv) consequences (i.e., response refers to potential consequences of the product), (v) prevalence (i.e., response refers to how widespread (or rare) the product is in general), (vi) traditions (i.e., response associates the product with reoccurring events or traditions), (vii) food (i.e., response contains an association of the product with food), (viii) habits (i.e., response indicates that there are particular points in time where it is a habit or routine to consume this product), and (ix) remnant categories (i.e., mere descriptions or repetition of the food product, non-codable responses, or the respondent indicated that they have no knowledge of the food product). An overview of all the coding categories can be found in Table 2; the coding instructions and the full coding scheme are available as supplementary material (Appendix A, supplementary data 1).

Two research assistants received the instructions and the complete coding scheme including descriptions and examples of each category to accurately code the responses. Both were native Norwegian speakers and independently coded a total of $N = 4679$ responses. Each response could be coded in one or more categories, and the coders were explicitly instructed to use the most specific code possible. A comparison of the independent coding yielded an initial agreement in 98.8% of the coding categories. Additionally, we calculated Krippendorff's alpha to assess inter-rater reliability between the coders ($\alpha = 0.75$). This indicates that the coders mostly agreed in their coding (Hayes & Krippendorff, 2007). After discussing the responses amongst them, the coders agreed on $n = 4670$ of the responses while they disagreed on $n = 9$ responses.

2.3. Procedure

Before the start of the survey, participants were informed about the main purpose of the study; that is, to know more about people's thoughts and feelings about different types of food. Participants were then randomly assigned to one of the four food categories, which resulted in a roughly equal distribution between categories: livestock ($n = 197$), capture fishery ($n = 193$), aquaculture ($n = 195$), and hunting ($n = 198$). One by one, the six food products in the corresponding food category were presented and participants were asked to write down their free associations in an open text field. Afterwards, participants were asked to reread their responses and to evaluate the affective valence of each association (positive/neutral/negative). At the end of the survey, participants had the opportunity to leave comments or questions regarding the study.

2.4. Analyses

R (R Core Team, 2022) and Jamovi (The Jamovi Project, 2023) were used to analyse the data. The nine responses on which the coders disagreed were excluded from the data analyses. First, we will report both the aggregated frequencies of the categories of the coding scheme and the frequencies per food category. Next, we conducted a correspondence analysis (Greenacre, 1984, 2017) to explore the relationship between the coded free associations and each of the food categories. In this analysis, we have only used the Level 1 categories of the coding scheme. Lastly, we conducted a one-way ANOVA followed by Tukey's post hoc test to compare the average affective valence evaluations of the food categories.

3. Results

3.1. Free associations

Aggregated across all food categories (see Table 2), the free associations about the food products mostly contained evaluations (42.23%). Specifically, the subcategories of affective valence and product quality/taste appear most frequently (22.12% and 14.30%, respectively). Free associations containing notions about food are second most frequent across all responses (31.25%), where often main dishes were mentioned (10.49%). A further 13.34% of the free associations referred to the presented food product as an animal. The other categories of the coding scheme, ranging from production (5.57%) to habits (3.75%) were less frequent. Finally, 15.23% of the free associations belonged to the remnant categories, meaning they were either mere descriptions (1.20%), non-codable (1.65%), or the participants indicated they had no knowledge or did not know what to answer (12.38%).

When taking a closer look at the frequencies of the coding categories

Table 2
Distribution of the free associations across all categories of the coding scheme, aggregated across all food categories (percentages).

Codes			Category	Percentages		
Level				Level		
1	2	3		1	2	3
1			**Animal**	**13.34**		
	10		*No specification*		10.88	
	11		Habitat		2.46	
2			**Production**	**5.57**		
	20		*No specification*		1.93	
	21		Ethics		0.90	
		210	*No specification*			0.13
		211	Good animal welfare			0.21
		212	Poor animal welfare			0.56
	22		Individual activity		1.56	
	23		Industrial activity		1.18	
3			**Evaluation**	**42.23**		
	30		*No specification*		2.53	
	31		Affective valence		22.12	
		310	*No specification*			2.10
		311	Positive affect			12.89
		312	Negative affect			7.13
	32		Conflict		0.75	
	33		Product quality/taste		14.30	
		330	*No specification*			7.28
		331	Positive quality/taste			5.95
		332	Negative quality/taste			1.07
	34		Price		1.88	
		340	*No specification*			0.04
		341	Low price			0.36
		342	High price			1.48
	35		Comparison		0.64	
4			**Consequences**	**4.86**		
	40		*No specification*		0	
	41		Health consequences		3.70	
		410	*No specification*			0.11
		411	Positive health consequences			2.96
		412	Negative health consequences			0.64
	42		Environmental consequences		1.16	
		420	*No specification*			0.11
		421	Positive environmental consequences			0.45
		422	Negative environmental consequences			0.60
5			**Prevalence**	**4.69**		
	50		*No specification*		1.11	
	51		Low prevalence		3.08	
	52		High prevalence		0.49	
6			**Traditions**	**4.22**		
	60		*No specification*		0.32	
	61		Traditional celebrations		0.79	
	62		International traditions		0.73	
	63		Norwegian traditions		1.88	
	64		Family traditions		0.49	
7			**Food**	**31.25**		
	70		*No specification*		14.35	
	71		Main dishes		10.49	
	72		Side dishes		1.86	
	73		Preparations		3.51	
	74		Brands		1.03	
8			**Habits**	**3.75**		
	80		*No specification*		0.56	
	81		Days		0.32	
	82		Meals		1.73	
	83		Seasons		1.13	
9			**Remnant categories**	**15.23**		
	91		Mere description		1.20	
	92		Non-codable response		1.65	
	93		Don't know		12.38	

Note. The table distinguishes between the different levels in the coding scheme and leads up to more than 100% as the responses could have been coded at multiple categories of the coding scheme. Level 1 categories are in boldface.

for each specific food category, there are some unique patterns; for details, see the supplementary material (Appendix A, supplementary data 2). For instance, we can see that hunting is specifically associated with a low prevalence (7.78%), meaning people do not often consume or come across this type of food. Relative to the other food categories, consuming livestock products is often associated with health consequences (7.23%), and specifically positive health consequences (5.36%). People often associate food products in the capture fishery category with the production process in general (9.33%) including more detailed associations about individual (2.62%) and industrial activity (1.31%). Additionally, capture fishery elicits associations about consequences, and in particular associations with positive health consequences (4.01%). Aquaculture mostly generated associations concerning remnant categories, and people commonly indicated they had no knowledge about such food products (34.97%).

Fig. 1 shows the correspondence analysis as a graphical representation of the relation between the Level 1 categories of the coding scheme and the four food categories. The relative position of the Level 1 categories and the food categories indicate the similarity of the distributive patterns. Meaning, the closer the Level 1 categories, the more similar their distributions are across the food categories, and vice versa. We decided on a two-dimensional configuration for interpretation, yielding a cumulative principal inertia = 90%.

The correspondence analysis plot (see Fig. 1) shows that both livestock and hunting are located close together on the left, indicating that they elicit similar associative patterns. Specifically, they are most closely associated with traditions and food. Additionally, hunting is closely located to prevalence, meaning people often associate hunting with how prevalent the food products are in general or in their personal life. Capture fishery is most closely related to production, consequences, and evaluations. Aquaculture is uniquely located in the right upper corner, closely related to the remnant categories. The horizontal dimension separates food produced on land (i.e., livestock and hunting; on the left side) from seafood (i.e., capture fishery and aquaculture; on the right side). This indicates a clear distinction in associative patterns between the two food sources. Food produced on land is associated with traditions, habits, food, and prevalence. Whereas seafood is associated with production, consequences, evaluations, and animals (especially in the case of capture fishery), and elicits considerably more associations belonging to the remnant categories compared to food produced on land (especially in the case of aquaculture).

3.2. *Affective valence evaluations*

The average affective valence evaluation of the free associations significantly differed between the four food categories as determined by a one-way ANOVA, $F(3,427) = 58.1$, $p < .001$. A Tukey post-hoc test revealed that the affective valence evaluations for the livestock category ($M = 0.58$, $SD = 0.44$) were significantly more positive than for the capture fishery ($M = 0.44$, $SD = 0.44$, $p = .010$) and aquaculture category ($M = 0.02$, $SD = 0.44$, $p < .001$). However, affective valence evaluations for livestock did not statistically differ from hunting ($M = 0.47$, $SD = 0.48$, $p = .053$). There was no significant difference in the evaluation of free associations with the capture fishery and hunting categories either ($p = .932$). Lastly, free associations in the aquaculture category were evaluated the most negatively of all food categories (each $p < .001$), indicating a difference in the evaluation of farmed products based on whether these are produced on land versus at sea.

4. Discussion

Reduced intake and improved production of livestock products has been advocated as a way to lower the carbon footprint of human diets (e.g., Garnett, 2011; Mayerfeld, 2023; Westhoek et al., 2014). However, the highly positive affective associations with the livestock and hunting food categories observed in this study illustrates why changing patterns

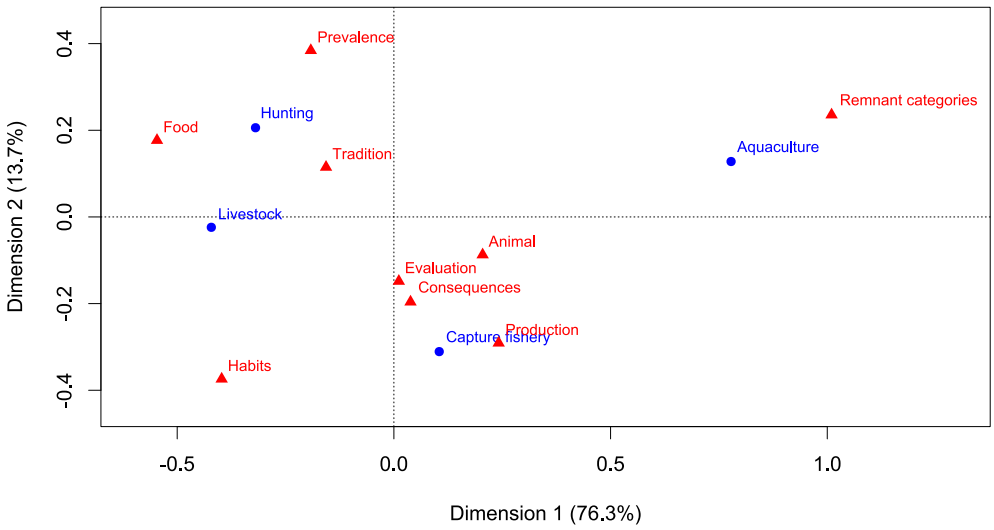

Fig. 1. Correspondence analysis plot of the Level 1 categories of the coding scheme (red triangles) and food categories (blue dots).

of consumption of these food products among the population is challenging. As previously stated, affect and emotions heavily influence human behaviour, and specifically positive affect is linked to higher frequencies of the related behaviour (Brosch & Steg, 2021). Specifically for food consumption, Onwezen et al. (2022) showed that positive emotions strongly predict increased intentions to consume alternative proteins. This connection between high consumption frequency and positive emotions is potentially indicated by the results of the current study. More specifically, the food categories that elicited associations implying high consumption frequencies, such as prevalence, habits, and traditions, also received the most positive evaluations.

An additional factor that challenges potential behavioural change in this case is that habits are particularly hard to change (Wood & Neal, 2009). Habits are behaviours that through repeated performance are automatically triggered by a situation (Gardner, 2015). Once these habitual behaviours are formed, they are quickly activated and easy to access in memory. Therefore, changing habits requires effortful self-control to interrupt the automatic action induced by habituation of the behaviour (Wood & Neal, 2009). Additionally, research on unhealthy eating habits revealed that when people's habits and intentions are in conflict, and people lack the momentary motivation and self-control to disregard their impulses, they are more likely to act consistently with their habits rather than with their intentions (Gardner et al., 2020). Graves and Roelich (2021) identified that habits are the most significant psychological barrier to reducing meat consumption. Based on these previous findings, positive affect and habits are on their own already two prominent predictors of high consumption. The combination of positive affect and habits suggest that changing related consumption behaviour could be even more difficult. As our results show this combination for livestock and hunting, decreasing the intake of animal-sourced food from land may not be without its challenges.

Previous findings indicate that people often associate seafood with health benefits and with negative environmental impacts resulting from overfishing and other unsustainable practices (Forleo & Palmieri, 2023; Schlag & Ystgaard, 2013). As for the associations with positive health consequences, our results are consistent with the work of Claret et al. (2014) that showed that especially wild-caught seafood is perceived to be healthy, more so than farmed seafood. Meanwhile, participants in this study associated wild-caught seafood mostly with the individual activity of fishing as a way of production and did not relate it to negative environmental effects, which contrasts with previous findings. A possible explanation for the Norwegian sample to have different affective associations might be the cultural aspect of seafood consumption. Norwegians have strong cultural ties to fishery and a long history with regards to the seafood industry (Johansen et al., 2019; Kolle et al., 2017). Correspondingly, Schlag and Ystgaard (2013) found differences between Norwegians and people from other European countries when it comes to their perceptions of seafood. In their study, people from other European countries linked capture fishery mostly with negative environmental impacts, whereas Norwegians instead displayed greater concerns about the environmental impacts of aquaculture. This may explain why the affective images of capture fishery in our current study are evaluated more positive compared to the affective images of aquaculture.

There are studies to suggest that Norwegians are better informed on benefits and issues related to aquaculture compared to other Europeans (Hynes et al., 2018; Schlag & Ystgaard, 2013). Nonetheless, the present study predominantly indicated that people have little knowledge about the products in this category, which also received more negative evaluations than any of the other food categories. Research suggests that there is a positive coherence between consumer's self-perceived knowledge and the extremity of the attitudes and evaluations towards foods (Fernbach et al., 2019). Meaning that having little self-perceived knowledge is related to non-extreme or neutral attitudes, which is reflected in our results. Correspondingly, in the case of climate change, the more knowledge people believe they have, the stronger their evaluations tend to be and therefore the stronger the polarization between different social groups (Guber, 2013). In the current study, people indicated to have little knowledge about aquaculture food products, and it is, as expected, evaluated neutrally. Based on this, one might assume that increasing people's knowledge about a product could intensify the affective valence of their reactions to this product.

4.1. Limitations

A major strength of this study is that the respondents gave their intuitive associations, without being prompted to focus on any specific aspects of the food product in question. Yet, this approach for studying mental representations is not without limitations. First, as there were no requirements for the number of words in which people were to describe their free associations, many of the responses were very short. Consequently, the interpretation of some responses (e.g., "Ok", "Nature") was ambiguous, which in turn could have lowered the reliability of the coding process. Second, the selection of food products in each food category was heterogenous. Livestock contained two non-meat products, and had no overlap in products with hunting, while the two seafood categories had some overlapping food products. This heterogeneity in selected food products could have implications for the mental

representations and evaluations within each food category, which in turn warrants caution with respect to generalizing the reported findings beyond the context of this study.

5. Conclusion

This study showed that people in Norway have overall more positive affective images for animal-sourced food produced on land than for seafood. Particularly the affective images of aquaculture were the least positive of all food categories. However, the positive affective images of capture fishery provide an encouraging perspective for the future. It suggests that the demand for animal-sourced protein could possibly be shifted away from land-based food and directed towards wild-caught seafoods, which are frequently reported as a more sustainable animal-sourced protein option (e.g., wild-caught mackerel; Hilborn et al., 2018; Koehn et al., 2022). Additionally, people have different mental representations for each of the food categories, which implies that their decision-making and individual behaviours are influenced differently for each food category. So, rather than generalizing findings on animal-sourced food as one category, we should differentiate, as there is a clear distinction between land and sea. This in turn calls for a diversity of strategies to encourage consumption of specific categories of food products.

Ethics

This study complied with the data protection regulations of the Norwegian Agency for Shared Services in Education and Research (SIKT). The Board for Research and Research Training (FFU), Faculty of Psychology, University of Bergen (UiB), provided an ethical assessment and granted ethical approval for the study (reference: 2020/1926-18).

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CRediT authorship contribution statement

Nienke Böhm: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Visualization, Writing – original draft, Writing – review & editing. **Rouven Doran:** Conceptualization, Investigation, Methodology, Supervision, Writing – review & editing. **Gisela Böhm:** Conceptualization, Funding acquisition, Methodology, Supervision, Writing – review & editing. **Charles A. Ogunbode:** Supervision, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.foodqual.2024.105168.

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