Thesis Submitted in Partial Fulfillment of the
Requirements for the Degree of
Master of Science
in Global Sustainability Science

The Knowledge-Action Gap Related to Meat Consumption in Sustainability Scientists and its Relevance for Societal Transformation

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Submitted on: July 2, 2018

Abstract

Eating meat leads to several environmental threats, hence reducing one's consumption can be a direct way to avoid environmental degradation. While sustainability scientists know about the environmental degradation due to meat consumption, many of them still choose to eat meat. It is questionable whether a broader societal transformation towards sustainable consumption is likely if people with the necessary knowledge and values already struggle and fail to implement a sustainable behavior. How can they expect others to change if they do not change themselves? This paper addresses the knowledge-action gap that is prevalent among sustainability scientists regarding their meat consumption and how they deal with it. Qualitative semi-structured interviews and thematic content analysis are applied to analyze the main internal barriers to pro-environmental behavior sustainability scientists face as well as what narratives and rationalizations they use to overcome the dissonance between their knowledge and actions. The internal barriers they demonstrated were emotional non-involvement and a perceived lack of power of the individual. The strategies used to overcome the dissonance were conscious consumption narratives and rationalizing the value of meat consumption, specifically its perceived sustainable dimensions. This paper also highlights that sustainability scientists do feel responsible to lead by example in the context of societal transformation, but do not always follow through with behavior change. This study concludes it is necessary that sustainability scientists do so more consequently to embrace their role as trendsetters and change agents for a sustainable transformation.

Keywords: meat consumption; knowledge-action gap; sustainability scientists; internal barriers; rationalization; transformation

Table of Contents

Appendices (digital):

Introduction

Meat production as a part of animal agriculture has been identified as one of the leading causes for several environmental threats like greenhouse gas emissions, land use change, acidification, eutrophication, and biodiversity loss (Poore et al., 2018). Consequently, reducing meat consumption and thereby production can be a valid option for climate change mitigation and other environmental benefits. Dietary changes can potentially have a higher impact than changes of meat production methods or general technological climate change mitigation (Hedenus et al., 2014; Springmann et al., 2016; Poore et al., 2018).

Deciding not to eat meat is therefore at least in theory a direct and seemingly easy way to avoid the negative environmental consequences of meat consumption. While more and more individuals decide to reduce their consumption or stop eating meat, meat consumption is still strongly embedded in most parts of societies around the world. Consumption is likely to increase more over the next decades as populations and their income grow; leading to shifts towards more meat-centric diets in many parts of the world (de Boer et al., 2013).

A lack of knowledge about the consequences of meat consumption can be a reason for not following through with a more sustainable behavior – in this context, not eating meat (Hines et al., 1987; Kollmuss & Agyeman, 2002). However, even within a group with comparably strong knowledge about sustainability problems and solutions – *sustainability scientists* – there still seems to occur a disproportionate gap between what they know about sustainable behavior and the way they actually behave. This is also the case for their meat consumption. While sustainability scientists know about the environmental degradation due to meat consumption, many of them still choose to eat meat (Bearzi, 2009; Šedová et al., 2016; Balmford et al., 2017).

This paper researches the occurrence of a knowledge-gap in the group of sustainability scientists regarding their personal meat consumption and how they deal with actions that do not align with their knowledge. It focuses on the negative environmental impacts of meat consumption; ethical aspects are not addressed as others have done so before (Šedová et al., 2016).

Research has demonstrated that a linear model of knowledge and sustainable behavior rarely describes reality appropriately. In many cases people with supposedly higher levels of knowledge and awareness of environmental issues do not demonstrate the same high level of sustainable behavior (Kollmuss & Agyeman, 2001; Balmford et al., 2017).

This so-called knowledge-action gap, sometimes referred to attitude-behavior gap (Kollmuss & Agyeman, 2002) or value-action gap (Blake, 1999), describes the discrepancy

between having environmental knowledge and pro-environmental values but not behaving accordingly (Kollmuss & Agyeman, 2002; Kennedy et al., 2009).

The knowledge-action gap and its influencing factors have been researched for decades, but the complexity of human behavior makes it difficult to find definitive answers for this issue (Kollmuss & Agyeman, 2002). This paper addresses sustainability scientists' knowledge-action gap regarding meat consumption and how they deal with the resulting cognitive dissonance.

For this, it is important to understand what cognitive dissonance means, why people experience it, and how they deal with it. Cognitive dissonance goes back to Festinger's (1957) dissonance theory and describes the discomfort people experience when they are mentally exposed to inconsistency or incompatibility between their thoughts or beliefs and their actions. In this case, the dissonance occurs due to the inconsistency between sustainability scientists' existing knowledge that meat consumption is not sustainable and caring about sustainability, but not acting on it. To deal with such dissonance most individuals seek ways to dissolve the dissonance. According to Festinger (1957) there are three general ways how this can be achieved. The individual can either *change their beliefs* to align with their actions or they can *change their actions* to align with their beliefs. The third way to dissolve one's cognitive dissonance, *changing how one perceives their action*, is achieved by rationalizing the action to perceive it in a manner that somewhat results in consistency between one's beliefs and actions. However, to be able to follow through with either of these options, there needs to be some level of consciousness regarding the dissonance between belief and behavior (Festinger, 1957; Gregory-Smith et al., 2013). People tend to avoid changing their beliefs and actions due to convenience and to evade personal sacrifices. In this case, the knowledge-action gap directly leads to cognitive dissonance and thereby to a level of uncomfortableness that needs to be overcome in order to maintain the gap and convenience (Gregory-Smith et al., 2013; Šedová et al., 2016).

While they are not the only group of individuals who experience the knowledge-action gap, it is relevant to understand why sustainability experts, who often expect others to change their behavior to be more sustainable, do not follow through with it themselves.

A transformation towards a sustainable and viable society is necessary considering the global challenges societies face. To achieve this, extensive adjustments and changes in infrastructures, systems, and lifestyles at political, societal, and individual levels are needed (WBGU, 2011). It is questionable whether a broader societal transformation towards sustainable consumption is likely if people with the necessary knowledge and values already

struggle and fail to implement a sustainable behavior. How can they expect others to change if they do not change themselves?

In the context of societal transformation, sustainability scientists can be an important element to help accelerate change. They need to realize and embrace their responsibility to be role models and use their personal behavior as a way to provide conscious, informed, and content examples of sustainable behavior (Bearzi, 2009; Balmford et al., 2017).

In this regard, it is necessary to detect whether sustainability scientists experience a knowledge-action gap and how they deal with it specifically related to their meat consumption. This will be addressed with Kollmuss' & Agyeman's (2002) internal barriers to pro-environmental behavior and dissonance reducing strategies adapted from Piazza et al. (2015), Rothgerber (2014), and Gregory-Smith et al. (2013).

Furthermore, it is also important to understand how sustainability scientists assess their (personal) role in societal transformation processes. Research has been done on various aspects of knowledge-action gaps, sustainability scientists, and meat consumption. However, research is limited on why sustainability scientists partake in certain unsustainable behaviors like meat consumption, what their views are on their role in change processes, and what implications this has on a broader societal transformation.

This paper aims to close this research gap and provide the specific reasonings and narratives sustainability scientists use to cope with the dissonance between what they know about negative environmental impacts of meat consumption and consuming meat as well as their place in societal transformation processes. The following research questions guided the research that has been conducted for this:

1. Do sustainability scientists experience a knowledge-action gap related to their meat consumption?
    a. Why do sustainability scientists eat meat despite knowing about the negative environmental impacts of meat consumption?
    b. How do they deal with the resulting dissonance?
2. How do sustainability scientists perceive their role in societal transformation?

To explore these questions, the following section provides a theoretical overview of factors that influence pro-environmental behavior as well as psychological mechanisms that help resolve dissonance in the context of the knowledge-action gap in sustainability scientists and their meat consumption. The methods section describes how qualitative semi-structured interviews were used to collect data and how this data base was analyzed. Key findings are

presented and later discussed. The last section summarizes the key findings and their relevance and gives implications for future research and the scientific community.

Theoretical Frameworks

The following concepts are important as a basis for this research as they help understand different aspects of the knowledge-action gap. The concepts analyze more general factors that influence individual's behavior related to sustainability issues as well as specific strategies that are applied in the context of cognitive dissonance.

The first concept introduced is Kollmuss' and Agyeman's (2002) model of pro-environmental behavior that tries to find reasons for the knowledge-action gap. For this paper, the focus is especially on the internal barriers preventing pro-environmental behavior. The other main concepts in this paper are by Gregory-Smith et al. (2013), Rothgerber (2014), and Piazza et al. (2015) and deal directly with the cognitive dissonance that results from the knowledge-action gap and the strategies people apply to overcome or reduce this dissonance. These strategies mostly consist of different rationalizations or justifications for their behavior – in this case rationalizing and justifying meat consumption. This includes compensatory choices (Gregory-Smith et al., 2013), perceived behavior change, promised improved future behavior (Rothgerber, 2014) as well as pro-meat justifications (Rothgerber, 2014; Piazza et al., 2015).

Internal barriers to pro-environmental behavior

For their model, Kollmuss & Agyeman (2002) analyzed a number of established analytical frameworks that try to explain the knowledge-action gap and identified some of the main factors that influence pro-environmental behavior in a positive or negative way. These factors are demographics as well as external and internal factors.

This paper explores some of the internal factors that Kollmuss & Agyeman (2002) have adapted from Fliegenschnee & Schelakovsky (1998) in their paper as such internal processes are often important but unnoticed in the context of understanding the knowledge-action gap. The internal factors that were chosen for this paper are emotional involvement (emotional non-investment and emotional reactions) and locus of control (Hines et al., 1987; Newhouse, 1990). These factors can either support or hinder pro-environmental behavior.

Emotional involvement and locus of control potentially play a crucial role for the knowledge-action gap in sustainability scientists, especially in the context of their meat consumption. Emotional involvement includes emotional non-investment and emotional reactions. Emotional non-investment can be broken down into a lack of knowledge and awareness as well as resistance against non-conforming information. Not knowing about the

specific causes and effects or the extent of certain environmental problems can lead to emotional non-involvement according to Kollmuss & Agyeman (2002). Whereas sustainability scientists usually have a certain degree of knowledge and awareness of the problem, they might not be aware of the extent of the problem. The internal barrier of resistance against non-conforming information is based in the theory of dissonance by Festinger (1957) and means that people are more likely to accept information that supports existing mental frameworks. At the same time, they avoid or disregard information about environmental problems if this information threatens basic assumptions regarding e.g. their quality of life (Preuss, 1991; Fliegenschnee & Schelakovsky, 1998). This is relevant in the context of meat consumption as people often seem to be attached to meat and state that eating meat is important to them due to a variety of reasons like taste and entitlement making it an essential part of their perceived quality of life to (Graça et al., 2015; Piazza et al., 2015).

Emotional involvement also includes a number of emotional reactions, which are denial, rational distancing, apathy and resignation as well as delegation. Emotional reactions can, but do not have to trigger pro-environmental behavior. In general, being confronted with extensive environmental problems often leads to a feeling of distress which leads to so-called secondary psychological responses that act as a defense mechanism to relieve the individual from negative emotions (Unterbruner & Weiglhofer, 1994). These defense mechanisms can be a major barrier to pro-environmental behavior. One of these defense mechanisms is denial or not acknowledging the reality of an environmental problem. Another mechanism is rational distancing, meaning that even though someone is aware, they distance themselves emotionally from the problem. According to Kollmuss & Agyeman (2002) this mechanism is often applied by scientists and environmentalists to be able to deal with the high number and complexity of environmental problems. Negative or distressing emotions can also lead to apathy and resignation, especially when combined with a feeling of helplessness. This can result in the individual "giving up" on the cause of pro-environmental behavior because they feel like they cannot make an impact and instead focus on other areas (Fliegenschnee & Schelakovsky, 1998; Kollmuss & Agyeman, 2002). The last defense mechanism that has been identified in this context is delegation. By delegating personal responsibility, the individual avoids guilt as well as personal sacrifice, and instead blames others - people, entire industries, or political establishments (Kollmuss & Agyeman, 2002).

Furthermore, locus of control is one of the internal factors that can impact pro-environmental behavior and is somewhat related to apathy and resignation as well as delegation. The locus of control is related to how individuals perceive their role in change processes, i.e. if

they believe that their own behavior plays a role in change process or not (Hines et al., 1987; Fliegenschnee & Schelakovsky, 1998). An internal locus of control means that the individual understands their role to be important and influential, while an external locus of control means that the individual does not believe to be important in change processes and instead thinks powerful actors are needed to make a change (Newhouse, 1990; Kollmuss & Agyeman, 2002).

Dissonance reducing strategies

Another way people deal with the knowledge-action gap are rationalization strategies that aim to reduce the cognitive dissonance they experience as a consequence. Rationalization is "the cognitive process that individuals use to convince themselves that their behavior does not violate their moral standards" (Tsang, 2002, p. 26). To overcome cognitive dissonance, individuals tend to accept comparably weak arguments if they help reconstruct their perspective on their behavior (Tsang, 2002; Mercier, 2011). The dissonance between consuming meat and knowing about its negative impacts can be eliminated by either becoming vegetarian or rationalizing meat consumption. This rationalization can be done by applying different dissonance reducing strategies which help justify one's behavior towards oneself or one's peers to avoid possible feelings like guilt and distress (Tsang, 2002; Piazza et al., 2015; Šedová et al., 2016).

For this paper, four main rationalization strategies have been identified: pro-meat justifications (Rothgerber, 2014; Piazza et al., 2015); compensatory choices (Gregory-Smith et al., 2013); perceived behavioral change (Rothgerber, 2014); and promised improved future behavior (Gregory Smith et al., 2013; Šedová et al., 2016). People rationalize why they eat meat mostly by using *pro-meat justifications*. (Joy, 2010; Rothgerber, 2014) Piazza et al. (2015) empirically tested the so-called 4Ns of rationalization. These 4Ns – natural, necessary, normal, and nice – are based on Joy's (2010) 3Ns framework that includes the first 3Ns - natural, necessary, and normal - expanding it with nice. The 4Ns are common beliefs people express they have about meat consumption. The meanings of these 4Ns can be seen in table 1.

NATURAL	Appeals to biology, biological hierarchy, natural selection, human evolution, or the naturalness of eating meat
NECESSARY	Appeals to the necessity of meat for survival, strength, development, health, animal population control, or economic stability
NORMAL	Appeals to dominant societal norms, normative behavior, historical human behavior, or socially constructed food pyramids
NICE	Appeals to tastiness of meat, or that it is fulfilling or satisfying

Tab. 1: 4Ns of pro-meat justifications. Adapted from Piazza et al. (2015).

These rationalizations are a way for people who do consume meat to justify their behavior when criticized or questioned (Piazza et al., 2015), but also to convince themselves that their behavior does not contradict their moral standards (Tsang, 2002; Rothgerber, 2014).

Another rationalization strategy people use to overcome their cognitive dissonance is *compensatory choices*. They feel the need to compensate the choice that is deemed unsustainable with a perceived more sustainable alternative, which helps them bridge their knowledge-action gap (Gregory-Smith et al., 2013). In the case of meat consumption this can mean replacing the type of meat one consumes by a different type of meat that in some way can be justified to be more sustainable. For example, replacing beef by chicken (or other non-ruminant meat) because of the lower CO_2 emissions (Hedenus et al., 2014) or buying meat that is labeled organic (Gregory-Smith et al., 2013).

Instead of replacing meat by more sustainable meat, *perceived behavioral change* is another strategy people use to rationalize their meat consumption. This can be used as a substitute to actually changing one's behavior or to (unconsciously) exaggerate how much the behavior has actually changed. By applying this strategy people attempt to convince themselves and others that they either do eat less meat or no meat at all. While this perception can be linked to actual behavioral change, people tend to overestimate the degree of their behavior change (Rothgerber, 2014).

When the experienced cognitive dissonance results in guilt or regret, people manage these highly negative emotions by *promising to improve their behavior in the future*. This might be something they do end up following through with, however, it might also be a way out of the guilty conscious they're confronted with by the knowledge-action gap (Gregory-Smith et. al, 2013; Šedová et al., 2016).

This paper looks into the role internal barriers play in influencing sustainability scientists' pro-environmental behavior – or lack thereof, regarding their meat consumption as well as into rationalization strategies they apply when they experience cognitive dissonance as a result of their knowledge-action gap. Figure 1 recaps the different barriers and strategies identified in this section.

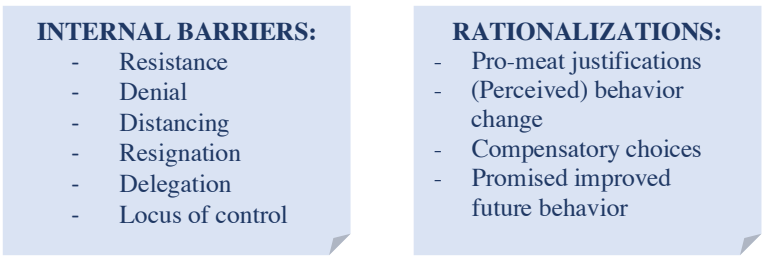

Fig. 1: Internal barriers and rationalization strategies. Based on Kollmuss & Agyeman (2002); Piazza et al. (2015); Rothgerber (2014); and Gregory-Smith et al. (2013).

Methods

To answer the research questions, a qualitative data analysis based on semi-structured interviews with a sample size of 22 meat-eating sustainability scientists was conducted. The interviews were used to explore if sustainability scientists experience a knowledge-action gap and to understand why they eat meat despite knowing about negative environmental impacts. Specifically, the rationalizations that sustainability scientists use to explain why they do consume meat although they are aware of negative environmental impacts were elicited as well as how they try to overcome the resulting cognitive dissonance. The following provides details on how the data was collected and analyzed and declares the ontology underlying this research.

Participant and Recruitment Procedure

The study sample consisted of 22 meat-eating sustainability scientists at different career stages at Leuphana University Lüneburg, Germany. Leuphana University leads the way for sustainability and transformation in teaching and research with Germany's only faculty of sustainability (Barth, 2014). The participants were first selected based on a convenience sample, i.e. personal contacts of the author. Graduate students (including Master students from the Global Sustainability Science program and PhD students), post-doctoral researchers, and professors at the different institutes in the faculty of sustainability at Leuphana University were considered. The convenience sample was driven by demographic and professional variables, seeking diversity in terms of gender, career level, and disciplinary background. To enhance the convenience sample, more participants were recruited through online research of the faculty members and then contacted via email. Of the 70 potential interviewees that were contacted, 17 were unavailable and 15 did not eat meat, making them ineligible for the study. 16 people did not respond to the request to participate in the study. In total, 22 people were interviewed.

The recruitment process aimed at achieving a partially stratified sample by contacting and interviewing a significant number of the members of the faculty as shown in table 2. The participants represent different disciplinary and cultural backgrounds (see appendix 1).

	N	**Interviewed**	**%**
Professors	29	3	10
Post-docs	~40	5	13
Graduate students	160	14	9

Tab. 2: The faculty in numbers. Based on https://www.leuphana.de/universitaet/fakultaet/nachhaltigkeit.html.

Data Collection

The qualitative semi-structured face-to-face interviews were chosen to gain in depth information about sustainability scientists' meat consumption, their environmental knowledge and values, their strategies to deal with their resulting knowledge-action gap, and their role in societal change. The basis of the interviews was a semi-structured questionnaire (see appendix 2) beginning with general questions about the interviewee's professional background. The central part of the interview consisted of 25 questions and a set of prompts that were used whenever answers were short and/or unclear. The length of the interviews varied between 18 and 60 minutes. After the interview, the participants received a short debrief that explained the goal of the research and allowed them to reconsider if they wanted to be part of it. No participant dropped out. The general background questions as well as the core questions were audio recorded, the introductory part and debrief were not. The interview protocol was pilot tested with two sustainability scientists at the graduate level. Their insights and comments were used to adapt and improve the protocol before the actual interviews were conducted.

Data Analysis

Thematic content analysis was chosen to deductively and inductively analyze the data set. It can be used to identify, analyze, and report patterns or *themes within the data set* (Braun & Clarke, 2006). The audio recordings from the interviews were transcribed using intelligent verbatim transcription (Hadley, 2015), the overall tone of the interviewee was also transcribed. These transcriptions were then organized and coded using the MAXQDA qualitative data analysis software. The codes were deducted from the thematic frameworks described above to investigate the narratives given by the interviewees. The codes were sorted according to the different frameworks of internal barriers to pro-environmental behavior and dissonance reducing strategies. The analysis and coding for the paper, however, was not purely deductive, but also included inductive coding for emerging themes. Therefore, other codes were added in the three rounds of coding and recorded in a codebook. The codebook (provided in appendix 3) was used to guide the coding process. The codebook consists of the different overarching codes and the affiliated codes. For the codes, a definition and examples were also recorded to help the coding. For example, "We, in fact have canine teeth, which are indicate of meat eating animals. Herbivores have flatter teeth, but we don't." was coded according to Joy (2010) and Piazza et al. (2015) as *natural* as it justifies meat consumption by referring to biology and the evolutionary naturalness of eating meat.

A total of 15 deductive and inductive codes were used to analyze the data set. Additionally, a second coder verified the accuracy by coding 10% of the data (two randomly

selected interviews). This coding was in line with the coding of the author of this paper. Patterns in the statements of the interviews were analyzed as themes with the help of quotes from the interviews. The themes' frequency adds a quantitative approach to the analysis as well.

Ontology

The ontology that underlies this research lies between social constructionism and critical realism, i.e. the understanding that there is no one true reality in which every statement made by people can be seen as the truth and facts. Instead statements are made-up realities, or *rationalizations*, which to some degree become true to the people when they believe in them. These multiple realities can have some common features of shared human experience and understanding. This means that statements and narratives can still partly be representative descriptions of experiences and behavior (Seamon & Gill, 2016).

Findings

This section provides answers to the research questions presented in the form of the key findings from the data analysis, which are supported by direct quotes from the interviews.

Knowledge-action gap and meat consumption

All participants demonstrated that they are knowledgeable about the negative impacts of meat consumption and the majority also linked these impacts to their personal meat consumption. All of them stated that behaving environmentally friendly is very important to them personally. They reflect and think about their behavior and impact regularly, however some prioritize other aspects of their life in certain circumstances.

> "I do my research on environmental behaviors so I'm always thinking about it. I live in a way that mostly aligns with my values and it's something I constantly struggle with. So, it's important to me to think about my environmental behavior and the impact of my lifestyle."

14 participants reported that being educated and/or working in sustainability has impacted their behavior: they stated that they reduced their meat consumption because of the knowledge and awareness they gained. This seemed to be most relevant for the master students, who all reported that studying sustainability science had led them to be more conscious about their behavior and reducing their meat consumption. It seemed least relevant for the PhD students with only one reporting such an impact. 8 participants did not change their behavior as a result of sustainability education or experience. Partly because they were already on a self-reported pathway of conscious meat consumption or their behavior was simply not affected by potential new knowledge.

The results suggest that sustainability scientists do in fact experience a knowledge-action gap related to their meat consumption, based on the collected data sample.

> "Of course, this leads to a lot of knowledge and insights but personally I haven't just stopped eating meat […]. But there is also as usual a gap between knowledge and behavior and so many people know about it and when they go to a restaurant and it's a nice atmosphere, you don't want to think about it. You just eat what you want. This gap is very important here."

The frequency of how often the interviewees eat meat in a week varied between less than one to ten times a week as can be seen in figure 2 (also appendix 4).

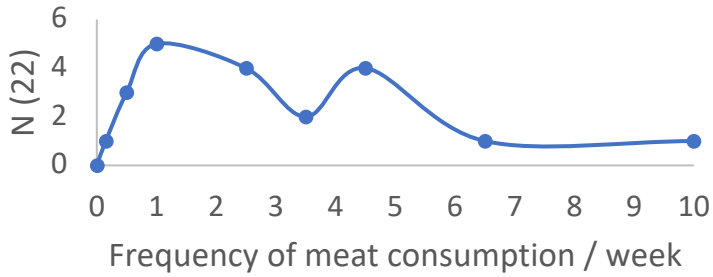

Fig. 2: Frequency of meat consumption of the 22 participants.

Except for one participant, they all agreed that societies need to eat less meat in order to avoid environmental degradation, specifically Western societies. Three people think it would be desirable if (Western) societies switched to a meat free diet. Relating this to their personal meat consumption, half of the interviewees think they should decrease their own meat consumption and two people considered giving up meat completely.

Internal barriers

So, why do sustainability scientists eat meat despite knowing and caring about the environmental impacts? First of all, they appear to experience a number of internal barriers that stop them from following through with pro-environmental behavior, in this case not eating meat. In total 20 out of the 22 participants, i.e. 91% demonstrated such internal barriers. The interviews revealed that there are mainly two overarching barriers sustainability scientists in this study face in relation to pro-environmental behavior: lack of emotional involvement and perceived lack of the power of the individual.

Emotional non-involvement

Despite caring about the state and development of the environment overall, 16 out of the 22 participants seemed to be not highly emotionally involved or invested – at least when

questioned about or confronted with the impacts of meat consumption. Six of them *denied* the specifics or the dimension of the problem and thereby avoided negative emotions.

> "I'm not sure how big that impact is, I'm a little skeptical about that."
>
> "Again, it depends when we talk about meat consumption, because I do consume meat, but I don't think I have a huge impact because it's totally different."

A common theme was also the *resistance against non-conforming information*. The participants were confronted with a number of statistics (see appendix 5) about the negative environmental impacts of meat consumption and a study that stated the necessity of the adoption of a global plant-based diet for the mitigation of climate change. 11 interviewees strongly resisted these statements and numbers, some discredited the sources or reacted generally defensive to the information that clearly did not align with their beliefs.

> "I would need to understand the study. This assumption… I don't know what it's based on. I don't think so, I think it's very provocative and it just tries to say that meat consumption is a problem."
>
> "I think that's not true. I think that depends on what meat you're eating. If you're eating sustainable, organic meat like I eat in South Africa…"

Another way to not be emotionally involved is *rationally distancing* oneself from the problematic aspects of one's behavior. 11 out of the 22 participants were aware of the problem and accepted its implications to some degree, however, they did not demonstrate any emotional response to it but instead distanced themselves from the issue and focused on different details and circumstances of meat consumption instead.

> "I think about [the negative impacts of meat consumption] every time I eat meat and I don't try to push it away, but it's pretty neutral. I don't feel bad when I eat meat. it's a decision that I'm aware of and if it would affect me every day negatively, I think I would be vegetarian."
>
> "The thing is even if you switch to a completely meat-free diet, wouldn't deforestation still take place to grow crops and soy beans and stuff? Aren't there just too many people on the planet?"

Power of the individual

The perceived lack of power of the individual in the context of averting environmental degradation was a factor that impacted 19 out of the 22 participants of the study. 8 interviewees showed such an external *locus of control* related to their personal meat consumption.

> "You can always make it seem insignificant, I'm just one person in this world and if I do this once today it won't have a huge impact."

Resulting from this external locus of control and feelings of overwhelming helplessness, 7 participants to some degree retreated into *resignation and apathy*.

> "I sometimes don't want to know because it's too much."

> "[…] sometimes I get overwhelmed and know the numbers and facts and figures and know that individual behavior is really not going to create the type of change that we need, and I get depressed and figure if my impact doesn't make a difference then I should pursue other goals than just the environmental impact."

13 out of the 22 participants attached little importance to the power of the individual by *delegating* their responsibility and potential feelings of guilt onto others. They blamed others or saw the problem of meat related environmental degradation in the capitalistic system. Most of the participants specifically blamed industrial agriculture for the environmental impacts of meat.

> "Related to my personal consumption behavior I do feel a little guilty, but there I really blame others to be honest. […] everyone else is eating meat and they're doing it more than I am and less conscious than I am."

> "So, me having 100g of meat a week or every two weeks, the effect of that is so small in comparison to the entire effects livestock production has."

<u>Dissonance reducing strategies</u>

Besides experiencing internal barriers to pro-environmental behavior, the participants of the study sample also made use of certain narratives that frame meat consumption as conscious. They also rationalized their meat consumption to overcome or reduce the cognitive dissonance they're dealing with resulting from their knowledge-action gap by justifying their meat consumption. Except for one participant, all applied multiple dissonance reducing strategies.

Conscious consumption narratives

The most commonly used narrative to rationalize meat consumption in this sample was *(perceived) behavior change*. 19 out of the 22 participants rationalized consuming meat by emphasizing that they do eat less meat and are more conscious about their meat consumption especially compared to the rest of society.

> "I've been a lot more conscious about my meat consumption for example when I eat meat and what kind of meat. […] I'm eating less meat now."

Another conscious consumption narrative that was expressed was *compensatory choices*. 16 interviewees elaborated on how important it is to them to eat meat that they perceive to be (more) sustainable with an emphasis on local and organic meat.

> "We try to buy organic meat because I think it has a lower environmental impact […]."
>
> "I think if you do consume meat, then it is important to try and reduce the impact or try to make it as sustainable as possible within the boundaries that you can do within that consumption."

Nine participants *promised to improve their behavior* in the future and stated that they will eat less meat in addition to using the other conscious consumption narratives, specifically when they were confronted with the statistics about the environmental impacts of meat consumption.

> "Well, of course now reading those figures I will try to reduce it at least here while eating in the [cafeteria], I will try to find alternative dishes."
>
> "I should eat less meat. I know that I don't have very strong discipline, so I know I will never stop eating meat, but I should get back on track to eat less."

Value of meat consumption

A prevalent way the participants of the study rationalized their meat consumption was justifying why eating meat has value to them personally and in general. 21 of the 22 participants justified their behavior on this base.

20 of them used the 4Ns of *pro-meat justifications*, 13 used two or more of the Ns to rationalize their consumption. Quotes from the interviews for each of the 4Ns can be seen in table 3.

NATURAL	*I don't see a reason to stop eating meat because we are omnivores. So, I think that we should, eating meat is part of the requirements I think.*
NECESSARY	*I have easy access to abounded, wild meat which I hunt myself to keep the population at the same size once a year.*
NORMAL	*Humans have been eating meat for quite some time.*
NICE	*I really, really like eating meat. My favorite dishes are meat dishes.*

Tab. 3: Exemplary quotes for the use of the 4Ns amongst the participants.

They especially justified eating meat to be *normal* and *nice*. Some also thought it was *necessary* and a minority felt like eating meat was *natural*. The distribution of these justifications can be seen in figure 3.

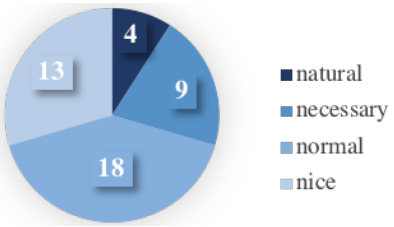

Fig. 3: Distribution of the 4Ns amongst the participants.

In addition to these justifications why meat consumption has a value of some sort, two other rationalization strategies in this category emerged in nine interviews. 4 people justified eating meat because they think that it is a valuable way to *experience cultures*.

> "[…] For me, when I travel [I like] to experience the culture through food."

> "I wouldn't want to miss out on things when I visit a place, to taste the traditional dishes and enjoy the culture and stuff. This kind of experience that would get lost because these traditional dishes contain meat."

The last justification for meat consumption that was used by 7 of the participants was the *sustainable impact meat consumption* can have in their perception. For some, this sustainable impact was achieved by avoiding meat food waste by eating meat instead of being vegetarian. Others argued that they were helping to preserve ecosystems and biodiversity through meat consumption.

> "If I become vegetarian, I wouldn't be able to accept meat in situations where it's good to eat meat. For example, when I go somewhere, and they offer me meat and otherwise they would throw it away."

> "[… It is] not good to skip all of these animals from our ecosystems and our landscapes. I think they have a crucial position in this interaction, they are something like ecosystem engineers. For example, cattle […] produce cattle pats and a lot of insects rely on these cattle pats like dung beetles and so on. […] I think that my personal meat consumption has an impact on the environment, but I think it's a positive one, especially for the dung beetles."

Overall, all 22 participants did either face internal barriers to pro-environmental behavior or applied specific strategies to overcome the dissonance between their knowledge and behavior. Most of them demonstrated a combination of both. If not, there was a tendency that the participants who experienced no or only a few internal barriers, seemed to more actively employ more rationalizations for their meat consumption. Similarly, the two participants that did not demonstrate internal barriers, did use a higher number of dissonance reducing strategies.

Role of sustainability scientists

The last question this study aims to answer is how sustainability scientists perceive their role in societal transformation. *Communication* was the most commonly identified role of sustainability scientists. 19 out of the 22 participants did associate the role of sustainability scientists with the responsibility to lead by example in order to be authentic and credible. All participants stated that they felt like they do lead by example in some areas of their personal lives.

> "Well, I guess apart from our work, we are walking billboards and examples for people. We are outlets on a personal level for information flow. We have personal relationships with people and they look up to us. We have a responsibility to lead by example."

5 participants combined this perspective on the role of sustainability scientists with another justification for their meat consumption: they argued that by eating meat in a conscious way they remain *relatable* to the greater public, which they identified to be necessary in order to have an influence as a role model.

> "I rather say even if I work in sustainability and I know these things, I am not perfect. This degree of imperfection is something that we all share, yet I try to do my best being aware of eating very little meat only in certain situations and so can you. I'm in general much more in favor of this practical wisdom."

> "I think the conversation about sustainability is easier to have if the people that you're trying to talk to don't see you immediately as an extremist. I think if I say I eat meat, so I understand you, but we still need to change the way we look at things, I've just had the experience a number of times that I get taken more seriously through that. I have made the experience that I can argue in a totally different way because I get seen not as an extremist but as someone maybe more relatable because of that."

Discussion

Similar to Šedová et al. (2016), this paper sheds light on the knowledge-action gap and its implications in a group of highly informed and aware omnivores – sustainability scientists. It demonstrates that sustainability scientists do in fact experience the knowledge-action gap related to their meat consumption, which is in line with previous quantitative and qualitative empirical research (Kennedy et al., 2009; Šedová et al., 2016; Balmford et al., 2017). However, knowledge seemed to influence most of the interviewees, apparently leading more than half of them to reduce their meat consumption significantly. Therefore, having the necessary information about a problem and its solution is still effective and thus being informed is the first step to change behavior even if behavior change is not a linear and instead a far more complex process.

Gender was not a factor that stood out as an influencing factor on the participants of the interviews. Contradictory to research that states that while women usually know less about environmental issues, they are more concerned and emotionally engaged in the matter (Kollmuss & Agyeman, 2002), demonstrating a higher willingness for behavior change than men (Tobler et al., 2011; Dowsett et al., 2018; Pfeiler & Egloff, 2018), this study sample did not show these results. The 9 women and 13 men interviewed for this study had similar levels of knowledge and were emotionally involved or not involved to a comparable degree. While

gender should not be neglected in the analysis of environmental behavior, it is necessary to understand that men and women are not two separate homogenous groups, but instead individuals that are impacted and influenced by much more complex variables. In fact, women's knowledge and role in environmental issues have historically often been underestimated due to outdated ideas and gender power relations (Swedish International Development Cooperation Agency, 2016). However, it cannot be ruled out that this insignificance of gender only applies specifically to this sample of highly informed people.

The internal barriers that prevent sustainability scientists from stopping to eat meat are the main source for the knowledge-action gap identified in this paper. This does not mean that the barriers are the only influence on this gap. The participants demonstrated that even though they are aware of the problem and do strongly care about behaving environmentally friendly, this does not result in the same level of emotional involvement. Some were not invested or did respond with deconstructive apathetic emotions; both typically obscure pro-environmental behavior. The participants that responded more emotionally were also more likely to consider eating less meat, which is something Grob (1991) and Kollmuss &Agyeman (2002) hypothesized before.

These internal barriers could be considered to be unconscious dissonance reducing strategies in themselves. Taking it back to Festinger's (1957) three ways to achieve consistency between one's beliefs and actions – *change beliefs, change actions, change perception of actions* – these internal barriers might not be a way to *change how one perceives their action* as the other dissonance reducing strategies do, but instead they might be a fourth option to overcome experienced dissonance. The internal barriers could be a way of *changing how one perceives their beliefs* by denying or resisting information that does challenge one's beliefs. However, as mentioned before, these internal barriers are only a small part of the influencing factors that are relevant for behavioral psychology and this is the first time they have been empirically explored in a specific sample like this.

Some of the narratives and rationalizations sustainability scientists used in this study are comparable to the ones used by the broader population, especially the 4Ns of pro-meat justifications (Piazza et al., 2015) and (perceived) behavior changes (Rothgerber, 2014). The strong focus on conscious consumption narratives and sustainable dimensions of meat consumption found in this study appear to be more specific to this group. There seemed to be a consensus among the participants that the negative environmental problems of meat consumption can be averted by avoiding meat that comes from industrial meat production. This is something Šedová et al. (2016) found as well. Their research also indicates that (perceived)

behavior change and the promised improved behavior narratives are widely used dissonance reducing strategies in their study with students of environmental studies. The deemed sustainable dimensions of meat consumption in terms of cultural experiences and perceived positive impacts of meat consumption as well as the need for relatability to role models are novel rationalization strategies that have emerged from this research. They appear to be very specific to the group of sustainability scientists as other studies conducted within the broader population did not find these rationalizations (e.g. Rothgerber, 2014).

This paper identified that sustainability scientists consider themselves to have a responsibility to lead by example in the context of societal transformation. They do not always demonstrate this in their personal lives because their rationalizations help them in being comfortable despite the knowledge-action gap, even though they think it is important to do so in general. An increasing number of sustainability scientists emphasize the importance of leading as role models to trigger societal transformations (Bearzi, 2009; Balmford et al., 2017). Literature identifies different kinds of roles that can play a part in societal transformation. According to Bicchieri & Funke (2018) there is a need for norm abandonment to achieve change, specifically for deeper behavior change. The initiators of such abandonment are so-called *trendsetters* who spearhead change and initiate broader change processes. Another way to perceive the role of sustainability scientists in societal transformation processes is the concept of *change agency*. Stephens et al. (2008) state that universities themselves as places of production, perpetuation, and dissemination of knowledge have the potential to accelerate societal transformation. These institutions can be a model for sustainable practices by setting an example for sustainable behavior that first spreads on the university campus and then transcends towards the rest of society. They can also educate change agents, i.e. people who advance "more sustainable practices in different cultures and contexts" (ibid, p. 318) and "help create a sustainable future" (Svanström et al., 2008, p. 347).

What implications does this have for sustainability scientists and their role in a broader societal transformation? First of all, it shows opportunities for ways in which sustainability scientists can trigger (i.e. act as trendsetters) and accelerate (i.e. act as change agents) a transformation towards more sustainable consumption by starting with incremental changes in their own behavior. It also serves as a reminder on how unique and privileged their role can be in societal transformation and how valuable it could be to embrace it.

Limitations

A general limitation of this research is the not accounting for potentially more complex reasons or influencing factors that stayed hidden in the study. There is no certainty that the

results and their implications can be transferred onto other sustainability scientists or individuals beyond this group. Beyond the ontology of critical realism, it is also not certain whether the participants did consciously or unconsciously tell the truth or if they were influenced by the interviewer or the interview situation. Especially the later could limit the dependability of the data. Even though it was stated that there were no right or wrong answers, the circumstances of the interview might have not aligned with that. One participant specifically said that he has the impression that "sustainability scientists tend to think there is always a right answer to such questions".

It can be argued that interviewing 10% of the faculty of sustainability, with variety in gender, age, cultural and disciplinary backgrounds as well as career level, is somewhat representative of the faculty. However, it is possible that people who are more knowledgeable and involved in sustainability and meat consumption were more willing to participate. It is also possible that especially people who perceive themselves to eat only little amounts of meat were more likely to take part in the study. Others who eat meat very frequently possibly did not respond to the request to participate due to predominant social norms that might exist at a faculty of sustainability. This group of sustainability scientists might experience the knowledge-action gap not at all or to a different degree. However, there was variety in the self-reported frequency of meat consumption in the participants including higher consumption.

While these implications might be generalizable and transferable to other sustainability scientists or individuals with similar levels of environmental awareness and values, they might be limited to this specific group of people. Nevertheless, the study provides insights and novel findings regarding the knowledge-action gap of sustainability scientists.

Conclusion

This study points out the existence of the knowledge-action gap in sustainability scientists regarding their meat consumption, its reasons and impacts, and the implications this potentially has on broader societal change. Distinctive results are the novel rationalization strategies of declaring a sustainable value to meat consumption and the element of relatability of role models, which are closely related to the characteristics of the group of sustainability scientists.

The findings presented provide insights into sustainability scientists' knowledge-action gap regarding their meat consumption, which establishes a base for further research. A next step could be a quantitative validation of the results of this study in a bigger group of sustainability scientists, especially for the novel rationalization strategies. Research should also

be done on how the knowledge-action gap can be dissolved and what specific role the different strategies might play in that.

This research hopes to get sustainability scientists to reflect on and potentially reconsider their meat consumption as well as to not underestimate their role in change processes. While all participants did experience a knowledge-action gap regarding their meat consumption and applied rationalizations to justify their behavior, knowledge played a role in forming a somewhat conscious behavior. The role of knowledge should therefore not be underestimated or even neglected.

Considering the need for drastic reductions in meat consumption to mitigate environmental degradation (Springmann et al., 2016), there is a need for people who lead the way towards sustainable consumption. This makes it necessary that sustainability scientists embrace their role in societal transformation by actively triggering and accelerating change. This implies that they implement such change in their own lives more and eat less or no meat at all. They also need to find effective ways to communicate about their behavior changes and ensure that the rest of society gains access to the necessary knowledge as well. Of course, this is a lot of responsibility and it is important to remember that sustainability scientists, in the end, are only human as well. Maybe being completely consequent and without flaws does not have to be the goal, but all efforts are valuable, and relatability does indeed help. As one participant put it:

> "That's why I think sustainability scientists should not all be the ideal type of person that's completely environmentally friendly because then a lot of people would not be able to relate to that person or type and that's why I think some of them should be very idealistic that we can see 100% is possible, but also 80% or 50% is possible."

Acknowledgements: I would like to thank the participants of the study, my academic advisors and additional reviewers, who helped improve my research, Rebecca Gerigk and Leo Reutter for the useful feedback during the pilot interviews and writing process, and my sister Eva for the support and knowledgeable insights.

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of interest: none.

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