Ideas about naturalness in public and political debates about science, technology and medicine

Report of Public Dialogue Workshop

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Executive summary

The concept of naturalness can inform people's opinions about science, technology and medicine. These ideas play an important role in how the public see the acceptability of advances in science and medicine. With this in mind, the Nuffield Council on Bioethics have been exploring how ideas about naturalness feature in the public debate and how this correlates with academic perspectives on naturalness.

This research has identified five principal understandings of naturalness (which are outlined in section 3.3). The Council commissioned this dialogue to test the results of their research with a small group of members of the public and discuss what, if any, recommendations should follow to target audiences (such as journalists or scientists) about how they use the concept of naturalness in their communication.

Participants had a range of views about the concept of naturalness and what made an object natural or unnatural. Participants tended to find discussion of the concept of naturalness challenging, recognising that naturalness was not a concept with a simple definition or meaning. Their understandings of naturalness fell into two broad categories: descriptive and normative understandings of naturalness. Participants offered two principal descriptive understandings - that objects are natural in virtue of them being free of human interference or that they are natural in virtue of them being made from natural ingredients. Participants also had normative understandings of naturalness – suggesting variously that naturalness was associated with our concept of goodness and that what is defined as natural changes, either over time or across different cultures.

Many of these views mapped on to the Council's findings (see section 3.2 for more details). For example, technological sceptics tended to express views associated with 'wisdom of nature' or 'God and religion' understandings. In contrast, participants who were more relaxed about technological change tended to find more affinity with the sceptical or neutral view of naturalness.

Participants felt most strongly about the use of 'natural' by companies advertising a product. Often, participants were deeply sceptical about the use of the concept in advertising, thinking that it is usually just a marketing con. There were contrasting views on responsibility: with some thinking that advertisers were responsible for how they used the term, while others felt that consumers needed to be proactive in making their own judgements.

When thinking about recommendations, some participants thought it is important that product manufacturers included detailed descriptions of why something should be considered natural, allowing participants to make up their own minds. Others believed that policy makers should implement regulations to make sure that manufacturers did this, with some suggesting that all products should be required to indicate whether they are natural or not. Some participants, however, were sceptical about whether regulation is appropriate in this context, reasoning that there is already a lot of important information on products.

Participants commented about the use of naturalness language by journalists, suggesting that they often sensationalise their articles or try to make their writing more appealing by using the term. Others identified that different newspapers would use the word natural in different ways. Participants tended to be somewhat averse to the idea of making recommendations to journalists about how they use the word natural, thinking that either journalists would not listen or that readers should be able to form their own judgement. However, other participants thought that journalists should not use naturalness as a way of victimising individuals and that there might be merit in writing best practice guidance on the use of the words 'natural' and 'unnatural' for journalists.

Participants tended to have greater trust in scientists' ability not to use 'natural' and 'unnatural' in unfair or imprecise ways. However, some participants were slightly more sceptical about policymakers' use of naturalness, believing it is important that policy makers understand the public's views about naturalness and incorporate this into their decision making. A number of participants believed it is also appropriate to issue recommendations to Parliamentarians about how to use the term.

Chapter 1:   Introduction

1.1.   Nuffield Council on Bioethics' Naturalness Project

Ideas about naturalness can inform or underlie people's views on science, technology and medicine. These ideas play an important role in public attitudes towards the acceptability or unacceptability of advances in science and medicine and influence the degree to which technologies aiming to treat disease, aid fertility or support food production, for example, are embraced or opposed by the public.

In 2015, the Nuffield Council on Bioethics decided to explore how current public and political bioethics debates are affected by ideas about naturalness and how this correlates with academic discussions relating to the concept. The outcomes of this work are intended promote informed debate about the way that ideas about naturalness influence public discussions about science, technology and medicine.

The project is overseen by a Steering Group chaired by Roland Jackson, Executive Chair of Sciencewise and a member of the Nuffield Council. The activities of the project include:

- Evidence gathering research, including a review of use of the terms natural, unnatural and nature in media articles, Parliamentary debates, and the reports of civil society and science organisations;

- An expert roundtable meeting and public dialogue meeting to test out the findings of the research;

- Working with poets to explore ideas about naturalness in creative ways;

- Public events and activities to promote debate more widely about the concept of naturalness in debates about science, technology and medicine.

A detailed paper and summary booklet that set out the project findings will be published in November 2015. Further information about the project can be found at:
www.nuffieldbioethics.org/naturalness.

1.2.   This dialogue

The Council wanted to ensure that people who do not work in related areas (such as journalism, science or politics) had an opportunity to contribute to the research, and commissioned Dialogue by Design to run this project on their behalf.

The objectives of this dialogue were to:

- Discuss and test the findings of the Council's research on ideas about naturalness in bioethics debates;

- Seek guidance on whether the Council should make any recommendations to specific target audiences based on its findings.

1.3. Reading this Report

This report has four chapters and four appendices. Following this introductory chapter, the remainder of the report comprises:

Chapter 2: Methodology – this chapter sets out our approach to designing the dialogue on naturalness, recruiting participants and to analysis and reporting. It also includes a description of the three main stages of the workshop.

Chapter 3: Thematic Summary – this chapter provides a summary of participants' comments, according to overarching themes.

Chapter 4: Recommendations – this chapter provides a summary and analysis of the recommendations to various different audiences that participants identified over the course of the workshop.

Appendices – In our appendices, we provide our sampling frame (Appendix A), all stimulus materials used for the project (Appendix B), our process plan (Appendix C) and a summary of our evaluation findings (Appendix D).

The term 'we' in this report refers to the project team at Dialogue by Design, rather than the Nuffield Council on Bioethics.

We use verbatim quotes throughout the report to illustrate particular points that participants raised in discussion.

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Chapter 2:   Methodology

This chapter sets out the methodology used in this dialogue event, including an overview of the main stages of the workshop.

2.1.   Recruitment

We recruited 16 participants, for an anticipated achieved sample of at least 12. Thirteen participants attended on the day. Participants were recruited by a professional agency, using an agreed sample specification and quota variables. This enabled us to achieve a diverse and inclusive sample. A representative sample was not possible, given the number of participants involved.

See Appendix A for details of the final sampling frame and the achieved sample.

2.2.   Stimulus materials

Stimulus materials were developed following discussion and agreement of a process design with the Nuffield Council on Bioethics. The materials provided factual information, mapped out the Council's research and were presented through PowerPoint slides and handouts.

See Appendix B for all stimulus materials used in the workshop.

2.3.   Dialogue workshop methodology

The workshop was designed to achieve the objectives outlined in section 1.3. Project team members from the Nuffield Council on Bioethics attended, playing a formal role – introducing and explaining the naturalness research – and participating in small table discussions.

The workshop had three stages:

- **Warm up and framing activities.** These activities were designed to stimulate participants' thoughts about the concept of naturalness and consider the ways in which it is used in ethical debates and wider society. The intention was not to explore in any detail how participants used these terms. Rather, it provided a framework within which participants might situate the findings of the Council's research. Activities included:
    - o An icebreaker: each participant was asked to bring an object with them that they considered natural and explain why;
    - o What is naturalness? Introduction to the concept of naturalness and its relevance to ethical debate through the examples of genetically modified crops and IVF.
    - o Testing the concept – several paired paragraphs of text were provided. One member of each pair included the word(s) 'natural', 'unnatural' or 'naturalness' and the other replaced this word with a descriptive phrase to describe the same phenomenon. For example, one pair might include 'It is

totally unnatural to have pig's heart transplanted into a human body' and 'The idea of having a pig's heart implanted into a human body is disgusting'. This activity was done to help participants explore the potential for words such as 'natural' and 'unnatural' to frame people's reactions to information.

- **Exploring and testing the Council's research.** To avoid focussing too much on participants' own reactions to naturalness, we designed this session to focus on what participants thought should follow from the Council's research.

- **Exploring recommendations.** In this session, we shared the Council's potential recommendations with participants, exploring what they thought of them and how they compared with views that participants had already offered in previous activities.

A detailed process plan for the event can be found in Appendix C.

2.4. Data collection

Discussions were digitally recorded and comprehensive notes were taken. Participants' permission to record was obtained and their data was kept securely. This report draws on these two data sources, referring to digital recordings to add richness to written notes and to ensure the accuracy of verbatim quotes.

2.5. Analysis and reporting

We used a thematic approach to analysis, grouping the comments participants made according to overarching themes, such as 'comments related to a specific audience' or 'general comments about the concept of naturalness'. This report is structured according to these themes, rather than using a purely descriptive approach to reporting.

2.6. Evaluation

All participants were asked to complete an evaluation form at the end of the workshop. A summary of the evaluation findings can be found in Appendix D.

Chapter 3:   Thematic summary

This chapter provides a summary of participants' comments by theme. This chapter is separated into two sections. The first section deals with how participants understood the concept of naturalness. The second discusses how participants thought that different groups used the concept of naturalness.

Participants were introduced to the Council's research, which identified five distinct accounts of naturalness in discussion of bioethics topics in public debates:

1. Neutral/sceptical view: scepticism that there is any real distinction between the natural and unnatural – just because something is natural, doesn't make it good.

2. The wisdom of nature: unnatural technologies don't respect nature and are therefore risky – we should trust Mother Nature.

3. Natural purpose: unnatural technologies are wrong because they move people/animals/plants too far away from what they are meant to do or be like.

4. Disgust/monstrosity: unnatural technologies make people feel disgusted or revolted, or seem like science fiction

5. God and religion: unnatural technologies undermine a divine natural order, distort God's creation or go against the will of God.

Where relevant, our analysis in this chapter explores the extent to which participants' preconceptions of naturalness mapped onto these five understandings. More detail about each of these themes can be found in the Council's analysis report, expected to be published in November 2015 at: www.nuffieldbioethics.org/naturalness

3.1.   Understandings of naturalness

3.1.1. Descriptive understandings of naturalness

We had asked participants to bring in an object that illustrated naturalness to them and asked them to explain why they had chosen their particular object. Not everyone brought in an object: the front cover of this report shows the objects discussed which included an orange, a coconut, a bottle of mineral water, a cast of someone's teeth and gums and a bottle of vanilla essence. In their initial discussion, participants identified two descriptive definitions of natural:

- An object is natural if it is free from human interference;

- An object is natural if its ingredients are natural.

For example, participants who had brought in fruit or leaves explained their choice on the basis that these had not been modified by humans in any way. The labelling of a packet of apples as 'organic' indicated (in participants' views) 'the absence of chemicals', emphasising the naturalness of the contents. These participants identified something as natural if it is free from human interference:

> *'Something that is natural is something that is not manmade…once you've changed something, it's not a completely natural product.'*

Other participants defined naturalness in terms of ingredients: whilst the product itself might have undergone some form of processing, the absence of chemicals was again seen as an indication of naturalness.

At this early stage of the discussion, the concept of naturalness seemed to have relatively clear and well-defined boundaries. Participants tended to think that an object either is natural or it is not. The line between natural and unnatural objects was drawn by knowing whether or not something contains ingredients that occur naturally (and 'chemicals' were not seen as naturally occurring, though we did not explore this issue in any detail) or whether its properties had been changed by humans.

As discussion continued, this rigid distinction broke down and the concept of nature became more complex and less well-defined, particularly for participants who thought that naturalness was determined by freedom from human interference. For example, they drew comparisons between genetically modified crops and IVF. Attitudes towards IVF were more ambiguous than attitudes towards genetically modified crops, despite both involving human intervention.

This discussion introduced value distinctions which had perhaps been implicit in the initial discussions, but became increasingly evident. Naturalness became associated with goodness of intent: the reasons behind intervention and the process by which the intervention took place became relevant. So in vitro fertilisation (IVF) done for the purpose of enabling a woman to bear a child was seen as natural, whilst IVF for the purpose of creating 'designer babies' – babies with specific selected characteristics – was not. In contrast, genetic modification of crops tended to be seen as not natural.

> *'I think it's natural – when you compare IVF to GM it's natural because you're helping a process. When you start talking about designer babies, that's pretty unnatural.'*

The increasing complexity of participants' discussion of what constitutes naturalness led them to find new ways of pinning down the concept. The idea that there are gradations of naturalness was introduced, with participants suggesting that the more human interference there is, the more unnatural something is. For example, participants suggested that changing the genetic structure of plants involves more human interference than IVF does.

> *'…when you start injecting, changing things chemically – it's unnatural. Crop rotation is fine but genetically modified crops are unnatural.'*

This view was not unanimous. A contrary suggestion was that humanity's desire to change things is in itself natural. This view was driven by the argument that humans are themselves part of the natural order, so our actions can themselves be seen as natural. This tended to remove some of the value or moral weight carried by naturalness, and is perhaps most closely aligned with the Council's category of a neutral/sceptical use of naturalness. It calls into

question the importance of the distinction between natural and unnatural: if humans and their actions sit within the natural order, then the concept of naturalness seemed to dissolve. However, the same participants seemed hesitant about expressing this view, as if they thought that they were stretching the definition of naturalness beyond its meaning:

'Sometimes you have to change things to make them actually better – can you change in a natural way. How far can you split the word natural?'

3.1.2. Normative understandings of naturalness

As noted above, the values and social factors determining the meaning of naturalness became increasingly evident in the discussion and throughout the workshop, participants often drew an equivalence between naturalness and goodness. This was one particular area where they sometimes found discussion difficult. Having suggested at first a definition of naturalness that excluded a set of technologies as unnatural (due to human interference for example), they then wanted to include developments (such as IVF) as natural because they thought they were good.

In seeking again to introduce more definition into the concept, participants switched their attention to unnatural things, arguing that these are not good. This gave rise to the notion of scientists 'playing God', and is closely aligned with the God and religion understanding of naturalness identified by the Council. A temporal element was introduced too, in the argument that future dangers could arise from unnatural interventions, with these arguments often chiming with the 'wisdom of nature' understanding of naturalness. These views tended to be expressed hand in hand with both fears about the potential dangers of synthetic products that imitate naturally occurring products – foods in particular - and with difficulties associated with knowing whether something is naturally occurring or synthesised:

'Artificial meat –that's very dangerous, people won't know whether they're eating artificial or real meat.'

Participants discussed the role of society and culture play in defining the concept of naturalness. One view expressed was that our reactions to naturalness are partly caused by culture. One example compared the experience of Vietnam to British culture, suggesting that it is considered perfectly natural to eat cockroaches in Vietnam while in Britain it would not be. Again, this introduced a further dimension to the concept of naturalness, with cultural expectations and norms being added to the ethical and interventionist or non-interventionist ideas discussed previously.

The idea that the concept of nature might be culturally determined links to participants' view that social consensus plays a role in how we perceive naturalness and that this will change over time. Participants contrasted this with the view that there is a given and unchanging definition that will determine whether something is natural or unnatural.

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One object brought in to illustrate naturalness was a cast of a participant's teeth, which had been produced in the course of dental treatment designed to straighten the teeth. Discussion about this object led to the association of naturalness with normality. This participant's suggested that having straight teeth is more normal and therefore more natural. Again, social factors are playing a role, with normality being the usual way to look at hence seen as more natural.

3.1.3. General comments about how we use naturalness in language

Participants reflected on the ways in which the use of naturalness in language influences how people think about particular issues. In a discussion of genetically modified crops, the observation was made that they are often perceived negatively because they are presented as unnatural. This view was usually associated with a positive view of genetically modified crops and technology in general, suggesting that it would be better to frame genetically modified crops as 'improved' rather than in terms of naturalness. They seemed to think that associating genetically modified crops with naturalness coloured people's views against positive technological developments. This view was not unanimous.

One pair of paragraphs that participants discussed described birth as either vaginal or natural, as a way of evoking different ways language could be used (see Appendix B for details). One view of this was that the term vaginal birth is patronising and – in this context – natural is the more appropriate language choice. However, this view seemed to be restricted to this particular example.

Another pair of paragraphs we presented to participants described an animal to human heart transplant either as 'unnatural' or as 'disgusting'. In this context, participants believed that unnatural is less emotive and therefore more appropriate. Two attitudes seemed to underlie this. One was a view that using 'disgusting' is unhelpfully dismissive – it does not engage with the issue and that the goal it sought to achieve was positive:

> *'They want to live a bit longer – the option is have an artificial heart or have a pig heart. If an artificial heart was working, I think most people would go with that.'*

Another attitude was that both 'unnatural' and 'disgusting' are inappropriate, because animals are living creatures and we should therefore treat this transplant procedure as natural (this overlaps with the 'natural order' comments discussed in section 3.1). The body, in this example, is seen as akin to a machine, with functional parts that can be exchanged between species and the intent behind the intervention is appealed to:

> *'I wouldn't agree that it is unnatural – because a pig is a living creature like we are. The heart is an organ that is common to all of us – it's a pump that keeps us alive. Whether it's a cat or whatever, it's still fine. Disgusting is just emotive.'*

Another argument in relation to this example was that the use of the word 'unnatural' is intended to indicate that the writer believed that it would not be a successful operation. This

seemed to suggest that 'unnatural' was being used as a signal for scientific developments that might not be successful. This could be reflective of the 'wisdom of nature' understanding - that there could be unforeseen consequences as a result of new technological developments.

3.1.4. Conclusions

Some central findings emerged from participants' interrogation and understanding of the concept of naturalness.

Participants tended to find discussion of naturalness challenging. They recognised that naturalness was not a concept with a simple definition or meaning, often committing themselves to 'natural' meaning one thing, before backtracking, accepting that the concept was more complicated, making its boundaries fuzzy and then seeking to re-introduce definition, through the use of gradations of naturalness or appeal to purpose.

This was particularly evident when participants discussed something being good and how it related to naturalness – participants clearly felt that unnatural things were not good, but then identified good technological developments that were not natural. They thought that there should be a descriptive definition of the word natural, but then went on to discuss how naturalness was in part constituted by cultural factors. The more technologically sceptical participants were least likely to take this view, often keeping to the same idea of naturalness throughout – seeing natural objects as only those (relatively) free from human interference or using natural ingredients. Those who were more likely to embrace technology or appeal to purpose were least concerned to pin down the line that divided natural from unnatural processes or objects.

Some of the ways in which participants used the terms natural and unnatural mapped on to the Council's findings – for example, the technological sceptics tended to express views that could be associated with the 'wisdom of nature' and 'God and religion' understandings. In contrast, those who tended to include humanity within the natural order often expressed views that were more sceptical about the utility of the concept of naturalness. Other views – such as what is natural being determined by social consensus – went beyond the research as it was presented to them.

3.2. Comments about how different groups use naturalness

3.2.1. How advertisers use naturalness

Having confused the concept and explored a little of the complex ways in which natural and unnatural are used and the implications they can carry, participants discussed how different groups use naturalness. Spontaneously, they referred to its use in advertising, and focussed much of their further discussion on this topic. Some participants were deeply sceptical about the use of the concept in advertising:

> *'I don't believe in the word natural anymore – if I see it in a supermarket I think yeah right…advertising on food, you don't believe anyway!'*

This scepticism seemed to have several sources. Firstly, participants were generally sceptical about advertising, often suggesting that advertisers should not be believed at all. However, there was also a more specific type of scepticism attached to the use of the word natural, perhaps reflective of their prior discussions about the varied ways in which the concept can be understood and the ends to which it can be put. In this vein, participants suggested that naturalness is always used to convey positivity about a product and that the term unnatural in never used in advertising, because of its connotations with negative characteristics. This further entrenched the scepticism that participants felt about advertisers.

Whilst remaining sceptical, participants had divergent views about who was responsible for the use of naturalness by advertisers. One view was that it is the responsibility of the manufacturer to use the terms nature or natural appropriately. For example, Innocent Drinks were highlighted as a company that advertise their smoothies as natural but complements this with detail about precisely what has been used in making the product, providing some warrant to their use of the term.

Other participants took a more relaxed attitude towards the use of the term natural by advertisers. They stressed the importance of personal responsibility throughout the dialogue, and particularly the role of consumers in being appropriately sceptical:

> *'All of us are going to interpret it according to our beliefs or knowledge, or in the context that it's used. You've got to make up your mind about whether that's natural or not.'*

Another relationship explored was between price and naturalness. One view was that consumer choices are primarily price driven and use of the term natural is unlikely to make much difference to these choices. Other participants felt that perceptions of quality matter for some consumers and that the description of a product as natural or containing natural ingredients could be an important element in judgements of quality.

3.2.2. How journalists use naturalness

Participants were often sceptical about how journalists would use terms such as natural or naturalness, believing that they are likely to try to sensationalise their articles, or make it particularly appealing and that these terms are a way of doing this:

> *'You read into the story – the way it's been written – there's a shock tactic to change your mind, change your perspective.'*

Participants did differentiate between the uses of these terms in different print media, though whether this related specifically to the use of the term, rather than views on the issues likely to be covered by each paper is difficult to determine. For example, using the term unnatural in the context of older women using IVF was seen as more 'Daily Mail', while participants thought

that the Guardian might use the term to discuss genetically modified crops. However, they did think that different newspapers would use the concept to achieve different aims and to persuade different types of reader.

Journalists were seen as unlikely to change the ways in which they use these terms, even if this use was challenged. This contrasted with their view that Parliamentarians and other policy-makers could be criticised strongly for saying the wrong thing. This view that journalists feel no need to pay attention to the views of others played a clear role in participants' views about the value or otherwise of making recommendations to them as a group.

Most comments relating to journalists focussed on recommendations and are discussed more fully in section 4.1.2.

3.2.3. How scientists and policy makers use naturalness

Participants tended to have more trust in scientists than in other groups identified in discussion:

'We've got to have some trust in scientists. Look at what they've achieved over the years and are still achieving.'

Participants tended to believe that scientists would not use the word imprecisely and would not be making value judgements when they describe something as natural or unnatural. The exception to this was participants who were more sceptical about new technologies, who were less trusting about how scientists use the concept of naturalness.

Views about policy makers' use of these terms were more ambivalent, with the suggestion being made that, unlike scientists, policy makers do not draw on evidence:

'There should be empirical evidence behind these policies – rather than just posh guys making decisions.'

These participants believed that policy makers should understand the public's views about naturalness and incorporate this into their decision making. Comparisons were drawn between unnatural technological developments and tobacco: policy makers had been slow to identify the negative effects of tobacco and that this presented a lesson for policy makers in ensuring they had adequate regulation of any unnatural products. This could be related to the 'wisdom of nature', as the implication appeared to be that unnatural technological developments may be more prone to unforeseen consequences.

3.2.4. Conclusions

Overall, participants were most interested in discussing how advertisers use naturalness. This could be because of greater familiarity with consumer goods or the greater frequency with which naturalness language is used for certain types of consumer products.

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Participants' main attitude towards the use of naturalness by various groups was one of scepticism. This seemed to reflect both their general scepticism towards powerful social groups – primarily food manufacturers and advertisers – and their own reflections on naturalness, which had exposed some of the complexity in both the concept itself and its use. This scepticism was less pronounced in the case of policy-makers and attitudes towards scientists in particular were more trusting.

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Chapter 4:   Recommendations

This chapter provides a summary of the recommendations that emerged from participants' discussions and links these recommendations to the understandings of naturalness identified in Chapter 3. Section 4.1 describes the recommendations identified by the Nuffield Council on Bioethics, while section 4.2 sets out the recommendations that participants came up with throughout the course of the discussion.

4.1.   The Council's potential recommendations

Participants were asked to consider the following draft recommendations arising from the Council's research to date:

For scientists and science communicators

- When discussing the acceptability of science, medicine and technology, scientists and science communicators should be aware that people can use the terms *natural* and *unnatural* as placeholders for a range of different important values or concerns;

- Scientists and science communicators should explore and engage with these values and concerns to ensure effective communication is taking place and the views of different people are fully understood and debated.

For policy makers

- Parliamentarians should avoid using the terms *natural* and *unnatural* to convey messages about the acceptability of science, medicine and technology without describing fully the values and concerns that underlie them;

- Policy makers should explore fully what people mean what they describe something as *natural* or *unnatural* when engaging the public to inform the development of science or health policy.

For journalists

- Journalists should always be clear about the values or concerns underlying the terms *natural* and *unnatural* when they are used to convey positive or negative ideas about science, medicine and technology.

4.2.   Participant recommendations

4.2.1. Recommendations to advertisers

Though advertisers were not identified as a target group in the presentation of recommendations, participants focussed their discussion on the regulation of advertising.

Participants took the complexity of the concept of naturalness very seriously, particularly after having spent time trying to reach their own conclusions about its meaning. One consequence of this, particularly in relation to consumer products, was a belief among some that new

language is needed to capture the many different meanings associated with the term natural. For example, one view emphasised that naturalness had meanings other than their initially preferred definition of 'free from human interference'. Participants suggested using the word 'unchanged', rather than natural, in order to capture the meaning that they thought was important.

'Not sure the word natural applies to very much in the food industry! Maybe it's the time for new words to be introduced.'

Other participants went further, recommending that the term natural should be replaced or supplemented on products with a fuller description of why something is natural, allowing people to make up their own mind about the accuracy of the definition on the basis of this description. It was sometimes unclear what motivated this view, as participants offered different reasons. One reason seemed to be rooted in the scepticism identified in section 3.2.1 – that people could not trust that something is natural *unless* they are able to assure themselves of this. Another seemed to relate to the contested concept of naturalness (for example, whether something is natural in virtue of its ingredients or the process for making it) and that a full description would allow people to see whether a product meets the definition of naturalness that they care about.

'Something like a description would be very helpful – it can be helpful to see that it's all natural.'

Some participants advocated greater regulation of the word natural, akin to that in place for use of the word organic. Some suggested that companies should be required to provide longer descriptions as outlined above and others that a simple seal indicating whether something is natural or not should be required on all food products. This, again, seemed to be motivated by scepticism about advertisers – in this case, that they would be willingly truthful and commit to fuller descriptions voluntarily.

Other participants disagreed with this recommendation, arguing that there is already a lot of information on packaging and that information about naturalness might be too much. In relation to food, they argued that the 'traffic light' system indicating whether a product is healthy or not is sufficient. This view placed naturalness within a list of food information priorities, and it was ranked lower than other information to which consumers should have access. Participants did not disagree with the principle of regulating advertisers' use of the term, but rather questioned whether this was a priority.

4.2.2. Recommendations to journalists

On the whole – and in contrast to the balance of views regarding advertisers – participants were fairly sceptical about the idea of making recommendations to journalists about how they use the word natural. In many cases, this was not because participants seemed to doubt the principle of making recommendations to journalists, but instead because they doubted the

efficacy of such recommendations. They tended to think that journalists would take no heed of any recommendations. Nonetheless, there were arguments about the value of making the attempt to regulate journalists' use of the term. In particular, participants felt there may be some merit in writing best practice guidance on using the words 'natural' and 'unnatural' for journalists, as long as it is voluntary guidance that provides advice, rather than seeking to proscribe, use of the terms.

There was some doubt about the principle of making recommendations at all, linked to the idea that there are implications for freedom of speech in attempting to regulate or influence how journalists used language:

'I'm almost going to embark on a freedom of speech debate – perhaps [journalists] shouldn't be talking about things they don't understand. But if you said that to journalists, they'd all be out of a job tomorrow!'

Those participants who opposed making recommendations to journalists, did still have views on how journalists should behave, arguing that naturalness language should not be used as a way of victimising people. For example, several participants believed strongly that older women using IVF should not be described as unnatural. A distinction was drawn between different types of journalism. News journalists were seen as under an obligation to strive for a neutral or 'objective' use of naturalness, whilst commentators were seen as entitled to use the word as they see fit. However, while participants did recognise that there were good and bad ways for journalists to use the concept, this tended not to override their more general scepticism about making recommendations to journalists.

4.2.3. Recommendations to Parliamentarians, scientists and policy-makers

Recommendations to Parliamentarians were seen as more appropriate, and perhaps more efficacious. Participants argued that there could be rules governing how they use these words. It was unclear exactly why participants thought that the case of Parliamentarians was different, though some participants did seem to feel that it would be simpler to regulate politicians' language, perhaps because they are seen as more responsive than journalists to public opinion. However, this was not a unanimous view. Participants who had consistently emphasised the importance of personal responsibility suggested that it is down to individuals to interpret and challenge what they hear:

'If we disagree with the way that politicians are using the word, we have the right to challenge that.'

Discussion about recommendations for other policy-makers and scientists were brief, perhaps because they were seen as more 'remote' than journalists, Parliamentarians or advertisers. Several participants agreed with the Council's recommendation that policy makers making policy decisions, particularly those involving science and medicine, should engage with and understand how the public use the concept of naturalness. Talking to the public in layman's

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terms, being factual and neutral in their use of nature and naturalness and paying attention to the way that the public use and understand these terms – particularly in relation to concerns about novel scientific techniques were seen as vital.

Appendix A: Sampling frame

This appendix provides the detail of the sampling frame used to recruit participants as well as the sample achieved (note: 16 participants were recruited, with 13 attending on the day).

Behavioural and Attitudinal Profile

This section sets out the questions that we used to exclude potential participants, as well as questions that ensure we had a range of attitudes to change and knowledge of science.

Behavioural/Attitudinal questions	Proportion and commentary	Actual sample
1. Have you participated in market research in the past six months? Yes/No	If yes, excluded at this stage.	No 'Yes' in final sample.
2. Are you employed as a civil servant for central Government? Yes/No		
3. Are you currently working towards a PhD?		
4. Are you currently employed by a university in a research capacity?		
5. Do you currently work for a campaigning organisation working in any of the following areas: • **Environmental issues** • **Technology** • **Moral issues (such as abortion or euthanasia)**		
6. Which of the following best describes your level of scientific knowledge? **(SHOW CARD)** (At least three people from each category; if necessary prompt for level of formal education = degree = very good; A-level = good; GCSE = average; no formal education = poor/very poor; or prompt for whether they read scientific magazines, have a job related to science etc. etc.)	I have a good level of scientific knowledge.	6
	I have an average level of scientific knowledge.	7
	I have a poor level of scientific knowledge.	0
7. Compared to other people you know, how would you describe yourself? **(SHOW CARD)** (at least three people from each statement)	I am generally among the first to try a new technology product.	2
	I am generally in the middle when it comes to trying a new	11

Behavioural/Attitudinal questions	Proportion and commentary	Actual sample
	technology product.	
	I am generally among the last to try a new technology product.	0
8. Do you have any access requirements to participate in the dialogue? (e.g. wheelchair user; limited mobility.)	To note.	None.

Demographic Profile

This section sets out the demographic characteristics we used, to ensure that the sample was – insofar as possible - broadly representative of the wider population.

Gender	Number (Note: acceptable range +/- 1)	Actual Sample
Male	8	5
Female	8	6

Age	Number (Note: acceptable range +/- 1)	Actual Sample
18-25	3 (must be no more than two of the same gender)	3, no more than two of the same gender.
26-40	4 (must be no more than three of the same gender)	3, no more than two of the same gender.
41-55	4 (must be no more than three of the same gender)	2, different genders.
56-65	3 (must be no more than two of the same gender)	3, no more than two of of the same gender.
66+	2 (must be one man and one woman)	2, different genders.

Social Grade	Number (Note: acceptable range +/- 1)	Actual Sample

A/Bs	3	4
C1	5	6
C2	4	1
DE	4	2

Ethnicity	Number (Note: acceptable range +/- 1, minimum 1)	Actual Sample
White (incl. British, Irish, Other)	10	7
Mixed/multiple ethnic groups	2	2
Asian/Asian British	2	2
Black/African/Caribbean/Black British	2	2

Appendix B: Stimulus Materials

This appendix provides details of the stimulus materials used in the event. A slide deck (not shown) was also used to present findings and help structure the event.

Naturalness handouts

Naturalness reactions

How people react to naturalness.

The wisdom of nature

- People with this view feel that natural or evolved processes have found the 'correct' or 'best' way of doing things.

- They fear that new technologies that fail to respect the 'wisdom of nature' or 'Mother Nature' can be risky, and may have unforeseen and damaging consequences.

- This view can be linked to the idea of nature as a force that can punish us for 'meddling with nature'.

- For example, people with this view might think that the genetic modification of crops is dangerous and unnatural and will have damaging effects on the environment.

Neutral/sceptical views of naturalness

- People with this view feel that the distinction between natural and unnatural things is not important and that there is no clear distinction between natural and unnatural things.
- They think that natural things are not necessarily good and unnatural things are not necessarily bad.
- For example, many things thought to be natural, such as diseases and poisonous plants, are thought to be bad, and 'unnatural' activities, like vaccinations and contraception, are thought to be good.
- They might point out that our views change over time and that things previously considered wrong because they are unnatural can later be seen as acceptable. IVF treatment and organ transplants are examples of this.

Naturalness reactions

How people react to naturalness.

Natural purpose
- People with this view feel that people, animals and plants have a natural purpose, or function, that they are meant to fulfil.
- Scientific innovations may be wrong because they move living things away from their 'fundamental nature'.
- For example, people with this view may think that it is unnatural for scientists to select embryos with certain characteristics to create 'designer babies' because this is not how humans are meant to reproduce.
- It may not be risky to do these things, but it could undermine natural purpose and would be wrong for that reason alone.

Naturalness reactions

How people react to naturalness.

Disgust/Monstrosity

- The products of some novel technologies may make people feel disgusted or revolted, which can be linked to their view about whether the technologies are natural or not.
- Some think that feeling disgusted by a novel technology can tell us something about whether it is ethically acceptable or unacceptable.
- These responses might sometimes be linked to science fiction. People might think that scientists are creating monsters or other horrific entities and practices, like genetically modified 'frankenfoods', synthetic meat or animal to human organ transplants.

God and religious belief

- People with this view think that some technologies undermine a divine natural order or go against the will of God.
- For example, they might think that the sex of a baby is determined by God and should not be interfered with by humans using technology.
- These concerns can often be linked to 'wisdom of nature' and natural purpose arguments regarding new technology, as people can see nature as an expression of God's will.

Example cards

The following paragraphs were used to introduce the concept of naturalness as they related to particular topics:

IVF:

IVF (short for in vitro fertilisation) is a process by which an egg is fertilised by sperm outside the body.

IVF treatments can help women get pregnant who otherwise might not be able to give birth.

Why might we consider IVF treatment unnatural or natural?

Genetically modified crops

Genetically modified foods are produced from crops that have had changes introduced to their DNA using methods of genetic engineering.

These techniques can be used to improve resistance to certain pests or diseases.

Why might we consider genetically modified crops unnatural or natural?

Paragraph cards

The following statements were used to illustrate the differences between the use of natural and non-natural language:

1. It is wrong to modify the genetic makeup of plants because it's unnatural/Scientists that modify the genetic make-up of plants are interfering with processes that have been in place for millions of years and it will have harmful effects on the environment.

2. I don't agree with these older women having IVF – it's not natural/I don't agree with these older women having IVF – humans are not supposed to be able to reproduce at that age so it can't be a good thing.

3. Natural, organic foods are what we should be eating/People have been eating food grown in fields without pesticides for years and we should trust in tried and tested, non-intensive farming techniques to produce the food we eat.

4. Oliver was 8lb when he was born and it was a natural birth/Oliver was 8lb when he was born and it was a vaginal birth.

5. With doctors and medicines keeping us alive longer and longer, it undermines the way God intended the end of our lives to be/With doctors and medicines keeping us alive longer and longer, we are not allowed to die naturally.

6. It is totally unnatural to have pig's heart transplanted into a human body/The idea of having a pig's heart implanted into a human body is disgusting.

Appendix C: Process Design

This appendix details the process design used in the dialogue.

Methodology rationale

In designing this process, we have been mindful that you do not want to explore the public's perceptions of naturalness but are seeking to understand their responses to your review of existing research and the recommendations that follow from this. We have structured the event in three broad stages:

- 10:00 – 10:50 – Warm up and framing activities. These activities are designed to get participants thinking about the concept of naturalness and how it is used in ethical debates and wider society. By the end of this session, participants should feel equipped to discuss the findings of your research.
- 10:50 – 12:10 – Exploring and testing your research. To avoid focussing too much on *their own* reactions to naturalness, we have designed this session to focus on what participants think should follow from your research. This will involve them starting to think about any recommendations they think should follow from the research, as well as discussing their own reactions to the work and its importance for public debate.
- 12:10 – 12:50 – Exploring your potential recommendations. In this session, we will share your potential recommendations with participants, and explore what they think of them, and how they compare with what they had devised themselves in the previous session.

Activity	Process	Materials required
10:00 – 10:10	Introduction from lead facilitator; short presentation from Roland Jackson on the wider Naturalness project.	PowerPoint slides.
10:10 – 10:20	Icebreaker – ask each participant to bring with them an object that they consider 'natural'.	None.
10:20 – 10:30	What is naturalness? The purpose of this session is to introduce participants to the concept of naturalness and its relevance to ethical debates. Consider two examples: 1. Why might we consider genetically modified crops unnatural or natural? 2. Why might we consider IVF unnatural or natural?	2 example cards.

Activity	Process	Materials required
10:30 – 10:50	Naturalness paragraph exercise, provide several paired paragraphs of text on tables, printed on double sided paper. Ask participants to pick up paragraphs that interest them, and explain why they were attracted to these paragraphs. Try and cycle through several different paragraph pairs. Ask: a. How would you describe this paragraph? b. What do you think the writer is trying to get the reader to feel or think? Why do you think this (e.g., is it about the way it is written, choice of words etc.)? c. What differences are there in the way you respond to each paragraph? Why do you respond differently? d. What differences (if any) do you think there are in the meaning conveyed in this paragraph, compared with the one we looked at first? Why do you think this is?	Paragraph text cards.
10:50 – 11:00	Short presentation explaining the body of research into public perceptions of naturalness, explaining the five thematic reactions: 1. The wisdom of nature: We should trust in natural or evolved processes – linked to suggestion that new technologies can fail to respect nature. 2. Natural purpose: Unnatural technologies are wrong because they move people/animals/plants too far away from what they are meant to do or be like. 3. Disgust and monstrosity: Some technologies illicit responses of disgust and revulsion, which may be linked to concerns about naturalness. 4. God and religious belief: Certain technologies may serve to undermine a divine natural order, distort God's creation or contravene the will of God; 5. Neutral/sceptical views of naturalness: don't think that the distinction between natural and unnatural is robust; doubt links between naturalness and value.	PowerPoint slides (Anna Wilkinson) & wall poster.
11:00 – 11:20	Break – explore the reactions over tea break, look at the wall chart – ask them to put post it notes on the posters.	
11:20 –	Discuss and test the findings. Key question:	

Activity	Process	Materials required
12:00	What do you think these findings mean for the way that we understand writing that uses words such as "nature" / "naturalness" or "unnatural"? What do you think these findings mean for people who are communicating with us – for example, journalists, politicians, scientists? Does this matter differently in different contexts? For example: in newspapers, on cereal packets, on television etc. etc. What recommendations would you make about using these words to: - Journalists - Politicians - Scientists - Campaigners - Others At 11:55 – ask people to summarise their recommendations.	
12:00 – 12:10	Plenary feedback on recommendations.	
12:10 – 12.15	Explain recommendations being considered by Nuffield Council: For journalists, politicians, campaigners, scientists: - TBC	PowerPoint slides – Roland Jackson.
12.20 – 12:50	Discuss potential recommendations: - Do those recommendations make sense to you? - Do the recommendations to scientists/policy-makers/journalist seem appropriate to you? - How do they compare with what you discussed in the previous session? - Does it make sense to have different recommendations for different audiences?	
12:50 – 13:00	Next steps and close. Catherine explains what the next steps for the project are; evaluation forms are handed out in exchange for	Evaluation forms.

Activity	Process	Materials required
	incentive payments.	

Appendix D: Evaluation results

This appendix provides a summary of how participants assessed the event.

How much do you agree with the following statements? [✓]				
1. I feel that my views have been listened to.	1 Strongly disagree	0 Disagree	1 Agree	11 Strongly agree
2. There was enough time to discuss the issues.	1 Strongly disagree	0 Disagree	2 Agree	10 Strongly agree
3. I felt able to express my own opinions.	1f Strongly disagree	0 Disagree	1 Agree	11 Strongly agree
4. I understand why the event took place.	1 Strongly disagree	0 Disagree	5 Agree	7 Strongly agree
5. The event was well organised and delivered.	1 Strongly disagree	0 Disagree	1 Agree	11 Strongly agree

Any other comments:

- Great to have my view and opinions heard;

- Very interesting, thank you;

- Very interesting thank you;

- The event was very good;

- Very thought provoking;

- Very interesting and thought provoking – thank you.