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

REVIEW OF MEDIA, PARLIAMENTARY, CIVIL SOCIETY AND SCIENCE SOURCES

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Contents

1 Introduction

As part of the Nuffield Council on Bioethics' project on naturalness, evidence was sought on the ways that ideas about naturalness feature in public and political debates about science, technology and medicine. One strand of the evidence gathering activities involved conducting a review of the use of the terms *natural*, *unnatural* and *nature* in media articles, Parliamentary debates, and the publications of civil society organisations and organisations that represent scientists.

This work included reviewing newspapers and online media sources from the last five years; Parliamentary debates and statements by MPs and Lords documented in the Hansard record from the last ten years; the reports, briefings and other publications of civil society organisations and NGOs working on bioethics relevant topics from the last 20 years; and the published work of learned societies and other organisations representing the views of scientists from the last 20 years.

Material on a range of bioethics topics was examined and uses of the terms *natural*, *unnatural* and *nature* were sorted into one of four different categories: value-laden, value-neutral, borderline cases and discussion uses.

The review identified uses of the terms within debates on genetic modification, food and farming, cloning, assisted reproduction and childbirth, cosmetic procedures, xenotransplantation, complementary and alternative medicine, end of life medicine, and sports science and use of prosthetics.

This is not a scientific study and the volume of material explored and limitations to the techniques used within the review mean it is not possible to use these results to draw inferences about statistically significant relationships between the variables explored. However, the review identified a range of value-laden examples of uses of the terms *natural, unnatural* and *nature*, indicated some differences in how these terms were used in distinct sources and contexts explored, and provided some other insights into the different ways that ideas about naturalness may feature in bioethics debates.

2 Approach and methodology

The objectives of the review were to identify uses of the terms *natural, unnatural* and *nature* in public debates of bioethics topics which connect ideas about naturalness with value, and explore the different ways that naturalness and value may be associated in these contexts.

2.1. Media articles

The review of media articles covered relevant articles from the last five years, beginning on 1 January 2010 and ending on 1 April 2015. This interval was considered both long enough to cover a substantial period of news coverage and balance out any trends in media coverage that may over- or under-expose certain topics, and short enough to be feasible within the timeframe of the project.

The following media sources were chosen for the review in order to include a range of readership profiles: The Guardian, The Daily Mail, The Telegraph and The Sun newspapers, and the BBC News website.

Keywords were used in conjunction with the words *natural*, *unnatural* and *nature* to identify bioethics-related news articles. Different words were tested for effectiveness in retrieving relevant articles from the selected sources. The word 'xenotransplantation', for instance, and candidate proxies such as 'hybrid', 'mutant' etc. were not effective in retrieving relevant articles and so were not included. The ten keywords found to be the most effective in retrieving relevant articles were IVF, GM, franken*, clone, cosmetic food, gene, conception, donation, birth, CAM and prosthetic.

A combination of tools was used to search media sources. The academic database [LexisNexis](#) stores every published article from each of the major UK newspapers and was used to identify and review relevant articles from The Guardian, The Daily Mail, The Telegraph and The Sun newspapers. News stories from the BBC website are not stored in LexisNexis and the BBC search engine was not effective in retrieving relevant articles, so the 'Advanced Search' feature of the search engine, Google, was used to conduct searches confined to the BBC website.

Due to the different meanings of the word *natural* (to mean *usual* or *understandable*) very large numbers of results were generated by searches conducted with the search engine Google and therefore only the first 100 articles listed in the search results were reviewed for relevance in these cases. Searches using the Lexis database generated fewer, more relevant sets of results.

There were differences in how many relevant articles searches using each keywords generated. Some bioethics-specific keywords, such as 'clone' tended to generate smaller sets of relevant results, meaning that it was not possible to review exactly the same number of articles for each search term and for each media source. We reviewed up to 25 articles for each source but the majority of search terms generated smaller sets of results. The results were not used to compare different media

sources with one another but rather to gather as much evidence as possible about uses of these terms across relevant media.

In total 132 articles from the Guardian, 150 from the Daily Mail, 125 from the Telegraph,105 from the Sun and 117 from the BBC, published between 1 January 2010 and 1 April 2015, were included in the media review.

2.2. Parliamentary sources

The review of Parliamentary sources covered House of Commons and House of Lords debates and written and oral answers and statements from the last 10 years beginning on 1 January 2005 and ending on 1 April 2015. The same keywords used for the media review were used to identify relevant debates.

The website www.TheyWorkForYou.com records all Parliamentary debates and was used to access the Parliamentary sources.

In total 181 debates, written and oral answers and statements from between 1 January 2005 and 1 April 2015 were reviewed.

2.3. Civil society organisations and organisations representing scientists

Civil society organisations working on bioethics-related topics were identified and their websites were searched for reports or briefings that might contribute to public or political debates. These kinds of publications were thought to represent the considered position of these organisations better than more informal publications such as blogs or short news articles. Relevant organisations that were found to have published this kind of material were Greenpeace, Christian Medical Fellowship, Soil Association, Genewatch UK, Society for the Protection of Unborn Children, Antibiotics Alliance and Human Genetics Alert.

The same process took place for organisations representing scientists. Relevant organisations that were found to have published reports, briefings or other material on bioethics-related topics were the Royal Society, Academy of Medical Sciences, Royal Society of Biology, Royal Society of Chemistry, Royal Academy of Engineering, Research Councils and Sense About Science.

Only publications discussing bioethics-related topics, such as genetic modification, assisted conception, organ donation and food, were included in the review.
Reports, briefings and other material published by civil society organisations and organisations representing scientists are generally publicly available on websites and consequently there was no need to make use of databases or search engines to identify relevant material.

Reports and other policy-relevant documents are published by civil society organisations and organisations representing scientists far less frequently than articles are published by media sources, meaning that the number of relevant reports published since 2010 was much smaller. For this reason reports from a longer

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period, of 20 years, were reviewed for use of the terms *natural*, *unnatural* and *nature*. The oldest report included in the review was published in 1998.

In total 126 publications from civil society organisations and 48 publications from organisations representing scientists from 1998 to the present day were reviewed.

2.4. Method for distinguishing between different types of uses of the terms *natural, unnatural* and *nature*

We identified four different types of uses of *natural*, *unnatural* and *nature*: **value-laden**, **value-neutral**, **borderline** and **discussion**. We also identified a subset of **agency** uses of the term *nature*.

Some uses of these terms purport to make straightforward appeal to a certain kind of relationship with what we call the natural world. This is the sense in which it might be said that plants indigenous to a particular area, or the jungle, are natural, and that a space shuttle, for example, is not. A wide range of things may be described in this way (rightly or wrongly) and when these words are used in that way, this can be thought of as a purely descriptive, **value-neutral** use of those terms.

The terms *natural*, *unnatural* and *nature* are also sometimes used to convey ideas about what is good or bad, or right or wrong. This can involve implying that something should be endorsed, commended, praised or favoured on the basis of its being natural e.g. '*wholefoods must be better since they are totally natural*', or conveying that something should be criticised, condemned or denounced on the basis of its being unnatural e.g. '*modifying the DNA of animals is unnatural and therefore wrong*'. These are cases in which it is being suggested that there is some close connection between naturalness and value, and are instances of the terms being used in **value-laden** contexts.

Whilst the particular definitions of the terms *natural*, *unnatural* and *nature*, and the means by which they sometimes convey ideas about value, are issues over which people may disagree, it seems that these words can be used in these two quite different ways – to assign some value-neutral property or to convey something about the value, worth or desirability of the thing described.

It is not always straightforward to distinguish an apparently value-laden from a value-neutral use of the terms *natural*, *unnatural* or *nature*. Whilst some uses appear to be straightforwardly value-neutral ('*the natural sciences'* or '*the natural environment'*) and some seem to clearly express some value judgement ('*human cloning is wrong because it's completely unnatural*'), it is often not obvious whether a person means to say something positive or negative about the thing they describe, or whether they simply intend to refer to some value-neutral property and say nothing about whether they take that thing to be good or bad.

Forming an assessment of whether a given use of the relevant terms is value-laden or value-neutral within the context of this review involved making an inference about whether the term had been deployed in order to say something positive or negative,

to commend or condemn, or do neither, on the basis of other features of the text. Our approach was to classify a given use of the relevant words as value-laden on the basis of factors such as the concurrent use of praising or criticising words, or appeal to what is implied to be related moral objection or approval. The process of categorising uses in this way necessarily involves an element of judgement and the criteria developed to make classifications were used as a guide, rather than a set of rules, on categorising uses.

After piloting draft criteria it was agreed that two further categories should be distinguished. It was thought that a separate category of **borderline** cases would facilitate a more nuanced exercise since there were numerous uses of the relevant terms in contexts suggestive of or associated with positive or negative values, but which could be reasonably said to fall short of endorsement or condemnation.

A separate **discussion** category was also created for uses of the relevant terms where the context implied that the language-user intended to acknowledge, engage with and/or question ideas about the connection between naturalness and value. For example, cases where a use might directly address the question of whether natural ageing or natural foods are better in virtue of being natural. These uses were sometimes flagged with the use of quotation marks e.g. '*some will complain that GM is a less 'natural' way of feeding the world's poor though it is unclear what this amounts to....*' but other instances, plausibly construed this way, did not e.g. '*Some people might accuse me of being selfish, or going against nature, but isn't it going against nature to perform heart surgery or transplants*?'

Use of the term *nature* was further classed - or 'tagged' - as an **agency** use if it carried an implication that nature was able to exercise agency or carry out intentional actions, or otherwise personify nature, whether by suggesting that nature was capable of knowing, deciding, choosing, or being something on which people should trust or rely e.g. 'Nature knows best' or 'Mother Nature'. These uses were further categorised as value-neutral, value-laden, borderline or discussion in the same way as every other case.

3 Classification criteria

Below are the considerations used to guide the classifications of the relevant terminology made in this review.

3.1. Value-laden uses

Considerations taken to count in favour of classifying a use of *unnatural* as **value-laden**:

- The word is used to describe something that is simultaneously described using negative [1] or critical descriptive words e.g. '*cloning is cruel and unnatural'*.
- The word is used to describe a feature to which the wrongness or badness of a process, technique or product is attributed e.g '*giving birth at the age of 60 is wrong because it's completely unnatural'*.
- The word is used to describe a feature about which it is said or implied that people have, would or should have, moral concerns e.g*. 'many would object to the use of such unnatural products'*.
- The word is used to describe a feature which is contrasted with other features that are themselves described positively or commended, or it is implied are positive, e.g. *'instead of using normal, wholesome processes, the procedure is unnatural'*.
- The word is preceded by an adjective which emphasises the degree to which the described object is unnatural e.g. '*transplanting a pig organ into a human being is a profoundly unnatural thing to do'*.

Considerations have taken to count in favour of classifying a use of *natural* as **value-laden**:

- The word is used to describe something that is simultaneously described using positive or commending descriptive words e.g. '*traditional farming methods are natural and safe'*.
- The word is used to describe a feature to which the rightness or goodness of a process, technique or product is attributed e.g. '*alternative remedies must be better because they are natural'*.
- The word is used to describe a feature which is contrasted with other features about which it is said or implied that people have, or should have, moral concerns e.g*. 'these natural methods are supported by many who would object to the use of modern fertility techniques'*.
- The word is used to describe a feature which is contrasted with other features described negatively or critically, or it is implied are negative, e.g. *'instead of using chemical, toxic substances, the procedure relies on a natural process'*.

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[1] A list of the words interpreted as negative and positive which was used in making these classifications can be found at paragraph 3.7.

- The word forms part of an expression the (overall) meaning of which construes what is natural as positive e.g. '*breastfeeding is the most natural thing in the world'.*

Considerations taken to count in favour of classifying a use of *nature* as **value-laden**:
- It is said or implied that a course of action should respect, revere or value nature e.g. '*we need to have greater faith in nature's ways of doing things'.*
- Verbs used to describe interventions or alterations to aspects of the natural world carry negative connotations e.g. '*the creation of hybrid animals involves meddling with nature* or *scientists' tampering with nature is getting out of hand'.*
- It is said or implied that nature is something vulnerable, delicate or fragile and should be protected e.g. '*introducing GM species to the natural environment is that this is bound to upset the fine balance of nature'.*
- The word forms part of an expression the (overall) meaning of which construes what nature as positive e.g. '*miracle of nature'.*

3.2. Value-neutral uses

Considerations taken to count in favour of classifying a use of *unnatural* as **value-neutral**:
- The word is used to describe something not found in the natural world e.g. '*this provides the cell with an instruction to incorporate an unnatural amino acid, one not normally found in living organisms'.*
- The word is used to describe an event or action unlikely to happen without human intervention.

and
- The word does not satisfy any of the value-laden criteria for *unnatural* i.e. the word is not used describe something that is simultaneously described using negative or critical descriptive words.

Considerations taken to count in favour of classifying a use of *natural* as **value-neutral**:
- The word is used to describe something found in the natural world e.g. '*sugar is naturally present in honey and fruit'.*
- The word is used to describe an event or action which may happen without human intervention e.g. '*antimicrobials may be synthetic or naturally produced by biological processes'.*
- The word forms part of an expression established by convention referring to a particular kind of process or activity e.g. '*Emma and Adam had been unable to conceive naturally'.*

and
- The word does not satisfy any of the value-laden criteria for *natural* i.e. the word is not used to describe something that is simultaneously described using positive or commending words.

Considerations taken to count in favour of classifying a use of *nature* as **value-neutral**:

- The word is used to describe the natural physical world e.g. '*this is one of a number of such compounds found in nature*'.

and

- The word does not satisfy any of the value-laden criteria for *nature* i.e. it is not said or implied that a course of action should respect, revere or value nature.

3.3. Borderline cases

Considerations taken to count in favour of classifying a use of *unnatural* as **borderline** case:

- The word is used to describe something within a paragraph or section of an articles, debate or report, which conveys a negative or critical stance towards that thing, overall.
- The word does not clearly fall into the value-laden, value-neutral or discussion categories, as characterised above.

Considerations taken to count in favour of classifying a use of *natural* as **borderline**:

- The word is used to describe something within a paragraph or section of an article, debate or report, which conveys a positive or commending stance towards that thing, overall.
- The word does not clearly fall into the value-laden, value-neutral or discussion categories, as characterised above.

Considerations taken to count in favour of classifying a use of *nature* as **borderline***:*

- The word is used in a paragraph or section of an article, debate or report which conveys a positive or commending stance towards to the natural environment, overall.
- The word does not clearly fall into the value-laden, value-neutral or discussion categories, as characterised above.

3.4. Discussion uses

Considerations taken to count in favour of classifying a use of *natural, unnatural'* or *nature* as **discussion***:*

- Quotation marks or apostrophes flank the word e.g. '*there is no 'natural' way to have a baby...* or *some will complain that this as 'unnatural''.*
- The subject matter of the article, report or debate engages with and/or challenges ideas about the connection between naturalness and value e.g. '*The cult of natural childbirth has gone too far*' and '*Why is it so important to have one mother and one father?*'

3.5. Agency uses

Considerations taken to count in favour of classifying a use of *nature* as **agency**:
- Nature is named e.g. '*Mother Nature'* or capitalised (mid-sentence).
- The word is used in a context in which it is said or implied that nature has knowledge or wisdom e.g. '*Nature knows best'* .
- The word is used in a context in which it is said or implied that nature is something in which people should place trust e.g. '*we should stop trying to beat nature at her own game*'.
- The word is used in a context in which it is said or implied that nature is capable of intentional action '*nature's revenge*' or '*Nature's conquest of Man*'.

3.6. Further notes on value-neutral uses

Ambiguity and proper names

Some uses of the relevant terms were discounted (sorted as neither value-laden, value-neutral or discussion) since they were taken not to be directly relevant to the objective of reviewing the ways that the notion of naturalness features in bioethics debates. Excluding such cases also meant that a longer period of bioethics-relevant public debate could be reviewed.

Proper names

Uses in which the term *natural, unnatural* or *nature* formed part of a proper name, such as the Natural History Museum, or Natural killer cells (NK cells) or *Nature*, the journal, were mostly not counted. Names of commercial products incorporating the terms *natural* or *nature* were taken to be promoting the product in question e.g. '*Natural goodness'* and '*Nature's Way*' and were counted as borderline cases.

Other meanings

Cases in which the term *natural* was used to mean something akin to 'obviously' in instances that did not directly involve a bioethics-relevant topic or point were not counted. For instance, uses of the following kind were excluded: '*Naturally Jim and Tamsin want to spend as little money on their food bill as possible*'. Cases of the kind '*it is only natural that Maria wanted a baby without resorting to IVF*' were counted as value-laden, value-neutral or discussion, depending on other features of the example.

The word *nature* is also sometimes used as a synonym for *features* or *character* and sentences of the kind '*the nature of the situation means the announcement is likely to arouse controversy amongst certain groups*' or '*Phillip explains that it is in his nature to take things personally and he was upset by the criticism of his choice*' were not counted.
The uses of *natural* and *nature* in these other contexts often carry positive or negative associations and may affect, in more subtle ways, views about naturalness

more generally and, thereby, the ways that debate on bioethics is conducted and novel technologies viewed. This is not something explored directly in the review.

3.7. Conventions involving the terms natural, unnatural and nature

Sometimes the word *natural* is most plausibly construed as part of a referring expression picking out a particular process, characteristic or other feature of the world. Examples of this are '*natural fertility*' and '*natural variation*'. These were largely classified as value-neutral uses on the grounds that there are well-entrenched conventions around the use of these terms to distinguish particular kinds of process from others. '*Natural variation*' is plausibly not a particular kind of variation but an expression used to refer to a specific scientific process. The expression '*natural conception*' also appears to be used frequently as a proxy for '*conception not involving the use of fertility techniques*'. '*Natural childbirth*' often seems to be used as a shorthand means of referring to childbirth without the aid of what, in the UK, are standard medical interventions.

The review did not routinely interpret these cases as value-laden or borderline uses of the term *natural*. The approach taken was to treat these kinds of case as inherited terminology and not (necessarily) instances of the term *natural* being used to commend, endorse or praise types of conception or childbirth etc, or otherwise invoke value. A further consideration in classifying these cases this way was that these expressions are sometimes used in contexts where these processes are discussed in negative or critical ways e.g. '*it's a dangerous myth that natural childbirth is not only the kindest form of delivery but also invariably the safest*' (Daily Mail, 2011). These expressions, however, are sometimes used in ways that do appear to commend, praise or endorse, or are suggestive of value, and these were sorted as value-laden or borderline e.g. '*Infertility treatment should focus much more on restoring natural fertility to patients and far less on engineering in the laboratory. Children deserve the best*' (Daily Mail, 2010).

3.8. List of words construed as positive or negative

Positive

Ethical, healthy, wholesome, gentle, humane, safe, common-sense, historically highly-efficient, sustainable, life-saving, acceptable, normal, dignified, better-performing, fabulous, comfortable, real, desirable, less traumatic, traceable, easy, beloved, cherished, amazing, elegant, efficient, effective, rich, fluid, fresh, proper, unadulterated.

Negative

Evil, insane, cruel, unnecessary, unethical, frankensteinish, odd, sad, industrialised, weird, revolting, expensive, inedible, rock hard, selfish, disturbing, scary, unsightly, out-of-place, undesirable, unpalatable, unfulfilling, painful.

4 Findings

4.1. Key insights

The review drew a number of insights about how ideas about naturalness feature in bioethics debates. Key insights from the review were:

- There were a variety of ways that naturalness and value were associated in debates on bioethics.

- A range of uses of the terms *natural*, *unnatural* and *nature* in value-laden contexts were identified in the media, Parliamentary and civil society sources reviewed.

- Within the publications of organisations representing scientists reviewed, value-laden uses of the words *natural*, *unnatural* and *nature* were almost non-existent.

- Cases of value-laden uses were identified in discussions of a wide range of bioethics topics including genetically modified crops, assisted conception, cosmetic procedures, cloning, mitochondrial donation, sports science, alternative medicine, and death and dying.

- There is a contrast between the regularity with which value was invoked by use of the term *natural* and the term *unnatural*. The term *unnatural*, when used, was more likely to convey something negative than the term *natural*, when used, was to convey something positive.

- Within the media articles reviewed, there was a larger proportion of value-laden uses of the words *natural* and *unnatural* in non-news articles (such as editorials, features and comment pieces) when compared with news articles.

- Uses of the term *nature* that implied nature is capable of agency, or otherwise personified nature, were often associated with value.

4.2. Ways that naturalness and value can be associated

Associations between naturalness and value within the bioethics debates reviewed were made in a number of ways. Sometimes suggestions about the connection between naturalness and value were conveyed when the terms *unnatural*, *natural* or *nature* were used alongside other critical or commending words, thereby associating naturalness or unnaturalness with other good or bad features. Technologies were sometimes described as 'unnatural and cruel', 'unnatural and unsightly' or 'unnatural and disturbing':

> [Breast implants] *are **hard, unfeeling, unnatural**, as well as a **health hazard** to the silly little cow that owns them* (The Sun, 2013)

> *Animal welfare campaigners say mega farms are **unnatural and cruel*** (BBC, 2010)

> *Between today and the end of my life, I hope there are a few more decades. But, as time goes by, the idea of dying without children feels **unnatural and sad**.* (Daily Mail, 2013)

Similarly, naturalness was often associated with value in virtue of the term *natural* being used conjointly with positive words, as in 'natural and safe' or 'natural and healthy':

> *'Cloning, cruelty and how science sold out to greed'…..far from being a **natural, or indeed wholesome process**, British Agriculture is embracing technological advancements at a terrifying pace* (Daily Mail, 2010)

> *Record numbers of people are now eating organic, and many of them are doing so because they feel intuitively that they are making a more **natural and healthy** choice* (Soil Association, 2001)

> *Dermal fillers sounded **safer and more natural**, as they're made from hyaluronic acid* (Daily Mail, 2012)

> *Let us get on with working for patients to live as well as possible until a **natural, dignified** death, not be taken up in becoming complicit in suicide* (Debate on Assisted Dying for the Terminally Ill Bill, 2006)

Some of the value-laden and borderline examples emphasised the *degree* to which a technology or activity is unnatural. Descriptions of technologies or other interventions as *profoundly*, *wholly*, *deeply* or *thoroughly* unnatural often went hand-in-hand with critical broader positions on the technology concerned. Phrasing of the kind *all, fully, completely* natural similarly indicated a positive stance to the thing described.

> *The routine freezing of eggs and use of IVF] is a future many might find **profoundly unnatural**, far removed from what we would wish for our daughters* (Daily Mail, 2011)

> *It wasn't a religious thing, but the thought of our baby being in a test tube before being in my womb was something I didn't agree with. It all just seemed **so unnatural*** (The Sun, 2010)

> *Margarine and spreads are **thoroughly unnatural** and loaded with additives. We now know that old-style spreads with trans-fats caused heart disease.* (The Sun, 2012)

> *I'd definitely have [the procedure] again - it's an **all-natural** Botox* (The Sun, 2012)

> *According to [the project designer]... it is an example of high-tech but **fully natural**, healthy, and sustainable food made possible by combining aspects of nature, science, technology and design* (Daily Mail, 2015)

In other cases, problems or negative aspects of a novel technology were directly or indirectly attributed to their unnaturalness or positive aspects of a process or technique attributed to its naturalness. These cases involved words like 'because' 'since' or 'as', or described effects or consequences of natural or unnatural features. The implication of these kinds of example is that a technology's being natural or unnatural is the source of what is right or wrong with it, or the cause of some favourable or adverse consequences:

> *People who tend to go down the herbal medicine route have a lot of confidence, however, **because** they are dealing with **nature** and **natural** products that have been used over the years* (Parliamentary debate on complementary medicine, 2013)

> *It's not a **natural** way for a baby to be born so **therefore** there are complications for the baby, there are certainly complications for a woman* (BBC, 2011)

> Genetically engineered crops are not accepted in organic farming, **as** it contrasts with the concept of **naturalness** and integrity (Greenpeace, 2014)

> *The body's complex system is being forced to do something very **unnatural**, and this requires large hormone doses. It is not surprising that these would have potentially dangerous **effects** on the body.* (Human Genetics Alert, 2011)

> *But the cleaner says the vampire facelift appealed **because** it's a **natural** treatment* (The Sun, 2012)

A further group of uses associated with value involved what might be thought of as 'value-laden expressions'. These were phrases or idioms using these terms that tend to be routinely deployed as a means of saying something positive or negative. As it

happens, these exclusively involved the words *natural* and *nature* and had positive connotations:

> *It should be **the most natural thing in the world**, starting a family when the time is right, but for many thousands, it just does not happen* (BBC, 2011)

> *Perhaps, rather than being at constant battle stations, we should get used to the idea [of death], especially as a former editor of the BMJ, Richard Smith, said it was probably the best way to go: "**Nature taking its course**."* (Guardian, 2015)

> *I have seen enough births to know that **no one knows better than Mother Nature*** (Daily Mail, 2011)

> *Are animals that combine species an unethical alteration of the **natural order of the Universe?*** (BBC, 2014)

4.3. Differences in uses of all terms between different sources of debate

The charts below (Figure 1) show comparisons of different kinds of use for all terms (*natural*, *unnatural* and *nature*) in the media articles, Parliamentary debates and reports of civil society and science organisations reviewed.

There were a range of uses of the terms *natural, unnatural* and *nature* in value-laden contexts in media, Parliamentary and civil society sources. These uses were found within discussion of a wide range of bioethics topics including genetically modified crops, assisted conception, cosmetic procedures, cloning, mitochondrial donation, sports science, alternative medicine, and death and dying.

Across all sources, the majority of uses of each of the terms *natural*, *unnatural* and *nature* were value-neutral. As explained in section 4.4 below, the word *natural* was used in value-laden contexts proportionately more regularly than the word *unnatural*. When considered together, and alongside uses of the word *nature*, the total proportions of uses of these words that occurred in value-laden and borderline contexts in the material reviewed were quite low.

The overall split between value-neutral, value-laden, borderline and discussion uses was comparable in media and Parliamentary sources.

Bioethics debate in the publications of civil society organisations featured a notably lower proportion of uses classified as discussion uses than the media and Parliamentary sources. This indicates that within these organisations' publications on bioethics topics, engagement with, and challenges to, ideas about the connection between naturalness and value was less common. The Christian Medical Fellowship was somewhat unusual within the group of civil society organisations in addressing this topic directly in more than one report:

Figure 1: Comparison of different kinds of use of all terms (*natural, unnatural* and *nature*) identified in media articles, Parliamentary debate and the reports of civil society and science organisations
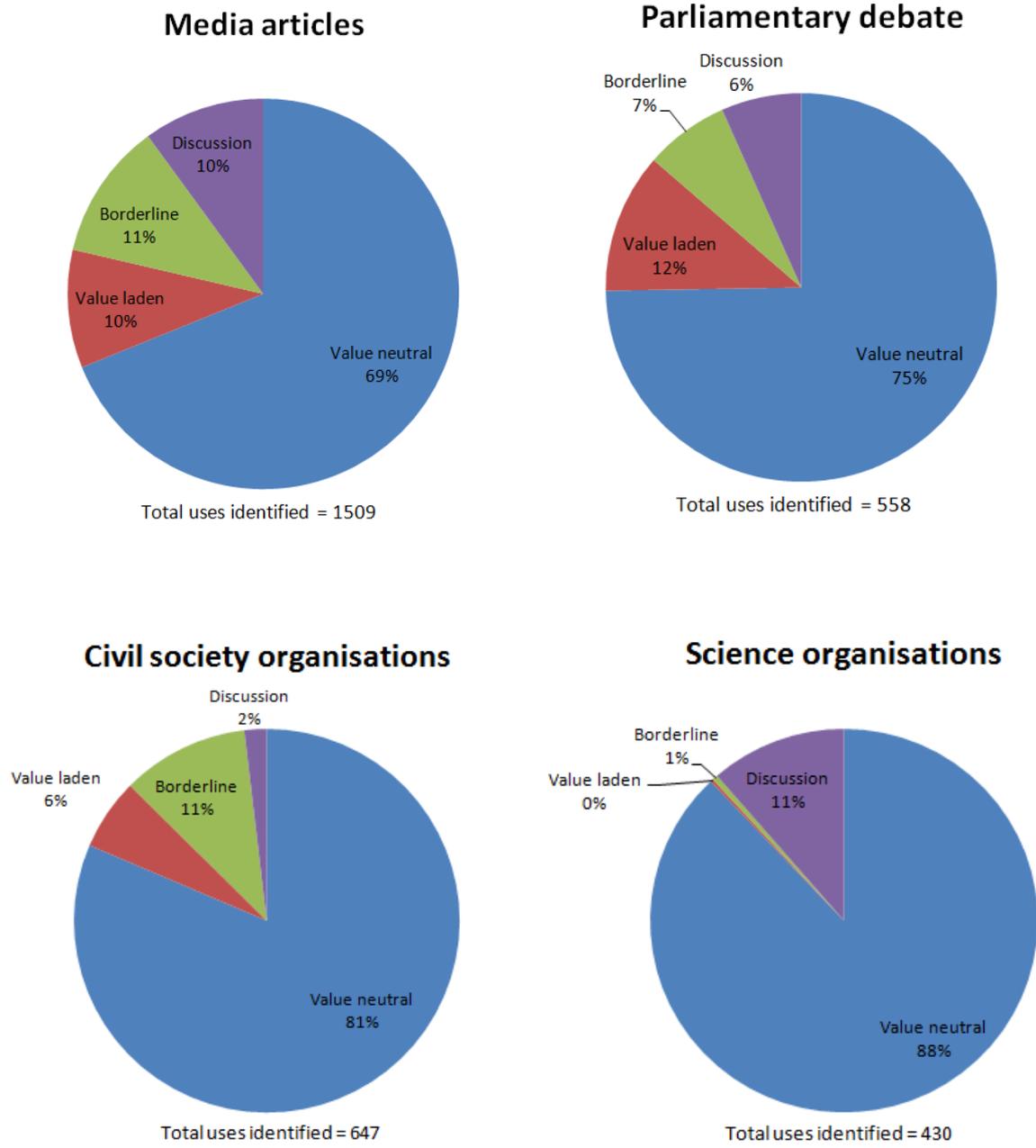
> *We need to be careful of falling into the trap of assuming that if something occurs in 'nature' then it must be good* (Christian Medical Fellowship, 2007, *Chimeras, hybrids and 'cybrids'*)

> *Ted Peters in his book 'Playing God?' makes a point that needs to be emphasised in today's Nature-glorifying society. He emphasises that just because something is 'natural' does not make it right.* (Christian Medical Fellowship, 2001, *Genes and Behaviour*)

> *The problem is that simply being natural does not necessarily make a feeling right. A doctor may have a 'natural instinct' to ignore a rude smelly patient, though if she cares, she will still respond to the patient's needs* (Christian Medical Fellowship, 1999, *The ethics of caring*)

Value-laden and borderline uses of the terms *natural*, *unnatural* and *nature* were almost non-existent in bioethics debates within the publications of organisations representing scientists. The following examples typify the kinds of use of these words within the work of science organisations:

> *Hair cell regeneration occurs naturally in birds after damage, providing an extra impetus for research into how this might be replicated in humans* (Royal Society, 2012, *Human Enhancement and the Future of Work*)

> *There is little information on the duration or natural history of many forms of dependent illicit drug use* (Academy of Medical Sciences, 2008, *Brain science, addiction and drugs*)

There were just two cases which were classified as borderline cases and a single instance of a value-laden use. This suggests that scientists may be less likely than non-scientists to make use of the terms *natural*, *unnatural* and *nature* in ways invoking value.

On the other hand, science organisations more regularly made use of the terms that were categorised as discussion, suggesting these publications more frequently engage with questions about the relationship between naturalness and value:

> *Whether a chemical kills pests, and the speed at which it does, has nothing to do with whether the chemical is natural or synthetic, but is to do with the properties of the chemicals and how they kill insects* (Sense About Science, 2007, *Celebrities and Science 2007*)

> *Not only is it very difficult to specify what 'unnatural' means, but it is not clear why 'unnaturalness' should be bad; IVF is an 'unnatural' process, but it has few contemporary opponents. Vaccination and antibiotic therapy, and nearly all of modern medicine, represent a scientifically informed intervention in nature.* (Academy of Medical Sciences, 2007, *Inter-species embryos*)

4.4. Differences in uses of natural versus unnatural

The review identified examples of both *natural* and *unnatural* being used in contexts that connect naturalness with value in media, Parliamentary and civil society sources.

However, proportionately, there was a contrast between the regularity with which value is invoked by use of the term *natural* and the term *unnatural*. Within the sources reviewed, the term *unnatural*, when used, was more likely to convey something negative than the term *natural*, when used, was to convey something positive. The term *natural* was used much more frequently overall, than the term *unnatural* but the majority of uses of *natural* were value-neutral.

The charts below (see Figure 2) show a comparison of how the two terms *natural* and *unnatural* are used differently from one another in media, Parliamentary, science and civil society sources.

Use of natural

Notably, as a proportion of the total, uses of the term *natural* that were categorised as value-laden or borderline was not high. Most uses were instead classified as value-neutral, suggesting that the word *natural* is, proportionately, not used in value-laden way often.

There are a large number of expressions incorporating the term *natural* that are used frequently in reports on science and technology, such as '*natural variation*', '*natural selection*' and the '*natural environment*', as well as expressions like '*occurs naturally*' and '*naturally found in....*'. This is likely to account partially for the high proportion of value-neutral uses identified in the review. There were many examples of the kind below:
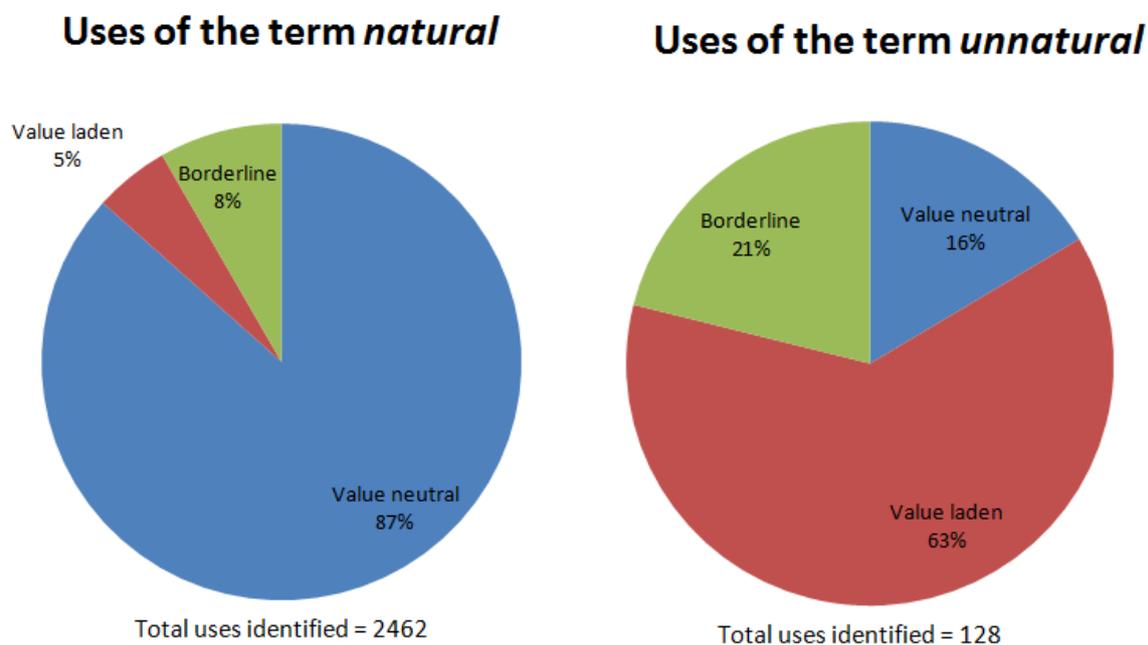
> *The rice has been engineered so that the precursor chemical is expressed in the edible grain as well as in the non-edible leaves, where it occurs **naturally*** (BBC, 2013)

> *Hyaluronic acid is found **naturally** in the human body and many temporary fillers use a synthetic form* (Daily Mail, 2012)

> *The chemical, known as (E)-beta-farnesene (EBF), is also found in beer because it occurs **naturally** in hops… lists over 300 varieties of plants in which EBF is known to occur **naturally*** (The Guardian, 2011)

> *Nicola and Nigel Dawson have experienced the frustration and heartbreak of infertility. The couple tried for several years to conceive **naturally**, but without succes*s (Guardian, 2014)

Figure 2: Comparison of different kinds of use of the terms *natural* and *unnatural* identified in media articles, Parliamentary debates and the reports of civil society and science organisations

Uses of the term *natural*

Value laden 5%
Borderline 8%
Value neutral 87%

Total uses identified = 2462

Uses of the term *unnatural*

Borderline 21%
Value neutral 16%
Value laden 63%

Total uses identified = 128

The term *natural* therefore appears to have a wider range of uses in value-neutral contexts, even when applied in bioethics debates. Uses which invoke value, such as '*medicinal remedies are better because they are natural*' or '*food that hasn't been genetically modified is better because it's natural*' therefore formed a lower proportion overall of these uses.

Nevertheless there were many examples of the word *natural* being used to convey ideas about the natural being good, positive, right or better than unnatural or non-natural things, particularly within articles on cosmetic procedures and other kinds of cosmetic enhancement:

> *I don't have any concerns about stem cells - they aren't man-made like Botox. I feel reassured about the safety because it is a* **natural** *product* (The Sun, 2013)

> *Karen wanted to lessen the appearance of lines on her face, and took it all in her stride: "There was some discomfort, but nothing to scream about. And I'm very pleased with the result - very* **natural** *looking"* (BBC, 2013)

Within food and farming:

> *But far from being the latest genetically modified monster, this horticultural wonder is entirely natural. Mr Hansord added: "Each TomTato plant is specially grafted by hand to create this unique double cropping feature. There's no genetic modification - it's an all-**natural**, and safe process"* (Daily Mail, 2013*)*

> *"The further you go from a normal, **natural** diet the more potential risks people can run in terms of health and other issues," she said* (BBC, 2013)

> *This week a British farmer….showed that, far from being a **natural,** or indeed wholesome, process, British agriculture is embracing technological advancements at a terrifying pace* (Daily Mail, 2010)

> *Tumbled chicken breasts are a symbol of how heavily-industrialised, intensive production now dominates the food chain, robbing the public of the **natural** flavours and wholesome goodness that we ought to expect from a succulent chicken breast* (Daily Mail, 2013)

> *I'm so concerned about the new labelling scheme. Those red lights will unfairly stigmatise perfectly healthy, **natural** foods, while the green lights will offer false reassurance to consumers, rewarding the food-processing companies that make us fatter and sicker every day* (Daily Mail, 2012)

There were other kinds of use that referred to '*natural rhythms*', '*natural cycles*' '*natural systems*' or '*natural ways*' which featured in discussion of a range of bioethics topics, here cloned meat, farming and genetic modification:

> *The idea of eating meat from the offspring of a cloned animal conjures up images of a science fiction world where the food chain is manipulated by geneticists and where the **natural** rhythms of life are ignored in the name of profit* (Daily Mail, 2011)

> *The organic movement has repeatedly advocated the precautionary principle, questioning practices that violate the **natural** cycle and represent a potential threat to health* (Soil Association, 2001)

> *The disease is humanity's abuse of **nature**. The disease is the factory farming on steroids that is poisoning and exhausting the **natural** systems that we humans depend on for our survival* (Guardian, 2013)

Use of unnatural

In contrast, the majority of uses of the term *unnatural* were value-laden, or were borderline cases, and a notably smaller proportion of uses were value-neutral. *Unnatural*, as compared with *natural,* was more reliably associated with value in discussions of science and technology:

> *We'd assumed IVF was a magic bullet, where the only major concern was coming to terms with making a baby in a rather **unnatural** way* (Daily Mail, 2014)

> *The instinctive desire within many of us not to consume something that is "**unnatural**" - the fear of so-called "**Frankenfoods**"* (Guardian, 2012)

> *I was also unhappy with the idea of having something as **unnatural** as a **silicone implant** in my body* (Daily Mail, 2012)

By way of comparison with the term *natural,* there are no obvious analogues to expressions like '*natural variation*' or '*natural selection*' which feature the term *unnatural*. Further when a natural process is compared to one that is taken not to be natural, it would often be described with a word other than *unnatural*. For instance, '*natural reproduction*' tended to be contrasted with '*assisted reproduction*' or, more commonly, '*IVF*'.

> *Too little is known about the basic mechanisms of early human development – whether **natural** or assisted – about interactions between the mother and her growing baby, or about the overall risks and benefits of ART to draw firm conclusions about whether a new treatment may have any unforeseen adverse consequences* (MRC, 2004, *Assisted reproduction: a safe, sound future*).

> *Since the first **IVF** baby was born in 1978, a staggering 85 licensed fertility clinics have sprung up in the UK and as many as four million babies have come into the world as a result of fertility treatment* (Daily Mail, 2011)

Unnatural, more so than *natural* was used as a value-laden term to condemn science and technology across the board including on cloning:

> *In Britain and the EU it is still illegal to sell meat or milk from **cloned animals** for food in general — and surveys suggest that consumers would most strongly object to eating or drinking such **unnatural** products* (Daily Mail, 2010)

> *But the reward meted out to a sausage-dog called Winnie may be regarded as **unnatural** — and even cruel — by many animal lovers. The 12-year-old dachshund has become the first dog in Britain to be **cloned**.* (Daily Mail, 2014)

Genetically modified food:

> *The instinctive desire within many of us not to consume something that is "**unnatural**" - the fear of so-called "**Frankenfoods**"* (Guardian, 2013)

*Moreover, people raise ethical concerns regarding intellectual property issues on crops and genes; about scientists "playing god", as **crops** are transformed in **unnatural** ways and about the implications for traditional beliefs and values* (Greenpeace, 2014)

*There is considerable unease about the morality of **genetic modification** per se and its potentially damaging effects on the environment. Some of the moral anxiety stems from discomfort with what is often characterised as 'tampering with nature', 'playing God' or as 'dangerous and **unnatural**'.* (Genewatch, 1998)

On assisted conception techniques:

*We'd assumed **IVF** was a magic bullet, where the only major concern was coming to terms with making a baby in a rather **unnatural** way* (Daily Mail, 2014)

*It wasn't a religious thing, but the thought of our **baby being in a test tube** before being in my womb was something I didn't agree with. It all just seemed so **unnatural.*** (The Sun, 2010)

*She said being a single parent made it easier emotionally for her to become involved in **surrogacy**, as husbands of surrogates could see it as **"unnatural"** that their partner was carrying someone else's child* (BBC, 2010)

*The creation of **hybrid embryos** undermines our dignity and is fundamentally disrespectful of the boundaries of nature…I understand the concerns, because we are dealing with a challenging concept and there is a sense that it blurs the distinction between animals and humans, creating **unnatural** entities.* (Parliamentary debate on the Human Fertilisation and Embryology Bill, 2008)

And cosmetic procedures:

*That **surgery** caused significant asymmetry of her breasts which produced an unsightly and **unnatural** result and caused her further severe distress, she said* (The Sun, 2011)

*I was also unhappy with the idea of having something as **unnatural** as a **silicone implant** in my body* (Daily Mail, 2012)

And stem cell research:

*Anthony Ozimic, communications manager at the Society for the Protection of the Unborn Child, said: "Foetal and **embryonic stem cell research** is unethical, **unnatural"*** (Daily Mail, 2010)

There were also a number of uses of this term that were categorised as discussion uses, where the writer or speaker acknowledged and queried assumptions about the connection between unnaturalness and what is wrong.

> *After all, with fire is **"unnatural",** but no other species would do it. Yes, fire happens in **nature,** but so does nuclear fusion.* (Telegraph, 2013)

> *I understand the concept of natural law, but much medicine and science is an **unnatural** intervention in the order of things, and one is constantly making ethical judgments about the extent to which that is justifiable to ease human suffering* (Parliamentary debate on the Human Fertilisation and Embryology Bill, 2008)

Contrastingly there were only a very few cases that involved the use of the word *unnatural* in value-neutral contexts:

> *At Scripps, researchers showed in a paper in PNAS how one of those three letter words could be re-assigned, so that cells would read it as an instruction to incorporate an **unnatural** amino acid, one not normally found in living organisms* (BBC, 2011)

4.5. Differences between news and non-news media articles

The charts below (Figure 3) compare two different sorts of article within media publications and how the terms *natural*, *unnatural* and *nature* were used differently in each kind.

News articles and non-news articles from all media sources were distinguished from one another. Articles were classified as *news* if they reported on current events and science topics. All other articles, including editorials, features, comment pieces, book reviews and lifestyle articles were classified as *non-news.*

The charts show there was a noticeably larger proportion of value-laden, borderline and discussion uses of the relevant terms in non-news articles, as compared with news articles.

This is likely to be linked to the particular role that such articles have within newspapers and other media. Comment and editorial media pieces tend to be characterised by the expression of strong personal opinions and do not always purport to be reporting science or other facts in neutral ways. Bolder language of different kinds tends to be used in such articles:

> *But most young women are not having breast reconstruction because they have had a mastectomy. They are doing it because of vanity, rock-bottom selfesteem and because they are under the illusion that men prefer fake breasts. Can we finally kill this lie? Men who prefer fakes don't love women. As a man, I can exclusively reveal that fake breasts are a giant turn-off for any red-blooded male. They are hard, unfeeling, **unnatural**...* (The Sun, 2013)

Figure 3: Comparison of different kinds of use of all terms (*natural, unnatural* and *nature*) identified in news and non-news media articles from 2010-5.[2]
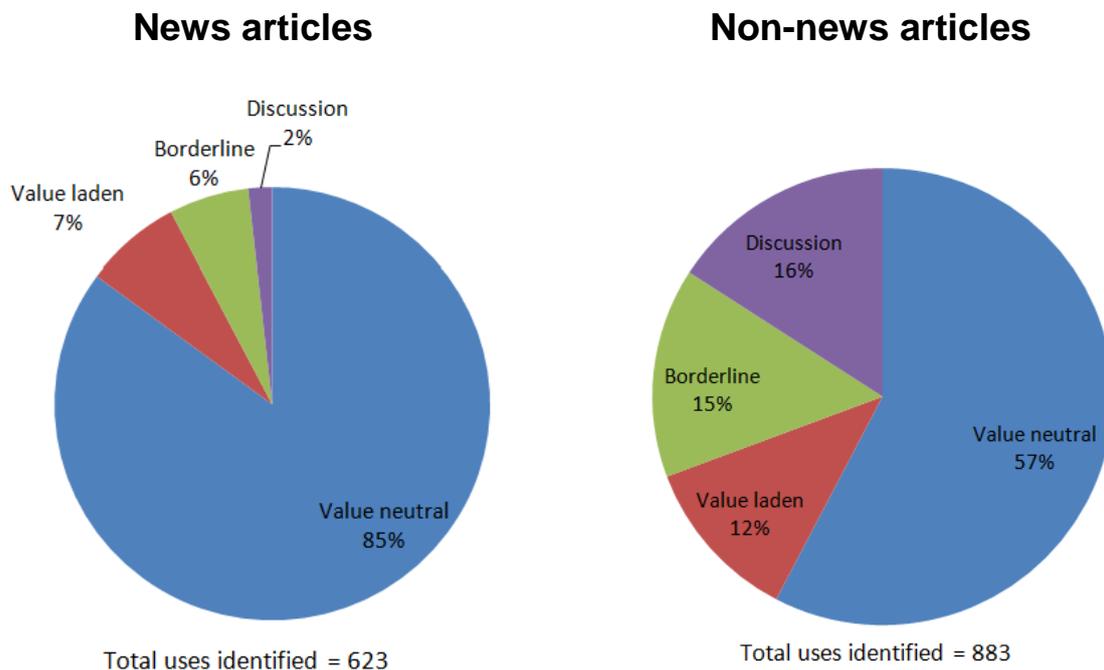
There were also a number of media articles in the non-news articles reviewed that reflected in critical ways on naturalness itself and its significance. This is likely to feature in the reason for the higher proportion of discussion uses of the terms in these contexts. For instance, the following were classified as non-news discussion examples:

> ...*it is impossible to police the commercial usage of such an ambiguous term, and with so many mass-produced, heavily processed items masquerading as **natural** foods, is the entire concept poppycock* (Guardian, 2013)

> *Our sense that species are eternal and fixed, which lies behind our discomfort with genetic modification, flies in the face of the evolutionary reality that they are in constant flux. What people think of as "**natural**" seems to be calibrated by what was technologically feasible when they were growing up.* (Telegraph, 2013)

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[2] Across all five media publications searched, 299 news articles and 330 non-news articles were found to contain one or more of the terms *natural, unnatural* or *nature* between 2010 and 2015.

*Surely delivering "**naturally**" or surgically under duress are as bad as each other. Nowadays, a "**natural**" birth is the only "right" one. But right for whom? If it's not a choice, then "**natural** motherhood" isn't about women's empowerment.* (BBC, 2014)

These results suggest that the terms *natural*, *unnatural* and *nature* may be more commonly used to convey ideas about value in editorials, features, comment pieces, book reviews and lifestyle articles than in news or science reports, but also that ideas about the connections between value and naturalness may be more likely to be challenged in these kinds of article too.

4.6. Differences between author's use, indirect quotes and direct quotes in all kinds of media articles

The terms *natural, unnatural* and *nature* can be used in one of a number of different ways in media contexts. We distinguished three categories: *author's use*, *direct quotes* and *indirect quotes*. Sometimes these examples involve uses of these terms where the journalist chooses the word themselves and does not purport to be describing the views or claims of other people. These we categorised as *author's uses*. For instance:

*Tampering with **nature** is leading to unforeseen circumstances (*Daily Mail, 2013)

[*Breast implants*] *are hard, unfeeling, **unnatural**…* (Sun, 2013)

On other occasions journalists might use these terms in attributing claims to third parties, without citing specific individuals. We classified these kinds of use as *indirect quotes*. These are uses where views or claims are attributed to groups of people, such as scientists, parents, farmers, animal welfare campaigners or others, but where the writer is not directly quoting any particular person. The following examples come from articles on surrogacy and farming, for instance:

*Animal welfare campaigners say mega farms are **unnatural** and cruel* (BBC, 2010)

*France's future at risk from '**unnatural** families' say conservative protesters* (Guardian 2014)

Sometimes these indirect quotes were not attributed to named groups either but were instead assigned to non-specified individual people or groups, such as 'people' or 'critics', or when the claim is put in the passive tense:

*It's selfish and **unnatural**, say the critics* (The Telegraph, 2014)

These terms may also be used as part of direct quotes from people being interviewed as part of an article or news feature:

*Thomas responds: "If people saw the conditions the cows are in, how unnatural the intensive environment is, they'd know it wasn't right. A five-year-old knows cows **belong** in fields."* (Guardian, 2010)

We also tracked the use of these terms in headlines and found a number of examples of these terms being used in value-laden or borderline examples embedding in headings or subheadings:

*My **natural** birth wrecked my body* (BBC, 2010)

*GM 'hybrid' fish pose threat to **natural** populations, scientists warn* (Guardian, 2013)

*Zero calories - and totally **natural**. But is the 'miracle' new sugar substitute too good to be true?* (Daily Mail, 2014)

The charts below (see Figure 4) suggest that a significant proportion of value-laden and borderline uses are indirect and direct quoted uses. This suggests that when value and naturalness are associated in media contexts, it is often via appeal to the views of others. This shows that writers do not always pick these words themselves when they are deployed in value-laden and borderline contexts, though the writer nevertheless makes a judgement about the use of these words as meaningful, succinct or efficient ways of representing the views of others in those cases. It also may suggest that this kind of language may be considered by journalists to be amongst the more interesting, or striking, parts of what interviewees or contributors say when they comment on a topic in science, technology or medicine.
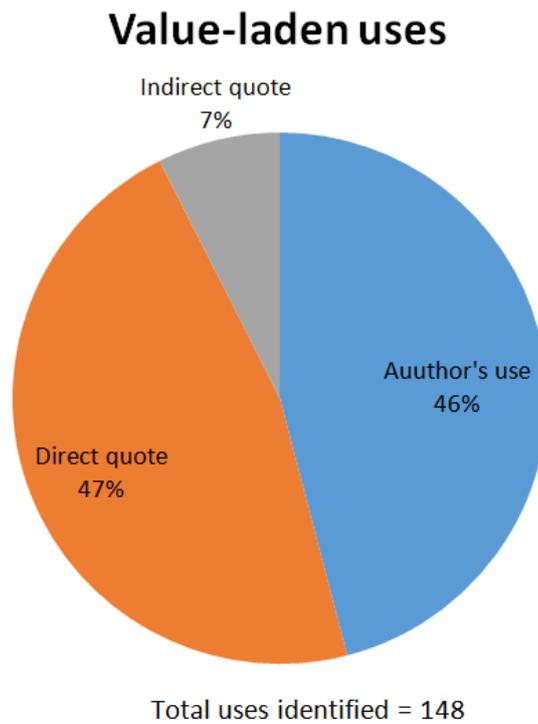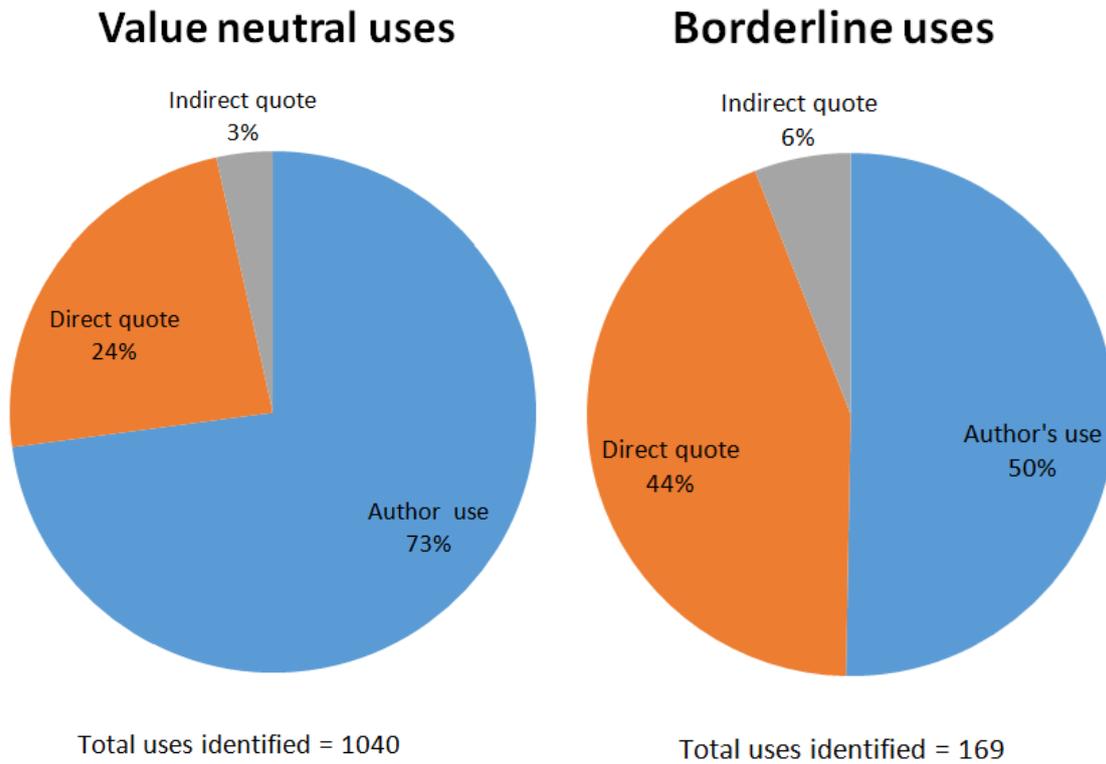
4.7. Agency uses of nature

Uses of the term *nature* were tagged as agency uses if they carried an implication that nature was able to exercise agency or carry out intentional actions, or otherwise personified nature. This occurred when it was suggested that nature was capable of knowing, deciding, choosing, or being something on which people should trust or rely e.g. '*Nature knows best*' or '*Mother Nature*'.

Examples that carried these connotations were identified in a number of different bioethics debates. There were a range of such cases which seem to appeal to intentional states, in contexts discussing fertility and assisted reproduction:

*But I think it shows that we need to have a bit more respect for **nature**, which seems to **know** how hard it is to look after a child when you are older* (Daily Mail, 2011)

*The other big question, she says, is why women are in need of donor eggs in the first place. "It's because society isn't making it possible for women to have babies naturally at the time **nature intended**."* (The Guardian, 2012)

Figure 4: Comparison of author's use, indirect quotes and direct quotes using the terms *natural, unnatural* and *nature* in all media articles reviewed

Value neutral uses

Indirect quote
3%

Direct quote
24%

Author use
73%

Total uses identified = 1040

Borderline uses

Indirect quote
6%

Direct quote
44%

Author's use
50%

Total uses identified = 169

Value-laden uses

Indirect quote
7%

Direct quote
47%

Auuthor's use
46%

Total uses identified = 148

Genetically modified crops, farming and food was another area where nature was referred to in this way:

> *But Mr Parry stresses a fundamental difference: "With GM crops, the gene is advantageous, so **nature will seek** to preserve the advantage. We're giving our organisms a disadvantage - the inability to reproduce." (BBC, 2015)*

> *Howard argued that pests, diseases and parasites should be regarded as 'nature's professors of good husbandry', teaching us how to farm for positive health. **"Nature has never found it necessary to design**… vaccines and serums for the protection of livestock" (Soil Association, 2003, Batteries not Included)*

There were a number of examples that mentioned '*Mother Nature*' directly, particularly, in the context of discussion of birth and assisted fertility techniques:

> *Under normal conditions, a woman is best left to be her own director, behaving in an instinctive and uninhibited way. Only when that is allowed to happen will she get the rush of **Mother Nature's** feel-good cocktail (Daily Mail, 2011)*

> *I may have tried to cheat **Mother Nature** twice, but I'm coming round to the opinion that not all women are destined to become mothers (Daily Mail, 2013)*

> *And in the case of IVF for women over 40, technology is being abused, by extending childbearing beyond the limit set by **Mother Nature** (Telegraph, 2013)*

The uses were further categorised within the review as either value-neutral, value-laden, borderline or discussion in the same way as every other case.

Figure 5 below shows that majority of uses of *nature* that have this feature were either value-laden or borderline cases. This may suggest that ideas about value are more often conveyed when the term *nature* is used in way suggesting it is capable of exercising agency or which personifies nature.

Figure 5: Comparison of different kinds of uses of *nature* that appeal to nature as exerting agency across all sources reviewed

Agency uses

- Discussion 5%
- Value neutral 21%
- Value laden 37%
- Borderline 37%

Total uses identified = 69