



Delft University of Technology

## Understanding value change

van de Poel, I.R.

### DOI

[10.13169/prometheus.38.1.0007](https://doi.org/10.13169/prometheus.38.1.0007)

### Publication date

2022

### Document Version

Final published version

### Published in

Prometheus: Critical Studies in Innovation

### Citation (APA)

van de Poel, I. R. (2022). Understanding value change. *Prometheus: Critical Studies in Innovation*, 38(1), 7-24. <https://doi.org/10.13169/prometheus.38.1.0007>

### Important note

To cite this publication, please use the final published version (if applicable). Please check the document version above.

### Copyright

Other than for strictly personal use, it is not permitted to download, forward or distribute the text or part of it, without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license such as Creative Commons.

### Takedown policy

Please contact us and provide details if you believe this document breaches copyrights. We will remove access to the work immediately and investigate your claim.

## RESEARCH PAPER

### Understanding value change

---

Ibo van de Poel

Department of Values, Technology and Innovation, School of Technology, Policy and Management, Technical University Delft, Delft, The Netherlands

#### ABSTRACT

The possibility of value change has implications for how to responsibly develop and deploy new technologies. If values can, and do, change after technologies have been developed and designed, this would seem to have major ramifications for approaches such as value-sensitive design and responsible innovation. This contribution explores descriptive as well as normative accounts of value change. It suggests three methodological principles that descriptive accounts of value change should meet. Normative accounts are relatively independent of descriptive accounts and raise the important question of whether normative or moral values themselves can also change. Through the example of the birth control pill and its (alleged) effect on sexual morality, the article illustrates what descriptive and normative accounts might look like in a concrete case. It closes with a discussion of implications for responsibly developing new technologies and draws some conclusions for more theoretical work on value change.

#### Introduction

The introduction of the birth control pill has resulted in a change in sexual morality (Swierstra, 2013). The adoption of mechanical ventilators in healthcare and developments in transplantation medicine led to the introduction of the notion of ‘brain death’ and to changes in values and norms of how to deal with the (near) dead (Giacomini, 1997; Belkin, 2003). The use of laptop computers by children in Ethiopia has instigated a value change towards more gender equality (Hansen *et al.*, 2014). These are examples of claims that suggest an explanatory, or even causal, relation between technology and what I will call simply ‘value change’. Such value change has been studied under a number of headings, such as ‘technomoral change’ (Swierstra, 2013), ‘moral revolutions’ (Appiah, 2010; Baker, 2019; Pleasants, 2018), ‘moral change’ (Eriksen, 2020) and ‘moral progress’ (Jamieson, 2002; Musschenga and Meynen, 2017; Buchanan, 2018; Kitcher and Heilinger, 2021). It has been suggested that such processes follow a similar pattern to Kuhnian scientific revolutions (Baker, 2019) or that they are driven by the destabilization of existing moral routines through technology (Swierstra *et al.*, 2009; Swierstra, 2013) or are driven by moral uncertainty (Nickel *et al.*, 2022). Others have suggested that such processes are not characterized by any common pattern (Eriksen, 2019).

Value change is interesting not just for academic purposes. It is also directly relevant to how we should innovate technologically and design technologies in a responsible and value-sensitive way. Over the past decades, several approaches, such as value-sensitive design and responsible innovation, have been developed that help to design technologies for societal and moral values (Owen *et al.*, 2012; Van den Hoven *et al.*, 2015; Friedman and Hendry, 2019). But if values are

---

**CONTACT:** I.R.vandePoel@tudelft.nl

**ACCEPTING EDITOR:** Steven Umbrello

bound to change in the future, this would seem to have major implications for how to innovate and design responsibly.

One approach to future value change is to try to predict it, or – when that is impossible – at least to anticipate possible future value change; e.g., by making technomoral scenarios (Swierstra *et al.*, 2009; Boenink *et al.*, 2010; Waelbers and Swierstra, 2014), or through studying the mediating role of technology (Kudina and Verbeek, 2019). One might also believe that, to some extent, value change is unpredictable and hard to anticipate, and therefore aim at better monitoring the consequences of new technology and designing technologies that are more flexible and adjustable (van de Poel, 2017, 2021).<sup>1</sup>

Value change also raises important moral and normative questions. To what extent are changes in values also normatively desirable and perhaps even an instance of moral progress? Or are they perhaps in some cases an instance of moral regress? Can normative or moral values also change themselves? Addressing such questions requires not only a descriptive or explanatory account of value change, but also a normative one. Although some authors, such as Swierstra (2013) and Eriksen (2020), have paid attention to normative questions, a more systematic normative account of the (possibility) of value change is still missing. One of the important questions is how such a more normative account would relate to descriptive or explanatory accounts.

The aim of this contribution is to explore how we can understand value change from a descriptive as well as from a normative point of view, and to see how these different understandings matter for technological innovation and value-sensitive design. While descriptive accounts of value change mainly try to explain why certain value changes occur, normative accounts focus on the question of whether such value changes are desirable from a normative or moral viewpoint. The article starts by exploring different descriptive accounts of value change and proposes three methodological principles for understanding descriptive value changes. It then turns to normative accounts of value change, distinguishing between accounts that allow for a normative assessment of descriptive value change and accounts that (also) allow for changes in normative or moral values. After this overview, it discusses the example of the birth control pill and its alleged effect on sexual morality to illustrate the various accounts of value change. The article concludes with the implications of value change for the design of new technologies and considers the further theoretical work needed to flesh out, particularly, normative accounts of value change.

### **Descriptive accounts of value change**

Descriptive value change has been the object of study in various social sciences and humanities, particularly sociology, psychology, anthropology and history. In these fields, values are often seen as an antecedent of behaviour, and hence as possible explanans of behaviour, although the relation between values and behaviour is often seen as indirect rather than direct (e.g., Maio *et al.*, 2006, Steg and De Groot, 2012).

Values themselves may be explained in a wide variety of ways; for instance, in terms of culture (e.g., Hofstede, 2001), evolution (e.g., Tomasello, 2015) or socialization (Inglehart, 2018). Other scholars conceive of values as something that agents can more or less freely choose (cf. Boudon, 2013). Still others believe they may be (potentially unconsciously) adhered to because they fulfil a certain psychological function for the individual agent or because they fulfil certain social functions, such as cooperation (Morris, 2015; Baker, 2019). Again, others believe that agents embrace values because they see them as expressions of what is morally good (cf. Boudon, 2013; Korsgaard, 2015).

Obviously, such different ideas about how values explain and are to be explained have consequences for the possibility of value change and how to understand or even explain such value change.

---

<sup>1</sup>These approaches should not be seen as contradictory or mutually exclusive. While we cannot fully predict or anticipate value change, it is useful to anticipate it as much as possible.

For example, if values are primarily biological or the product of evolution, value change would seem possible only on very long time-scales. If they are the product of culture, time-scales would likely be shorter, but still be rather long. Hofstede (2001) claims that cultural value change would typically require 50 to 100 years or extreme external events, although there are studies measuring Hofstede's values over time that suggest they actually change at shorter time intervals (Zhao *et al.*, 2016). Inglehart (2018) holds that values are formed mainly before adulthood and change little afterwards. So, collective value change is largely a matter of changing generations rather than individuals changing their values.<sup>2</sup> Again, however, there are studies that suggest that the values which are central in Inglehart's work, such as materialist versus postmaterialist values, may also change because of external events, such as the recent Corona pandemic (Lampert *et al.*, 2021).<sup>3</sup>

### *Different notions of value*

What complicates matters is that different authors and different disciplines do not just offer different explanations of values and value change, but also, at least sometimes, hold different notions of value. One important distinction is that between what may be called more psychological and more sociological notions of values. Many psychologists seem to think of values as being part of an agent's personality. For example, Steg and De Groot (2012, p.89) maintain that it is 'commonly understood that values are central and relatively stable elements of one's personality that reflect the relative importance of different guiding principles in life'.

Probably the most influential theory of value in psychology is that of Schwartz, who defines values as '(a) concepts or beliefs, (b) about desirable end states or behaviors, (c) that transcend specific situations, (d) guide selection or evaluation of behavior and events, and (e) are ordered by relative importance' (Schwartz and Bilsky, 1987, p.551). According to Schwartz (1992), there are ten basic values which he understands to be universal.<sup>4</sup> Moreover, these values are related to each other, in the sense that some are mutually motivationally reinforcing, while others are motivationally each other's opposite. According to Schwartz's value theory, there can be no new values; there can be only changes in the relative importance of the ten basic values, which will follow a certain logic because of the opposing and reinforcing motivational relations between values.

When values are part of an individual's personality, it would also seem natural to assume that they are formed when one's personality is formed and will not change much thereafter. Indeed, various authors have suggested that values are formed during people's pre-adult years and do not change much later (Rokeach, 1973; Inglehart, 2018). Nevertheless, there are also studies which suggest that value change at a later age may be possible (Gouveia *et al.*, 2015); for instance, because of migration (Bardi *et al.*, 2014), education (Krishnan, 2008), the use of technology (Hansen *et al.*, 2014), or because of extreme external events, such as terrorist attacks (Verkasalo *et al.*, 2006), the financial crisis (Sortheix *et al.*, 2019) or the Corona pandemics (Steinert, 2020).

In contrast to such a psychological understanding of value as part of one's personality, there are also scholars who understand values as collective social or cultural phenomena (e.g., Douglas

---

<sup>2</sup>Inglehart (2018, p.14) calls this the 'socialization hypothesis'. His other major hypothesis is the so-called 'scarcity hypothesis', which holds that virtually everyone values freedom and autonomy (i.e., postmaterialist values), but that under scarcity people will prefer opposite materialist values, such as material sustenance and physical security. Since modern societies are increasingly less plagued by scarcity, newer generations will typically value postmaterialist values more than previous generations, leading to long-term value change.

<sup>3</sup>Inglehart (2018, p.23) allows for the possibility of more short-term value change attributable to economic recessions, e.g., but believes these will eventually cancel out, while long-term value change is cumulative.

<sup>4</sup>Values are seen by Schwartz as functional in helping humans cope with some very general and universal challenges of existence, like the needs of individuals as biological organisms, the requisites of coordinated social interaction and the survival and welfare needs of groups. Since these challenges are universal, this would explain why values are also universal.

and Wildavsky, 1982; Jasanoff and Kim, 2015).<sup>5</sup> A good example is the definition of value offered by Demski *et al.* (2015, p.60) as ‘prevalent identifiable cultural resources or collectively imagined forms of the social good through which people anchor their understandings and formulate their preferences’. Although such collective or social values may be imagined or socially construed, they are nevertheless real in a sociological sense. That is to say, individual agents can usually not simply ignore them, but somehow need to relate to them. This is so because other agents expect them to respect these values, and if they do not, these others may sanction them or ask them to justify or legitimize their behaviour.<sup>6</sup> This does not imply that individual agents always adhere to social values, but they cannot usually just ignore them. Still, their reaction to these values can range from adherence and even promotion of these values to paying only lip service to them, to actually opposing these values and, more or less, deliberately deviating from them and trying to change them. The latter reactions may, however, be more costly (in terms of social sanctions) to the agent.

From a sociological perspective, adherence to social values in behaviour is not only or primarily explained by people’s personality or what they individually believe to be good, but by what people believe other people believe to be good. Here it may be useful to distinguish between what Bicchieri (2006, p.15) calls first-order and second-order normative beliefs. First-order normative beliefs are personal normative beliefs and they may express personal values on which psychologists tend to focus. Second-order normative beliefs are normative expectations, which are beliefs about what others believe to be good. What is important is that such second-order beliefs may lead to social values that deviate from personal values.

Bicchieri (2017, pp.42ff) describes this phenomenon in terms of what she calls ‘pluralistic ignorance’. Her description focuses on norms (which are not the same as values), but an analogous argument seems to apply to values. Bicchieri considers a norm *N* in a network *G* so that it is the case that (1) all members of *G* believe that all other members of *G* follow *N* (empirical expectation), and (2) all members of *G* believe that all other members of *G* believe one ought to follow *N* (normative expectation). In these circumstances, it is very likely that all members of *G* will follow *N*, even if it is the case that all of them personally dislike *N* and personally believe one ought not to follow *N*. The reason is that people may be unaware that others also do not approve of *N* (e.g., because communication about it is difficult or taboo), while they expect that if they were (individually) to deviate from *N*, this would lead to negative sanctions from the others in *G*. An example of such pluralistic ignorance, cited by Bicchieri (2017, pp.45-46) is the case of female genital cutting in such countries as Sudan, Djibouti and Burkina Faso, where surveys show low support (i.e., low individual approval) for the practice of female genital cutting, while the practice is nevertheless widespread.<sup>7</sup>

With this more sociological notion of value, value change can occur in a number of ways: new values may arise in a group or in society; the meaning or understanding of a value may change; the relative importance or prevalence of values in a society may change, or the (relative) number of people adhering to value may change. It should further be noted that in this sociological sense of value, a society at some point in time may possibly be characterized by incongruent or conflicting values that exist next to each other.

---

<sup>5</sup>Various authors allow for the possibility that values can be a personal as well as a group or social characteristic (e.g. Kluckhohn, 1951; Rokeach, 1973). What is, however, not always fully appreciated is that social values are not always shared values (i.e., values individually held by all members of a group, community or society as first-order normative beliefs). As the example below of female genital cuttings shows, it is even possible that social values exist, and influence behaviour, while none of the agents individually would subscribe to that value when asked independently from others.

<sup>6</sup>In this sense, social values are similar to other macroscopic social phenomena, such as social norms (Bicchieri, 2017) and institutions (Ostrom, 2005).

<sup>7</sup>Bicchieri (2017, pp.45-46) cites data from UNICEF: in most countries, the prevalence of the practice is higher than support for it would suggest, in Chad the percentages are similar (around 45%), while Yemen is the only country in which support is higher than prevalence (41% against 22.6%).

*The relation between psychological and sociological explanations*

The above raises the question of how psychological and sociological explanations of value and value change are related to each other. One possibility is that they talk about different phenomena at different levels. Psychology focuses on the individual level and understands and explains possible value change as changes in someone's personality or in agents' first-order normative beliefs. Sociology focuses on the societal level and studies and tries to explain changes in values, understood as shared notions or collective resources that express what is good and desirable, and which can be explained in terms of changes in agents' second-order normative beliefs. While there is some truth in this idea, it is mistaken in an important sense, namely that a good sociological explanation cannot just study or explain phenomena like values at the collective or macroscopic level only. This methodological point of view is often called 'methodological individualism' (Weber, 1978; Boudon, 1981; Coleman, 1990). It holds that proper sociological explanations cannot restrict themselves to the collective level, but rather need to connect the collective and individual level.

This suggests that, eventually, psychological and sociological explanations of value change may be reconciled or combined in an overarching explanatory framework. Before suggesting how this is possible, the article takes a step back and discusses a number of methodological principles that any good sociological explanation of value change should meet. Following Boudon (2012), good sociological explanations need to meet three requirements: (1) methodological singularism, (2) methodological individualism and (3) an interpretative approach that understands the behaviour of (individual) agents as a meaningful response to the social situation in which they find themselves. The discussion below by and large follows Boudon (2012).

Methodological singularism means that we should aim to explain singular social phenomena; for example, why French politicians and engineers after World War II opted for particular nuclear technologies for energy generation on the basis of 'French values' (Hecht, 1998), or why the introduction of the contraceptive pill led to certain changes in sexual morality in the Netherlands (Ketting, 2000; Swierstra, 2013). Singular social phenomena stand here in contrast to complex events, such as the French Revolution or the Industrial Revolution, and to general social phenomena, such as social change or value change. One reason for methodological singularism is that it makes it more likely to arrive at scientific explanations (explanations that are empirically verifiable and are open, at least in principle, to falsification). Another reason has to do with the other two methodological rules, which imply that sociological explanations eventually always have to be cast in terms of individual behaviour in specific circumstances, which sets limits on the possibility of formulating general sociological laws.

Methodological singularism would seem to make it impossible to offer proper sociological explanations of general phenomena such as value change or moral revolutions (cf. Boudon, 1983). This is not to say that we cannot (sociologically) explain particular value changes (or moral revolutions). We certainly can, but there are no general laws governing value change. Nor is there a prime mover, such as, for example, class struggle or technological development that in all cases determines value change (cf. Boudon, 1983, 1986). What we might want to look for, instead, are general social mechanisms that are at work in particular cases of value change (cf. Ylikoski, 2017). Such mechanisms may be similar in several particular cases and hence be useful to distinguish. However, in a new particular case, we cannot automatically assume any particular mechanism to be at work or to be the only mechanism at work.

Methodological individualism means that sociological explanations in the ultimate analysis are to be understood in terms of the actions of individual agents. This does not imply, as is sometimes thought, that individual actions are not influenced by social structures or other macroscopic phenomena or variables. On the contrary, it means that individual action is to be understood as a meaningful or even a rational response to the circumstances in which the individual agent acts. In as far as methodological individualism implies certain ontological or metaphysical commitments, it is that only individual agents can act (in a way that can be understood as meaningful by other

humans) and that, for example, social structures, institutions, technologies or legal rules cannot act, but can ‘only’ influence individual behaviour.

Methodological individualism does not mean that there cannot be causal relations between, or explanations of, macroscopic phenomena, but rather it poses that such relations or explanations are indirect, i.e., they always need ultimately to be explained through the actions of individual agents. A typical sociological explanation of this kind then starts with certain macroscopic phenomena or variables, which make up the situation or context in which individual agents act; the next step is to explain individual actions as meaningful in this context (see also the next methodological point), and, then, as an aggregation effect of individual actions, new macroscopic phenomena may arise, or macroscopic ‘variables’ may change (Coleman, 1990; Boudon, 1981). Importantly, these macroscopic effects, at the aggregate level, need neither be intended nor foreseen by the individual agents, as they are the emergent result of individual behaviour. In fact, certain social structures may be shown to consistently result in aggregate effects that frustrate the intentions and preferences of the individual agents in the system (Boudon, 1981).

The third methodological principle goes back to Max Weber’s idea of *verstehende Soziologie* (interpretative or comprehensive sociology). According to Weber (1978 [1922]), we should understand individual behaviour *from the viewpoint of the agent* as a meaningful response to the situation in which that agent acts. This means that we may interpret the individual act as being based on a rational principle, but – when that is not possible – the analyst should emphatically (e.g., by imagining or reliving) try to understand the agent’s behaviour in the situation. In both cases, the understanding should be based on the viewpoint of the agent in the situation.

Weber (1978 [1922]) distinguishes four basic modes (or ideal types) of individual action: goal-rational action, value-rational action, affective action and traditional action.<sup>8</sup> The last two types interpret actions as either affective/emotional responses (affective action) or as habitual/customary responses (traditional action) to a situation. Weber takes these latter two types of action to be merely irrational, while the first two types are rational. Weber’s notion of goal-rational action is often interpreted in terms of means-end rationality, in which we rationally select means in view of given or non-rational ends.<sup>9</sup> However, Weber’s view is more nuanced:

[a] person acts rationally in the ‘means-end’ sense when his action is guided by considerations of ends, means and secondary consequences; when, in acting, he rationally *assesses* means in relation to ends, ends in relation to secondary consequences, and, finally, the various possible ends in relation to each other. (Weber, 1978 [1922], p.29; emphasis in original)

This seems to leave open the possibility of rationally setting goals, which is typically not assumed in many (other) forms of means-end rationality.<sup>10</sup> Weber takes value-rational action to be based on values that the agent takes to be absolute and to be externally imposed upon her. This type of action is rational in so far as it is based on a deliberate or conscious attachment to certain absolute values, rather than an unconscious attachment as is typical for affective action. It should be noted that the agent acting as value-rational tends to see the values on which her actions are based as absolute and given, even as objective.

---

<sup>8</sup>Weber stresses that these four types should not be seen as exhaustive, and he also believes that actual actions will typically be combinations of these four (and possibly others). The four types should therefore be seen as ideal types that are useful for sociological purposes rather than as existing in reality.

<sup>9</sup>I use the term ‘non-rational’ here to indicate that in this view ends are often seen as being beyond rational choice. This does not seem to make them so much irrational (in the sense of going against rationality) as merely non-rational in the sense of not being open to rational choice.

<sup>10</sup>Examples are forms of means-end rationality as they are typically assumed in rational choice theory and in microeconomics, as well as in Humean moral theories that assume that ends cannot be rationally chosen. For an interesting discussion of how we can rationally adapt our (final) ends, see Richardson (1997).

The core of the third methodological principle is not so much the four ideal types of action described by Weber, but rather the general idea that we should understand individual action as a meaningful response to the social situation in which an agent finds herself. This means that we should understand individual human action (as much as realistically possible in a given situation) as meaningful and hence as intentional rather than as automated or predetermined. Moreover, we should understand the intended meaning of the individual action as a response to the – real, perceived or expected – actions (and their intended meaning) of other agents. This general methodological principle still leaves open a wide range of explanations in a specific situation, ranging from explanations in terms of rational action to explanations in terms of affection and habits.

This brings us back to the earlier question about the relationship between psychological and sociological explanations of value. Although psychological explanations of value and behaviour tend to focus on the individual level, oftentimes they do so in a way that fits the third methodological principle. Most psychologists would explain individual behaviour not just in terms of someone's values (understood as personality traits) and other individual characteristics, but also as being dependent on the situation and context. It is only in so far as psychological – or other – theories force us to disregard the context or to see action as automated rather than meaningful that they disregard the third methodological principle, but this would seem the exception rather than the rule.

The important suggestion for our investigation into descriptive accounts of value change is that both notions of value (values as (1) personality traits and as (2) collective social phenomena) are relevant for descriptive explanations of value change. However, their role in such explanations is different. An agent acting in an interaction situation, on the one hand, can be understood as reacting to that interaction situation, including the existing collective values at the societal level. However, the actions of the agent will also be based on, and can be partly explained by, her own values, understood as personality traits or first-order normative beliefs. These values will influence not only what the agent considers desirable, but also how she perceives the situation in the first place.

Depending on the situation and the case, the two types of value may do a larger or smaller part of the overall explanatory work. Cast in terms of the Weberian ideal types, we may say that the action of the agent is affective when it is unconsciously based on her personal values. We may call it value-rational when it is deliberately based on values – individual or collective – which are taken as absolute. We may call it goal-rational if it involves a more strategic reaction to the situation, including collective values. As Weber was aware, these are ideal types, and a real situation will always be a mixture of these. The important point is that in all cases we should interpret the action of the agent as a meaningful response to the situation in which she finds herself.

### **Normative accounts of value change**

Normative accounts of value change can take two main forms, namely (1) accounts that help make a normative judgement on the desirability of certain descriptive value changes, and (2) accounts of the (im)possibility that – and the ways in which – normative or moral values themselves can change.<sup>11</sup> The first takes certain descriptive value changes, as discussed in the previous section, as given and then makes a normative (or moral) judgement about the desirability of such value changes. It should be noted that, in order to be able to make such judgements, one need not assume the possibility of normative or moral value change. In fact, one might judge descriptive value changes from the viewpoint of moral values that are taken to be eternal and unchangeable.

---

<sup>11</sup>Not all normative values are moral; think of such values as truth and beauty. Nevertheless, I will use the terms 'normative values' and 'moral values' interchangeably to refer to the broad category of normative values including moral values. Similarly, one might want to speak of 'normative progress' rather than 'moral progress', but I will employ the conventionally used terms.



It seems that the verdict arising from normative judgements of descriptive value changes can take four basic forms: (1) moral progress (the descriptive value change brings (subjective) values of agents or in society closer to moral values, (2) moral regress, if the opposite happens, (3) a morally neutral value change or (4) moral uncertainty about how we should judge the (descriptive) value change. The last may occur because we are not morally certain enough about what the right moral values are. This may, for example, be the case because judging whether new technologies bring about a desirable or undesirable descriptive value change is possible only on the basis of relevant experience, which we may lack because some technologies create possibilities, situations and experiences that did not exist before (van de Poel, 2018; Klenk and van de Poel, 2021).

From a practical point of view, the possibility of making normative judgements on past, actual or expected value changes is very relevant. It would seem to have direct consequences for value-sensitive design and responsible innovation. It also raises a range of further practical, epistemological as well as ethical questions. How can we know what the right moral values are? Can we? Who has the right to make such normative judgments? Can there be ethical experts, or should this always be a kind of participatory or democratic process?

While these questions are very relevant, focus here is on the second form that a normative account of value change can take, namely accounting for the (im)possibility of normative or moral value change. This is not primarily a normative ethical issue, but rather a meta-ethical one. In further exploring this issue, I will focus on two particular meta-ethical positions with respect to values, namely desire-based and realist accounts of value. The reason to focus on these two accounts is twofold. First, they seem to be two of the main contenders (although certainly not the only two) in meta-ethical debates about value.<sup>12</sup> Second, as will become clear, both have certain attractive features when it comes to judging value change from a normative point of view.

Desire-based accounts of values are a form of idealism about values; idealism holds that values can be reduced to mental states, such as desires, emotions or beliefs. Reducing values to desires seems to have a number of advantages. First, it gives us, unlike realist accounts, direct epistemic access to values. Second, it explains how values can be motivating, as desires are generally taken (by philosophers) to be motivational mental states (unlike, e.g., beliefs) (Smith, 1995). The main challenge for desire-based accounts of value is to avoid normative or moral relativism. If values are desires, they would seem to be subjective and relative. The challenge for the desire theorist is to show how values can be desires and nevertheless be somehow agent-neutral and non-relativistic.

Realists take values to be mind-independent and thus somehow objective. Realism about values can still take many forms; descriptivism or naturalism holds that values can be (somehow) reduced to descriptive properties (e.g., Jackson, 1998); non-naturalism usually takes values to be non-natural properties that supervene on descriptive or natural properties (e.g., Parfit, 2011). Value realism avoids the trap of relativism about values, which seems to make it normatively more convincing. However, it has – at least *prima facie* – some distinct disadvantages of its own. Value realists, for example, may have a hard time explaining how we have (epistemic or experiential) access to values and how values motivate; even if we have knowledge (beliefs) about value, such beliefs may not be motivating. Moreover, realists would seem to have a harder time explaining disagreement about values than desire theorists (cf. Rowland, 2017). On the other hand, the value realist may be better able to explain why people often seem to conceive of values not just as subjective opinions but as objectively true.

This article now moves to compare desire-based and realist accounts of values in three respects that seem relevant as considerations if we want to use such accounts to develop a normative understanding of value change. These respects are (1) whether they can account for value change, (2) whether they are compatible with more descriptive accounts of value change (like the ones I

---

<sup>12</sup>For a useful overview of different meta-ethical positions with respect to value, see Oddie (2005, chapter 1). The discussion below will largely follow some of his distinctions.

have discussed before) and (3) whether they provide an adequate (non-relativistic) normative basis for judging the desirability of certain descriptive value changes.

On the first count, desire-based accounts of value seem to do well; since desires may change, so do values. However, for normative reasons, most desire-based accounts of value are not based on actual desires, but on somehow refined desires; for example, desires in certain ideal circumstances, like being (fully) informed (e.g., Griffin, 1986) or (instead) from behind a veil of ignorance (Rawls, 1999 [1971]) that filters out irrelevant circumstances. Others have suggested that values correspond not to actual desires, but to so-called second-order desires (Frankfurt, 1971, Dworkin, 1988) or even higher-order desires (cf. Oddie, 2005, chapters 4–5). While on such more sophisticated desire-based accounts, value change would seem rarer; it would certainly not be impossible.

This is different for realist accounts. Not only would realists, in general, have difficulty with conceiving values as open to change, as they see them as part of (objective) reality, value realism often comes with two additional assumptions that would seem to make value change impossible. First, many value realists are primarily interested in so-called intrinsic values, which are valuable only because of their intrinsic properties (e.g., Moore 1922; Zimmerman, 2001; Tucker, 2019).<sup>13</sup> Since such intrinsic properties cannot change (that is what makes them intrinsic), change in intrinsic values would seem impossible. Moreover, many realists think of values as some kind of (non-natural) properties that supervene on the descriptive properties of value bearers. Such (non-natural) properties are typically believed to be universal and unchangeable (not unlike how Plato thought about forms in his cave metaphor) (Orilia and Paoletti, 2020).

On the second count, compatibility with descriptive accounts, desire-based accounts also seem to fare better at first sight. The reason is that they are based on a subjective notion of value which would seem to fit well with most descriptive accounts of value change offered in the social sciences (cf. Boudon, 2013). On closer inspection, the fit may, however, be less than perfect. Many psychologists think of values as beliefs rather than as desires (e.g., Rokeach, 1973; Schwartz, 1992; Steg and De Groot, 2012).<sup>14</sup> The more sociological notion of value, which sees values as social constructions or cultural resources, also does not seem to associate values with desires, although it might associate values with other mental states or with mental constructs. What such social scientific accounts of value and desire-based accounts of value in philosophy may nevertheless have in common is that they conceive of values as just mental states rather than as being in the external world. There do not appear to be many social scientists who think of values as having some independent existence from human beings, although there are some exceptions.<sup>15</sup>

Some authors have pointed out that agents often tend to conceive of values as being somehow objective or real (Boudon, 2013; Korsgaard, 2015). Korsgaard (2015) suggests that the idea that values are just subjective preferences or only fulfil some social function raises concerns about what she calls ‘transparency’. If it were transparent to agents that values are just subjective or fulfilling social functions, they would most likely no longer subscribe to them, she claims. Whether this is indeed so is open for discussion, but it seems to suggest that value realism is not necessarily at odds with descriptive accounts of value and value change.

If we approach the issue from the viewpoint of the third methodological principle that requires interpreting agent behaviour as a meaningful response to an interaction situation, it follows that the descriptive analyst should be methodologically agnostic with respect to the question of

---

<sup>13</sup>Such authors as Korsgaard (1983) and Rabinowicz and Rønnow-Rasmussen (2005) have suggested that there can be extrinsic final values. The idea is criticized by Tucker (2019), who argues that such values can ultimately be understood as intrinsic values, in as far as they are really valuable.

<sup>14</sup>Although psychologists also seem to think of values as motivating, perhaps unlike (some) philosophers, they do not believe that beliefs cannot be motivating.

<sup>15</sup>Psychologists like Schwartz seem to think of values as being objective in the sense that they are a part of our make-up as a result of evolution, but they would then still not seem to exist independent of humans, but rather be part of human nature.

whether values are subjective or objective for the agents in the social system analysed. This implies that the analyst should allow for the possibility that the agents perceive values as either subjective or objective. This methodological agnosticism still leaves open that the analyst herself is normatively either committed to value realism or to a subjective account of values.<sup>16</sup> All in all, it seems that both desire-based and realist accounts of values can eventually be reconciled with descriptive accounts, or at least that neither of them scores better in this respect.

On the third count, the possibility of normative judgement, realist accounts would seem to fare better *prima facie*. That is to say; they have no problem avoiding relativistic traps, although they may have a problem showing how we have epistemic access to values. Desire-based accounts are much more prone to relativistic concerns, certainly if they are based on actual desires. Typically, however, desire-based accounts are most sophisticated, as indicated above; often, they are based on (hypothetical) desires in idealized circumstances or on higher-order desires.<sup>17</sup>

The idea of second-order desires is that we might not always – on reflection – desire what we desire (Dworkin, 1988). For example, I may be an addictive smoker and therefore desire a cigarette, but I may well desire not to desire a cigarette. Similarly, I may have certain discriminatory or unsustainable desires, but on reflection, I may desire not to have such desires. Such second-order desires would seem better candidates for being values than actual desires, although it would seem hard to rule out that second-order desires can be unethical or otherwise normatively questionable.

Oddie (2005, chapters 4–5) discusses an interesting possibility for revising desires in a way that might result in shared or agent-neutral desires, which may be a better candidate for values. It is based on the simple idea that we care for, or even love, other people, and therefore often desire that their desires are fulfilled. This gives us reason to revise our own desires accordingly. He shows that, under not so strict conditions, a group can, in this way, arrive at shared or agent-neutral desires – everyone desires the same – which may then be a good candidate for value. However, he also shows that under some other conditions – at least one person being an egoist who cares only for himself – this procedure will give clearly undesirable results, for example, with everyone adapting his or her desires completely to the egoist. Oddie argues that even sophisticated desire-based accounts have what he calls a value residue, an element of value that cannot be reduced to desire.<sup>18</sup>

The conclusion, then, is that accounts that try to reduce values fully to desires are bound to be normatively unsatisfying. This leaves open the possibility of mixed accounts or accounts that try to reduce values to other mental states than desires. One promising avenue might be to understand values not as desires, but as beliefs about what is good or valuable. As we have already seen, many psychologists understand values as beliefs. Similarly, the more sociological descriptive notion of value may be understood in terms of second-order normative beliefs (beliefs about what others believe to be good). The idea that values are beliefs then seems to cohere well with existing descriptive accounts of value and value change.

If we understand values as beliefs about what is good or valuable, value change would be a form of belief change. This may give an interesting take on when value changes are normatively justified: we might now approach this question as a question about when it is justified to change our moral or normative beliefs. Such changes may, for example, be justified if we acquire new information or new experiences. This would suggest a new way of understanding normatively justified value change, namely as a change in justified beliefs about what is valuable.

---

<sup>16</sup>It might perhaps be (psychologically) more difficult for value realists than for non-cognitivists to embrace methodological agnosticism. This perhaps explains why many social scientists seem to be subjectivists about value.

<sup>17</sup>Note that, on more sophisticated accounts, the problem of epistemic access to values seems to surface again, as we typically are not the type of idealized persons or judge under the typical idealized circumstances that such accounts often assume.

<sup>18</sup>This also seems obvious for accounts that start from desires under idealized conditions, as the delineation of what counts as ‘ideal’ conditions is clearly value-laden in a way that cannot be reduced to desires.

Such a notion of value change might also aid understanding of how new technology can lead to value change. For new technologies we will often lack operational experience. Consequently, some of the social consequences of new technology will become clear only over time (van de Poel, 2017). This means that, over time, we will acquire new insights into what values are relevant for the design of technology (van de Poel, 2021). This is not just descriptive knowledge, but may also be moral knowledge, which is required to judge certain consequences or impacts of technology (van de Poel, 2018). As it seems reasonable to assume that moral knowledge requires relevant experiences, or at least becomes more reliable with increasing experience (Klenk and van de Poel, 2021), such experience may lead to the new moral knowledge and, consequently, to value change.

### **An illustration**

The discussion until now has been rather general and abstract. An illustration of a particular value change will give the discussion more flesh and bones. The aim is not to tease it out in all detail, but rather to sketch the contours of what a descriptive explanation of this value change might look like, and to indicate how the desirability of such a value change might be judged. The case is that of the change in sexual morality arising from the introduction of the birth control pill. This is often seen as a typical example of a value or moral change.

The changes in sexual morality in the Western world over the past fifty years have been radical. Sexuality and procreation have become largely separated. Homosexuality and sex outside marriage have become more generally accepted. (Van der Burg, 2003, p.14)

Diczfalusy (2000, p.3) makes a direct link with the introduction of the birth control pill:

In retrospect, it is clear that the introduction of steroidal contraception in 1959 and beyond was a major historical revolution, scientifically, medically, socially, and also ethically.

In order to meet the principle of methodological singularism, the illustration will focus on the change in sexual morality caused by the introduction of the birth control pill in the Netherlands. Swierstra describes this more specific value change as follows:

Before its introduction in the Netherlands a conservative sexual morality reigned . . . In the decades after the pill's introduction, under the headings of 'women's liberation' and 'sexual revolution', these sexual morals were radically transformed. . . . In short, this technological device – the pill – has proven to be a motor of moral change. (Swierstra, 2013, pp.212–13)

However, Swierstra (2003, p.213) also warns not to overstate the case. Many Dutch still adhere to traditional sexual morality, while others might also have embraced the new sexual morality without the pill. To explain how the pill nevertheless contributed to the change in sexual morality, Swierstra (2013, p.213) notes that:

The pill created new conditions that enabled more people than previously to take the dominant norms and values less seriously, while previously marginalised norms and values could come to the fore and gain societal acceptability.

This goes quite some way towards providing a sociological explanation of value change. It cites a change at the macroscopic level (the introduction of new technology – the pill), which in turn led to changes in the pay-off of certain options for the agents at the individual level, and a consequent change in behaviour, which in turn may have led, cumulatively, to a change at the macroscopic level in the predominant sexual morality. It should be noted that this particular explanation assumes that the agents at the individual level already desired a more liberal sexual morality and had corresponding individual values (values here understood as part of their personality). Indeed, it has been

suggested that, although a more traditional sexual morality was still, at the societal level, the norm around 1963 when the birth control pill was introduced in the Netherlands, individual values had already started shifting, although this had not yet led to a change in the dominant social value (Ketting, 2000). In fact, this shift seems to fit the more general claim of Inglehart (2018) that in more affluent societies there is an (intergenerational) value change from materialist to postmaterialist values.

This explanation can be further fleshed out by pointing out that the pill implied not just a change for those who wanted to have more casual sex, but also for general practitioners (Ketting, 2000). General practitioners in the Netherlands had been reluctant to prescribe contraceptives. The reason was that, at the time, contraceptives were quite unreliable, and general practitioners did not want to contribute to the number of abortions. The pill was, however, very reliable and thus might well contribute to decreasing the number of abortions.<sup>19</sup> This tilted the argument; unlike previous contraceptives, prescribing the pill came to be seen as a very acceptable if not desirable course of action for general practitioners.

Another important characteristic of the pill was that its use was not directly connected to having sex, unlike, for example, condoms (Ketting 2000). It can even be taken for medical reasons by women who are not planning to have (casual) sex. This made it less taboo and probably lowered the threshold for using it. In fact, in the Netherlands, by 1976, already 40% of women used the pill (Ketting 2000); it seems unlikely that all of them did so because they wanted looser sexual morality.

So, if the pill had ‘only’ allowed people to take some of the existing norms less seriously and to have casual sex with fewer consequences, it might have contributed to value change to a far smaller degree than it actually did; in fact, technology that allowed casual sex, like the condom, had existed since the Middle Ages. Rather, it seems to be the use of the pill for reasons that are not directly connected to casual sex, as well as a long-term intergenerational value change in people’s personal values, which was largely independent of the birth control pill, that enabled the pill to play its causal role.

This sketches the contours of what an explanation of the descriptive value change might look like, but what about normative value change? Swierstra does not make a moral judgement on the moral desirability of the sexual revolution. He mentions that some might have judged it as moral regress, but one gets the impression he would disagree with such a judgement. The aim here is not to give a moral judgement about the value change contained in the sexual revolution. Still, it is worthwhile to reflect on the example to see what a more normative account of value change might look like in a case like this. A first thing to note is that one can have a normative judgement on the desirability of the value change triggered by the birth control pill relatively independent of the exact descriptive explanation of this change. That is to say, if one subscribes to the descriptive explanation of this value change, one can still normatively embrace or reject it or consider it normatively irrelevant. This is not to say that the descriptive account is completely irrelevant to such a normative judgement: we may recognize the actual (motivating) reasons agents had, and have, for acting – and for propagating the value change – as good reasons, or as not so good reasons, from a normative point of view, and this may feed into our normative judgement. It would, however, not seem decisive for such a normative judgement.

This seems to me more generally true, and to show that descriptive accounts and normative accounts of (specific) value changes are relatively independent of each other. This is not to say that we do not have reasons to aim for actual (descriptive) value changes that reflect what is normatively

---

<sup>19</sup>It actually did not much influence the abortion rate. Ketting (2000) attributes this to another value change brought by the pill. Pregnancy, and having children, increasingly became seen as something that could be planned and controlled, so that accidental pregnancies were less accepted. Whereas in the past only highly undesirable pregnancies led to abortion, increasingly unintended pregnancies led to abortion. The net effect (no significant change in abortion rate) may then be the result of two opposing tendencies: the high reliability of the pill and the lower acceptance of accidental pregnancies.

desirable; we might well have such reasons. It is to say that there might well be a gap between the descriptive explanation of a value change and our normative judgement about it, and the existence of such a gap seems unproblematic. After all, the descriptive and normative accounts serve different aims, namely trying to explain and understand why the value change actually occurred versus making a normative judgement.<sup>20</sup>

Another interesting question raised by the example is whether we might also interpret it as a case in which normative or moral values themselves have changed. It would be if (and only if, it seems) the kind of sexual morality that was acceptable or desirable before the introduction of the birth pill or before the sexual revolution was different from the kind of sexual morality that became acceptable or desirable after it. It is hard to see how this would be possible. Certainly, people's views about what is acceptable have changed, and most likely people's desires as well, but this does not mean that what is morally acceptable has changed. Such changes in what is morally or normatively acceptable or what is morally good are not impossible, but the birth control pill and the sexual revolution do not seem me to be such a case. There is no obvious factor that has changed and that would justify a change in what is morally good or acceptable in this particular case.

### **Implications and conclusions**

When it comes to proactively designing technologies for values, as in value-sensitive design or responsible innovation, both descriptive and normative accounts of value change are relevant. Descriptive value changes are relevant because such changes will likely impact the actual employment of technologies and what may be called their 'social acceptance' (van de Poel, 2016; Taebi, 2017). Social acceptance may be defined in different ways. One way is in terms of the compatibility of user or societal values with certain technologies. On such an understanding, descriptive value change is directly relevant. Social acceptance may also be understood in terms of behaviour; for example, in terms of technological use or lack of resistance. Since the relation between values and behaviour is usually indirect and depends on, for example, contextual factors, such as understanding, value change may not always directly impact social acceptance, although it is still likely to be relevant.

Normative value change is also important in so far as we aim for technologies that reflect not just people's subjective values, but (also) moral values that are morally acceptable and not just socially accepted. From this perspective, it is first of all important to be able to judge the normative desirability of certain descriptive value changes. In addition, there is the question of whether moral or normative value change is possible. One interesting way to approach such questions is to think of value change as a change in justified beliefs about what is valuable. If we understand it in this way, value change can occur without a change in what is valuable in a more objective, moral sense. However, the practical effect may be similar as it may lead to changes in what we have (most) reason to believe to be of value. So, a technological device that is designed today on the basis of the best of our current knowledge and relevant values may no longer be deemed normatively acceptable in the future when we have gained new, additional evidence or experience. This has important practical implications for how we should design for innovative new technologies – for example, in more flexible or adaptable ways – as well as for how we organize processes of technology development and implementation; for example, we should look for more experimental or more agile ways that speed up the process of learning and knowledge acquisition while keeping the design of technology flexible.

On a more theoretical level, an important conclusion is that there is a (potential) gap between descriptive and normative accounts of value change. Such a gap is not necessarily problematic as both types of accounts serve different aims. Nevertheless, it is important to be aware that a descriptive

---

<sup>20</sup>Of course, normative judgements are perhaps relevant only if they can influence the actual course of events. But for that we need to show only that it is possible that they motivate the behaviour of actors, not that they actually have done so in a specific case. Weber's ideal type of value-rational action is an example of how people's behaviour can actually be motivated by moral values (see Boudon, 2013).

explanation of value change, and an understanding of the reasons for the agents acting as they do, is different from a normative justification. Conversely, it is usually not enough to know what is good in order to do or achieve good. The problem is not just that we need to be motivated to do the right thing – what Michael Smith (1995) has called the ‘moral problem’ – but that even when we are motivated to do the right thing and have good intentions, we might, as an interaction or aggregation effect, bring about consequences that are undesirable. This is actually one of the main lessons from the methodology of sociological explanations suggested here: what is brought about at the macroscopic level as the aggregate result of individual actions may well go beyond or even against the intentions of the acting agents. Therefore, effectuating desirable value changes requires more than just knowing what is good and having the right motivation; it requires an understanding of how actual value changes might come about or how they may fail to achieve. In other words, if we want to aim for normatively desirable value changes, a better understanding of descriptive value change is also required.

### Acknowledgement

This article is a product of the project ValueChange, which received funding from the European Research Council (ERC) under the European Union’s Horizon 2020 research and innovation programme (grant number 78832).

### References

- Appiah, A. (2010) *The Honor Code: How Moral Revolutions Happen*, Norton, New York.
- Baker, R. (2019) *The Structure of Moral Revolutions: Studies of Changes in the Morality of Abortion, Death, and the Bioethics Revolution*, MIT Press, Cambridge MA.
- Bardi, A., Buchanan, K., Goodwin, R., Slabu, L. and Robinson, M. (2014) ‘Value stability and change during self-chosen life transitions: self-selection versus socialization effects’, *Journal of Personality and Social Psychology*, 106, 1, pp.131–47. doi: 10.1037/a0034818.
- Belkin, G. (2003) ‘Brain death and the historical understanding of bioethics’, *Journal of the History of Medicine and Allied Sciences*, 58, 3, pp.325–61. doi: 10.1093/jhmas/jrg003.
- Bicchieri, C. (2006) *The Grammar of Society: The Nature and Dynamics of Social Norms*, Cambridge University Press, New York.
- Bicchieri, C. (2017) *Norms in the Wild: How to Diagnose, Measure, and Change Social Norms*, Oxford University Press, New York.
- Boenink, M., Swierstra, T. and Stemerding, D. (2010) ‘Anticipating the interaction between technology and morality: a scenario study of experimenting with humans in bionanotechnology’, *Studies in Ethics, Law, and Technology*, 4, 2, pp.1–38.
- Boudon, R. (1981) *The Logic of Social Action. An Introduction to Sociological Analysis*, Routledge & Kegan Paul, London.
- Boudon, R. (1983) ‘Why theories of social change fail: some methodological thoughts’, *Public Opinion Quarterly*, 47, 2, pp.143–60.
- Boudon, R. (1986) *Theories of Social Change*, University of California Press, Berkeley.
- Boudon, R. (2012) ‘“Analytical sociology” and the explanation of beliefs’, *Revue Européenne des Sciences Sociales*, 50, 2, pp.7–34.
- Boudon, R. (2013) *The Origin of Values: Sociology and Philosophy of Beliefs*, Transaction Publishers, New Brunswick.

- Buchanan, A. (2018) *The Evolution of Moral Progress: A Biocultural Theory*, Oxford University Press, New York.
- Coleman, J. (1990) *Foundations of Social Theory*, Belknap Press, Cambridge MA.
- Demski, C., Butler, C., Parkhill, K., Spence, A. and Pidgeon, N. (2015) 'Public values for energy system change', *Global Environmental Change*, 34, pp.59–69. doi: 10.1016/j.gloenvcha.2015.06.014.
- Diczfalusy, E. (2000) 'The contraceptive revolution', *Contraception*, 61, 1, pp.3–7. doi: [https://doi.org/10.1016/S0010-7824\(99\)00112-2](https://doi.org/10.1016/S0010-7824(99)00112-2).
- Douglas, M. and Wildavsky, A. (1982) *Risk and Culture: An Essay on the Selection of Technical and Environmental Dangers*, University of California Press, Berkeley
- Dworkin, G. (1988) *The Theory and Practice of Autonomy*, Cambridge University Press, Cambridge.
- Eriksen, C. (2019) 'The dynamics of moral revolutions: prelude to future investigations and interventions', *Ethical Theory and Moral Practice*, 22, 3, pp.779–92. doi: 10.1007/s10677-019-10005-x.
- Eriksen, C. (2020) *Moral Change: Dynamics, Structure, and Normativity*, Palgrave Macmillan, Cham, Switzerland.
- Frankfurt, H. (1971) 'Freedom of the will and the concept of a person', *Journal of Philosophy*, 68, 1, pp.5–20. doi: 10.2307/2024717.
- Friedman, B. and David, H. (2019) *Value Sensitive Design: Shaping Technology with Moral Imagination*, MIT Press, Cambridge MA.
- Giacomini, M. (1997) 'A change of heart and a change of mind? Technology and the redefinition of death in 1968', *Social Science & Medicine*, 44, 10, pp.1465–82. doi: [https://doi.org/10.1016/S0277-9536\(96\)00266-3](https://doi.org/10.1016/S0277-9536(96)00266-3).
- Gouveia, V., Vione, K., Milfont, T. and Fischer, R. (2015) 'Patterns of value change during the life span: some evidence from a functional approach to values', *Personality and Social Psychology Bulletin*, 41, 9, pp.1276–90. doi: 10.1177/0146167215594189.
- Griffin, J. (1986) *Well-Being: Its Meaning, Measurement, and Moral Importance*, Clarendon Press, Oxford.
- Hansen, N., Postmes, T., Tovote, A. and Bos, A. (2014) 'How modernization instigates social change: laptop usage as a driver of cultural value change and gender equality in a developing country', *Journal of Cross-Cultural Psychology*, 45, 8, pp.1229–48. doi: 10.1177/0022022114537554.
- Hecht, G. (1998) *The Radiance of France: Nuclear Power and National Identity After World War II*, MIT Press, Cambridge MA.
- Hofstede, G. (2001) *Culture's Consequences: Comparing Values, Behaviors, Institutions and Organizations across Nations*, Sage, Thousand Oaks CA.
- Inglehart, R. (2018) *Cultural Evolution: People's Motivations are Changing, and Reshaping the World*, Cambridge University Press, Cambridge.
- Jackson, F. (1998) *From Metaphysics to Ethics: A Defence of Conceptual Analysis*, Oxford University Press, Oxford.
- Jamieson, D. (2002) 'Is there progress in morality?', *Utilitas*, 14, 3, pp.318–38. doi: 10.1017/S0953820800003630.
- Jasanoff, S. and Kim, S.-Y. (2015) *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*, University of Chicago Press, Chicago.



- Ketting, E. (2000) 'De invloed van orale anticonceptie op de maatschappij', *Nederlands Tijdschrift voor Geneeskunde*, 144, pp.283–6.
- Kitcher, P. and Heilinger, J.-C. (2021) *Moral Progress*, Oxford University Press, New York.
- Klenk, M. and van de Poel, I. (2021) 'COVID-19, uncertainty, and moral experiments', *History and Philosophy of the Life Sciences*, 43, 1, paper 8. doi: 10.1007/s40656-020-00360-9.
- Kluckhohn, C. (1951) 'Values and value-orientations in the theory of action: an exploration in definition and classification' in Parsons, T. and Shils, E. (eds) *Toward a General Theory of Action*, Harper & Row, New York, pp.388–433.
- Korsgaard, C. (1983) 'Two distinctions in goodness', *Philosophical Review*, 92, 2, pp.169–95.
- Korsgaard, C. (2015) 'Eternal values, evolving values, and the value of the self' in Macedo, S. (ed.) *Foragers, Farmers, and Fossil Fuels: How Human Values Evolve*, Princeton University Press, Princeton, pp.184–201.
- Krishnan, V. (2008) 'Impact of MBA education on students' values: two longitudinal studies', *Journal of Business Ethics*, 83, 2, pp.233–46. doi: 10.1007/s10551-007-9614-y.
- Kudina, O. and Verbeek, P.-P. (2019) 'Ethics from within: Google Glass, the Collingridge Dilemma, and the mediated value of privacy', *Science, Technology & Human Values*, 44, 2, pp.291–314. doi: 10.1177/0162243918793711.
- Lampert, M., Inglehart, R., Metaal, S., Schoemaker, H. and Papadongonas, P. (2021) 'Two faces of Covid-19 impact: the pandemic ignites fear, but boosts progressive ideals and calls for inclusive economic growth. Measuring the pandemic's impact on social values, emotions and priorities in 24 countries', available at <https://glocalities.com/reports/valuestrends> (accessed February 2021).
- Maio, G., Olson, J., Bernard, M. and Luke, M. (2006) 'Ideologies, values, attitudes, and behavior' in Delamater, J. (ed.) *Handbook of Social Psychology*, Springer, Boston MA, pp.283–308.
- Moore, G. (1922) *Philosophical Studies*, Routledge, London. Morris, I. (2015) *Foragers, Farmers, and Fossil Fuels: How Human Values Evolve*, Princeton University Press, Princeton.
- Musschenga, A. and Meynen, G. (2017) 'Moral progress: an introduction', *Ethical Theory and Moral Practice*, 20, 1, pp.3–15. doi: 10.1007/s10677-017-9782-5.
- Nickel, P., Kudina, O. and van de Poel, I. (2022) 'Moral uncertainty in technomoral change: bridging the explanatory gap', *Perspectives on Science*, 30, 2, pp.260–83. doi: 10.1162/posc\_a\_00414.
- Oddie, G. (2005) *Value, Reality, and Desire*, Oxford University Press, Oxford.
- Orilia, F. and Paoletti, M. (2020) 'Properties' in Zalta, E. (ed.) *Stanford Encyclopedia of Philosophy*, Metaphysics Research Lab, Stanford University, Stanford CA.
- Ostrom, E. (2005) *Understanding Institutional Diversity*, Princeton University Press, Princeton.
- Owen, R., Macnaghten, P. and Stilgoe, J. (2012) 'Responsible research and innovation: from science in society to science for society, with society', *Science and Public Policy*, 39, 6, pp.751–60. doi: 10.1093/scipol/scs093.
- Parfit, D. (2011) *On What Matters*, Oxford University Press, New York.
- Pleasants, N. (2018) 'The structure of moral revolutions', *Social Theory and Practice*, 44, 4, pp.567–92.

- Rabinowicz, W. and Rønnow-Rasmussen, T. (2005) 'A distinction in value: intrinsic and for its own sake' in Rønnow-Rasmussen, T. and Zimmerman, M. (eds) *Recent Work on Intrinsic Value*, Springer, Dordrecht, pp.115–29.
- Rawls, J. (1999) [1971] *A Theory of Justice*, Belknap Press, Cambridge MA.
- Richardson, H. (1997) *Practical Reasoning about Final Ends*, Cambridge University Press, Cambridge.
- Rokeach, M. (1973) *The Nature of Human Values*, Free Press, New York.
- Rowland, R. (2017) 'The significance of significant fundamental moral disagreement', *Nous*, 51, 4, pp.802–31. doi: <https://doi.org/10.1111/nous.12170>.
- Schwartz, S. (1992) 'Universals in the content and structure of values: theoretical advances and empirical tests in 20 countries', *Advances in Experimental Social Psychology*, 25, pp.1–65.
- Schwartz, S. and Bilsky, W. (1987) 'Toward a universal psychological structure of human values', *Journal of Personality and Social Psychology*, 53, 3, pp.550–62. doi: 10.1037/0022-3514.53.3.550.
- Smith, M. (1995) *The Moral Problem*, Blackwell, Oxford.
- Sortheix, F., Parker, P., Lechner, C. and Schwartz, S. (2019) 'Changes in young Europeans' values during the global financial crisis', *Social Psychological and Personality Science*, 10, 1, pp.15–25. doi: 10.1177/1948550617732610.
- Steg, L. and De Groot, J. (2012) 'Environmental values' in Clayton, S. (ed.) *Oxford Handbook of Environmental and Conservation Psychology*, Oxford University Press, New York, pp.81–92.
- Steinert, S. (2020) 'Corona and value change: the role of social media and emotional contagion', *Ethics and Information Technology*, 23, 1, pp.59–68. doi: 10.1007/s10676-020-09545-z.
- Swierstra, T. (2013) 'Nanotechnology and technomoral change', *Etica & Politica / Ethics & Politics*, 15, 1, pp.200–19.
- Swierstra, T., Stemerding, D. and Boenink, M. (2009) 'Exploring techno-moral change. The case of the obesity pill' in Sollie, P. and M. Düwell, M. (eds) *Evaluating New Technologies*, Springer, Dordrecht, pp.119–38.
- Taebi, B. (2017) 'Bridging the gap between social acceptance and ethical acceptability', *Risk Analysis*, 37, 10, pp.1817–27. doi: 10.1111/risa.12734.
- Tomasello, M. (2015) *A Natural History of Human Morality*, Harvard University Press, Cambridge MA.
- Tucker, M. (2019) 'From an axiological standpoint', *Ratio*, 32, 2, pp.131–8. doi: <https://doi.org/10.1111/rati.12219>.
- Van den Hoven, J., Vermaas, P. and van de Poel, I. (eds) (2015) *Handbook of Ethics and Values in Technological Design. Sources, Theory, Values and Application Domains*, Springer, Dordrecht.
- van de Poel, I. (2016) 'A coherentist view on the relation between social acceptance and moral acceptability of technology' in Franssen, M., Vermaas, P., Kroes, P. and Meijers, A. (eds) *Philosophy of Technology After the Empirical Turn*, Springer International, Cham, Switzerland, pp.177–93.
- van de Poel, I. (2017) 'Society as a laboratory to experiment with new technologies' in Bowman, D., Stokes, E. and Rip, A. (eds) *Embedding New Technologies into Society: A Regulatory, Ethical and Societal Perspective*, Pan Stanford Publishing, Singapore, pp.61–87.

- van de Poel, I. (2021) 'Design for value change', *Ethics and Information Technology*, 23, pp.27–31. doi: 10.1007/s10676-018-9461-9.
- van de Poel, I. (2018) 'Moral experimentation with new technology' in van de Poel, I., Mehos, D. and Asveld, L. (eds) *New Perspectives on Technology in Society: Experimentation beyond the Laboratory*, Routledge, Milton Park UK, pp.59–79.
- Van der Burg, W. (2003) Dynamic ethics', *Journal of Value Inquiry*, 37, pp.13–34.
- Verkasalo, M., Goodwin, R. and Bezmenova, I. (2006) 'Values following a major terrorist incident: Finnish adolescent and student values before and after September 11, 2001', *Journal of Applied Social Psychology*, 36, 1, pp.144–60. doi: <https://doi.org/10.1111/j.0021-9029.2006.00007.x>.
- Waelbers, K. and Swierstra, T. (2014) 'The family of the future: how technologies can lead to moral change' in van den Hoven, J., Doorn, N., Swierstra, T., Koops, B.-J. and Romijn, H. (eds) *Responsible Innovation I: Innovative Solutions for Global Issues*, Springer, Dordrecht, pp.219–36.
- Weber, M. (1978) [1922] 'The foundations of social theory' in Matthews, E. (ed.) *Max Weber: Selections in Translation*, Cambridge University Press, Cambridge, pp.17–32.
- Ylikoski, P. (2017) 'Social mechanisms' in Glennan, S. and Illari, P. (eds) *Routledge Handbook of Mechanisms and Mechanical Philosophy*, pp.401–12, Routledge, Milton Park UK.
- Zhao, H-Y., Kwon, J-W. and Yang, O-S. (2016) 'Updating Hofstede's cultural model and tracking changes in cultural indices', *Journal of International Trade and Commerce*, 12, 5, pp.85–106.
- Zimmerman, M. (2001) *The Nature of Intrinsic Value*, Rowman & Littlefield, Lanham MD.