Why do we Need Norm Sensitive Design? A WEIRD Critique of Value Sensitive Approaches to Design

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Abstract

The article argues that mainstream value-sensitive approaches to design have been based on narrow understandings of personhood and social dynamics, which are biased toward Western Educated Industrialized Rich and Democratic cultures and contradicted by empirical evidence. To respond to this weakness, the article suggests that design may benefit from focusing on user behaviours from the joint perspective of values and norms, especially across cultural contexts. As such, it proposes Norm Sensitive Design as a complement to value-sensitive approaches when designing and implementing new technologies. Versus values, norms serve as more accurate predictors or descriptors of behaviours and can thus support value-sensitive approaches to realize the aspiration of informing user behaviour via design. The article makes two key contributions. On the theoretical side, it promotes the consideration of norms in design. On the practical side, it offers designers and instructors prompts for reflecting on design ethics from the perspective of norms.

1 Introduction

This article argues that mainstream value-sensitive approaches to design, such as Value Sensitive Design (VSD) or Design for Values (DfV) have been based on narrow understandings of personhood and social dynamics. These are biased toward

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Western Educated Industrialized Rich and Democratic (WEIRD) cultures and contradicted by empirical evidence. Not only that the specific values promoted by VSD and DfV are not representative of global populations, but neither can human collective behaviours be adequately understood in terms of values alone. By contrast, we posit that design benefits from understanding user behaviours from the joint perspective of values and norms, especially across cultural contexts. By norm, we understand a controlling factor for human behaviour (Gavrilets and Richerson 2017), which draws on group level intersubjectivity (Fehr et al. 2002) and consensus to enact it (Sechrist et al. 2001), such that its endorsement becomes in time a mode of collective behaviour.

For that reason, we propose Norm Sensitive Design (NSD) as a complement to value-sensitive approaches, to help these fully realize the aspiration of informing user behaviour. To do so, the article is divided into three parts: first, it discusses the history of and motivations for VSD and DfV; next, it provides an empirical critique from a non-WEIRD perspective; thirdly, it introduces NSD as a complement to VSD, presenting mosh pits as an example of artefact that highlights the need to consider norms alongside values in design. The contribution concludes with a list of reflective questions to aid designers and design researchers in engaging with NSD, which instructors can also use in the classroom when teaching design ethics.

The article has two major implications. First, on the theoretical side, it makes the case for considering norms alongside values in design, introducing the concept of NSD. Second, on the practical side, it offers designers and instructors alike prompts for reflecting on design ethics. Overall, our proposal for bringing norm-sensitive approaches to design is a call for making explicit with regard to VSD and DfV practices that are already carried out in the fields of behavioural economics and social psychology or when developing decision architecture and formulating "nudges" (Thaler and Sunstein 2008; Dameski et al. 2022).

2 Background

We begin our examination of value-sensitive approaches by providing a background description of the development of VSD and DfV, followed by an examination of their theoretical assumptions.

2.1 The Historical Emergence of VSD and DfV

VSD was introduced by Friedman (1996) and later popularised in the Netherlands by several philosophers such as Peter Paul Verbeek, Ibo van de Poel or Jeroen van de Hoven. It draws on the Philosophy of Technology and Science and Technology Studies to explore and address the value dimensions of technology, by considering the effects of technological artefacts on their users and environments during the design process (van de Poel and Verbeek 2006; Verbeek 2008).

Having as its initial application domain the technology of information (Friedman et al. 2002), VSD has now extended to other technological domains (Brey 2015) and breached out to an articulation of "shared public values" in design and innovation, championed by DfV (Van den Hoven et al. 2015).

Although having distinct domains and scopes, both VSD and DfV aspire to consider and integrate values from the design stage of a technological system or artefact. As such, both approaches focus on decisions made in the early stages of design, when ethical considerations may emerge in the formulation of requirements, specifications, and criteria, as well as in the assessment of trade-offs between diverging criteria and setting acceptable outcomes (van Gorp and van de Poel 2008). In this sense, VSD and DfV require a commitment to a set of values informing the design and contributing to its actuation. Value is understood here as "what is important to people in their lives, with a focus on ethics and morality", in order to provide "explicit checks and balances" in the design process (Friedman and Hendry 2019, pp. 24–25).

VSD emerged in the 1990s inspired by advances in the field of Human-Computer Interaction (HCI), which called for complementing the focus on the functionality, efficiency or reliability of new technologies with considerations about the role of values in design (Friedman 1999; Jacko and Sears 2007). Highlighting the need for VSD, Friedman (2004) asserted that "human values and ethical considerations no longer stand apart from the human-computer interaction community but are fundamentally part of our practice."

At its inception, VSD focused on privacy and introduced the value of informed consent for web browser cookies (Friedman et al. 2002). Later, outside the HCI community, we saw the rise of VSD approaches in the design of urban simulations (Borning et al. 2005), health information systems (Walton and DeRenzi 2009), social networks (Cotler and Rizzo 2010), healthcare robots (van Wynsberghe 2013), implantable medical devices (Denning et al. 2010) or exercise enhancement (Rector et al. 2015). Examples of everyday artefacts representing VSD include designing benches that discourage homeless people from lying down or sleeping on them and installing nubs on ledges and handrails to prevent skateboarders and rollerbladers from using them for tricks.

2.2 Theoretical Tenets of Value-sensitive Approaches

According to VSD, every design creates certain possibilities for action and application, while obstructing others. Design can thus promote or block the instantiation of specific moral values. As such, VSD relates to values in two ways: acknowledging that technological design impacts our understanding of human values and focusing on how values can be inscribed in technological artefacts via design (Manders-Huits 2011). The term "value" was defined in this context as "what a person or group of people consider important in life" (Friedman et al. 2006, p. 349), and is seen as guiding behaviours.

Verbeek (2006) further expands the theoretical tenets of VSD to address the influence of technologies on human actions through what STS scholars call *scripts*. These are prescriptions of how to act that are built into an artefact, thus charging technologies with morality. The notion of scripts brings the focus on how artefacts invite specific actions and inhibit others. Verbeek recognizes that value-sensitive approaches cannot inherently lead to value-driven behaviours based on values alone. As such, Verbeek is especially concerned with how mediation theory can inform design practices. By answering this question, he argues, mediation theory can "effectively and

desirably" explain the actuation of values in terms of behaviours via VSD (Verbeek 2008).

In a similar spirit to VsD we see the emergence of DfV. The approach originated at the Delft University of Technology and aimed for a broader coverage spanning the design of new products, public utilities, and the built environment (van den Hoven 2007). DfV champions an "active value-driven steering of and intervention in technological development," which would make obsolete the "societal opposition during implementation and adoption" of new technologies (Van den Hoven et al. 2015). As such, DfV is strongly linked with the ideal of responsible innovation in its ambition to "contribute to the success, acceptance, and acceptability of innovations" (Van den Hoven et al. 2015). The approach is explicitly committed to values such as safety, sustainability, and more recently responsibility, democracy, or justice (Van den Hoven et al. 2015).

Nevertheless, despite the popularity of value-sensitive approaches and their increasing uptake in different fields (Friedman et al. 2021), there is still little known about the depth of value conceptualization and how conceptualization is achieved methodologically in the studies describing such projects (Winkler and Spiekermann 2018). In the following section, we develop a critique of VSD informed by empirical data, highlighting three weaknesses related to the bias toward WEIRD values, how these values are enacted differently across distinct cultures, and the uptake of a Western-inspired understanding of values as a reliable predictor of behaviours.

3 Empirical Critique of VSD

On the empirical front, it has been argued that VSD cannot properly account for the diversity of values and how they play out in different ways across cultures and contexts (Davis and Nathan 2015, p. 21). Albrechtslund (2007) notes, even though VSD draws on ethical theory and claims to take universal values into account, it does not make clear *what* and *whose* theories and values it includes. As such, VSD runs the risk of perpetuating the "belief that a particular group, culture, or religion is the keeper of those values, and needs to impose them on others – with sometimes tragic consequences" (Borning and Muller 2012, p. 1127). Furthermore, VSD frameworks offer little light on empirical matters related to the emergence or intermediation of values (Johri and Nair 2011, pp. 297-8). In this section, we continue the critical discussion by questioning value-sensitive approaches from a non-WEIRD cultural perspective based on current empirical research.

3.1 Primacy of WEIRD Values

When it comes to the values typically included in VSD, Friedman and Kahn (2002, pp. 1187–1193) list a collection of twelve "human values with ethical import often implicated in system design," which includes *human welfare*, *ownership, and property*, *privacy*, *freedom from bias*, *universal usability*, *trust*, *autonomy*, *informed consent*, *accountability*, *courtesy*, *identity*, *calmness*, and *environmental sustainability*.

While VSD frameworks might seem well-positioned to account for societal preferences, they may do so in a misguided manner. Davis and Nathan (2015, p. 12) argue that VSD tacitly suggests that "designers *must* attend to values supported by theories of the right, which are obligatory, and *may* attend to values supported by theories of the good, which are discretionary." Nevertheless, these theories (i.e. deontology, consequentialism) have developed in the cultural space of Europe and Ancient Greece. As Luegenbiehl (2009) points out, "foundational ethical principles as the major source for ethical decision-making are a specific product of the Western philosophical tradition."The primacy of the Western lens is evident in the list of values of VSD, with Friedman et al. (2006, p.364) acknowledging that the list "comprises many of the values that hinge on the deontological and consequentialist moral orientations."

However, this is problematic since technologies are used by people across different parts of the world. As a result, the theories on which values used in VSD are based might not be relevant to designers in different regions, who should consider the values of local user groups. Prominent studies by Hofstede (1991; 2003) and Leung et al. (1995) show that values vary by culture and country. They concern more than human welfare, ownership and property, privacy, and so on - values emphasised in VSD. More recently, the large-scale *Moral Machine* study conducted by MIT asked global populations to respond to moral dilemmas involving autonomous vehicles (Awad et al. 2018). It gathered 40 million responses in ten languages from people across 233 countries and territories. Thus, this study provides insights regarding approaches to take in designing self-driving cars. The most important of these is that Western values are unrepresentative of global populations.

The study shows that respondents from different regions and cultures prioritised different values when deciding on moral dilemmas. These differences mirror patterns reflecting cultural and economic variations between countries. The study found that "the more culturally similar a country is to the US, the more similarly its people play the Moral Machine" (Awad et al. 2018, p. 8). The authors consider that "an important obstacle" is the split between individualistic and collectivistic cultures when it comes to the "distinctive value of each individual" (Awad et al. 2018, p. 8). The individualism-collectivism axis is the exact same dimension highlighted by Hofstede's (1991; 2003) empirically based model of cultural values, which showed that people from different countries tend to hold contrasting values. These are some of the problems associated with treating values used in VSD as if they were universal. Even if certain values are universalizable across some cultures, efforts to contextualise these values are not universalizable. Saab (2008, p. 8) also draws attention to the peril of treating the values promoted by VSD as universal. For example, he points out that the values of privacy and autonomy are part of individualist cultures, while group cohesion and harmony belong to collectivist cultures. As such, Saab (2008) notes that a US designer of an information system might favour the autonomy of the individual and design an interface with "concomitant responsibility for revisions of information content, the ability to personalize the technological interface, and the ability to keep an individual's information private while allowing open access to other information and knowledge." Such design would not meet the values of Guatemalan or Singaporean users, for whom "the personalization of the interface is likely to be less important than a single interface that fosters harmony of process among users" and who prefer

that the technology "prioritizes the accomplishment of group goals" and "tracking revisions of information content at a group rather than individual level".

Friedman and Hendry (2019) do not claim that the list of values is exhaustive and leave open at the declarative level the possibility for additions. Yet, Le Dantec et al. (2009) argue that the articulation of VSD methodologies does not support the active refinement of the value classification. This is particularly concerning given the industry, government, and academia's increased interest in AI ethics, which focuses on transparency, explainability, and trustworthiness (Balasubramaniam et al. 2022; Deloitte 2019; High-Level Expert Group on Artificial Intelligence 2019; European Commission 2020). These principles rest on narrow conceptions of ethics characteristic of the Western world that emphasise autonomy and individual protection.

For DfV, Van den Hoven et al. (2015) include the values of *safety*, *sustainability*, *responsibility*, *democracy*, and *justice*. Among these, justice is a culturally problematic value. Bombaerts et al. (2020, p. 11) draw attention that justice is a WEIRD concept that has been "pushed" into global philosophy. According to Tan (2015), the word justice does not exist in Chinese, thus questioning its universality as a philosophical concept. Furthermore, it is acknowledged that in Confucianism, justice is conjoined with two other concepts related to humanness and propriety, with the latter representing the external realization of justice via rules and norms (Lebow and Zhang 2022).

These examples show that value-sensitive approaches have been biased toward WEIRD cultures in two ways: first, values representing western philosophical traditions are overrepresented; second, non-western values are adopted via an improper western translation and theorised as universal.

3.2 Enacting Values Across Cultural Contexts

We continue our analysis by focusing on the acontextual fallacy of value-sensitive approaches in the discourse about values. This fallacy points to the act of referring to specific values as if their interpretation is homogenous across different individuals and groups. For example, values such as *privacy* or *sustainability* have become so commonplace in day-to-day language that their origins, specificities, or legitimacy are left unquestioned, leading to acontextual interpretations. Values thus become empty signifiers, given their unquestioned connotations when used on a routine basis to accept or reject technological designs (Stone et al. 2020, p. 1384).

Furthermore, there is a contextual side to human values, since they are situated and experiential: what a value means and how it is enacted depends partly on a local context and situation (Wong and Nguyen 2021). Hence, values whose interpretation differs in WEIRD and non-WEIRD cultures require contextual considerations for translating values into behaviours via design. For example, in the interpretation of *safety*, the anthropological component of the safety culture is considered to reflect the broader national culture (Yorio et al. 2019). It pertains to shared organizational beliefs, assumptions, and values related to safety (Yorio et al. 2019). Cultural tendencies that play out in a national setting are seen to shape the beliefs and work behaviours of employees, as well as their safety-related values (Noort et al. 2016). In a highly global profession, such as the maritime industry, empirical studies found that

nationality impacts one's attitude toward safety (Håvold 2007; Hansen et al. 2008). More specifically, Hansen et al. (2008) found that seafarers from Southeast Asia, mainly the Philippines, have a lower risk of occupational accidents than those from Western Europe, which is due to different safety attitudes. Moreover, the reduction in human failures in shipping operations is correlated with a high Confucian dynamism, manifested in following rules and procedures or saving face when it comes to safety (Lu et al. 2012). Merritt (2000) found that Hofstede's dimensions also replicate in aviation. Even though aviation is a tightly regulated industry at the global level, we encounter a meaningful influence of national cultures on attitudes and behaviours (Merritt 2000).

This variation is also present when considering *autonomy* and *informed consent*, which are among the VSD values listed by Friedman and Hendry (2019). In medical ethics, discussions on the universality of values are more advanced and have explored how values are interpreted differently in WEIRD and non-WEIRD cultural contexts (Nie 2011). Xu (2004) gives the example of Chinese culture, where patient autonomy is extended to the entire family, and ethical practice requires seeking informed consent from the entire family rather than from the individual alone. Moreso, in Eastern cultures, news about terminal diagnostics is typically disclosed to family members, while they are kept hidden from the patient (Fan and Li 2004). Following Hanssen (2004), who argues against the universality of autonomy across cultures, Xu (2004) concludes that WEIRD values need to be translated to other cultures to preserve the best interests of users across the globe.

3.3 Axiology Concerns: Values as Unreliable Predictors and Descriptors of Behaviours

The third point of critique is an axiological concern about whether values function the way value-sensitive approaches assume they do. A major assumption for pursuing VSD is that values are output-oriented, and as such, reliable predictors of behaviours. We further unpack this assumption, noting that it is based on a WEIRD conceptualization of value.

The supposed nature and assessment of values have arisen in WEIRD cultural contexts (Kulich and Zhang 2012). Values have been conceived as long-standing beliefs or ideas about which states are worth pursuing (Torelli and Kaikati 2009), rooted in consequentialist or deontological criteria (Luegenbiehl 2009). As such, in WEIRD cultures, values are oriented toward the "output" side of human actions, translated into considerations of how one ought to behave (Garfield 2022, p.199). This comprises normative specifications of either the actions to be pursued or of the rationale for those actions. In contrast, Buddhism places one's experience of the world as the principal object of moral evaluation, grounded in a social and psychological account of human nature (Garfield 2022, p.22; p.169). Ubuntu also acknowledges its distinct understanding of morality, which is relational rather than rational (Birhane 2021). Birhane (2021) further claims that WEIRD cultures are inherently rationalistic, having at the core the Bayesian model of prediction to establish normative explanations of behaviours. This is reflected, for example, in the design of advanced distribution

management systems, whose WEIRD-centric rationalistic value system is prone to the amplification of socially held stereotypes (Mhlambi 2020).

This is true also of value-sensitive approaches to design, which rest on a WEIRD conception of values as guiding and, therefore, able to predict behaviours. An example relevant to VSD is Verbeek's (2006) use of the "script" concept to indicate how technologies prescribe human actions via specific values integrated into technological designs. Nevertheless, social psychology research shows that values do not necessarily function as ascribed by VSD and DfV scholars. Specifically, values are unreliable predictors of behaviours when individuals are induced to think concretely about situations (Torelli and Kaikati 2009) or in the immediate future (Eyal et al. 2009). Eyal et al. (2009) showed that due to their high-level abstract nature, values are aspirational constructs that are more likely to be activated when considering future situations but are less likely to inform immediate actions. As such, a medical check-up, when envisioned in a distant future, is more likely to be represented as a desirable opportunity to improve health, compared to an upcoming check-up which is more likely to be represented in terms of discomfort or duration, which goes to show that the value individuals attach to health is less likely to guide one's behaviour of signing up for a medical check-up in the immediate future (Eyal et al. 2009). High-level abstraction also comes into play when individuals deem particular objects or events as attractive or aversive based on the values held, but may fail to focus on these values for interpreting their own actions (Torelli and Kaikati 2009). As Darley and Batson (1973)'s study shows, theological seminary students running late to give a talk failed to help an ailing person on their way, even when the subject of their lecture was the parable of the Good Samaritan, which is centered on the value of helpfulness. The power of values to predict behaviours also varies by culture (Knafo et al. 2009). The values of non-WEIRD (Western Educated Industrialized Rich and Democratic) groups say less about how people will behave (Knafo et al. 2009; Henrich et al. 2010). For example, prosocial behaviours such as helping strangers are more likely to be encountered in less developed economies, as well as in Spanish and Latin American cultures (Knafo et al. 2009).

Additionally, although values are often invoked to understand cultural differences, they are nevertheless poorly suited for this role. Values are only one of many ways to understand culture and are not an especially accurate descriptor. For example, the values of mainland Chinese, Hong Kongese, and Singaporean Chinese, which are typically conceived as all belonging to the same cultural group, are closer to those of people in Zimbabwe, Israel, and Malaysia, respectively, than they are to each other (Smith 2010). Research based on the World Values Survey (Haerpfer et al. 2020) shows that "socioeconomic development tends to propel societies in a common direction, regardless of their cultural heritage," with all of the "high-income" societies (as defined by the World Bank) ranking relatively high on the dimensions purporting to secular-rational values and self-expression values, while all of the "low-income" societies fall into the lower left zone of the cultural axis, pertaining to traditional values and survival values.

Thus, VSD is seen to run the risk of committing the naturalistic fallacy of treating selected values in a normative sense. Manders-Huits (2011) points out that while VSD claims that values depend on the stakeholders' stance, this implies a sociologi-

cal conception of values rather than an ethical one. Simply because design frameworks address stakeholder preferences or values, does not mean they would be normatively sufficient. In other words, accounting for values is a necessary but not sufficient condition of ethical design. Taebi (2017) puts this problem down to the difference between "ethical" (or normative) and "social" (or descriptive) acceptability. This critique highlights the need to complement the focus on values in design with additional considerations, in order to bridge the gap between, on the one hand, individual and localised preferences, often of a WEIRD influence, and on the other hand, behaviours that are manifested by groups and that can be representative across cultures. In the following section, we will explore how a focus on norms can serve the role of guiding design practices toward accounting for WEIRD and non-WEIRD behaviours or practices.

4 From Value to Norm Sensitive Design

To fully realize the societal ambitions of VSD, value-sensitive approaches must complement their theoretical paradigms and practical processes with considerations of norms. VSD cannot achieve its goal solely by focusing on values alone. In what follows, we argue that norms can serve as better descriptors and predictors of behaviours than values, making them suitable candidates for complementing value-sensitive approaches. To support our point, we give the example of mosh pits as a technological artifact that reveals the importance of NSD.

4.1 Norms as Descriptors and Predictors Behaviours

First, while values are internal, aspirational constructs, norms are rules governing behaviour (Bicchieri et al. 2018) and patterns representative of or typical for behaviours in human groups (Ehrlich and Levin 2005). Norms have evolved affecting behaviours to facilitate collective actions, such as cooperation in overcoming natural disasters and conflicts with neighbouring groups (Henrich 2015a; Gavrilets and Richerson 2017). Cultures with histories of greater existential threats have more norms, which are more strictly enforced (Gelfand et al. 2011). This suggests that such behavioural dynamics needs to be understood in terms broader than values alone. For example, Boyd et al. (2013) plea for understanding behaviours generated by technology from the perspective of cultural evolution, and norms may have this function. Considering its effect on human behaviour, achieving norm internalization is important for reducing the costs necessary to ensure cooperation and adjusting the utility functions in rapidly changing environments and situations (Gavrilets and Richerson 2017). This suggests there are prospects for design to facilitate norm internalization.

  Second, since values concern internal states, they can only be accessed reflectively, through individual self-reports. By contrast, since norms concern external behaviours, they are publicly available and easier to measure using various methods, including experimental and quasi-experimental procedures, such as economic games and mathematical models (McElreath and Boyd 2007; Henrich 2015a, b; Chudek and Henrich 2011; Bicchieri 2016). Furthermore, norms have been conceived as follow-

ing from values, insofar as values concern states worth pursuing and norms ensure that these states are achieved (van de Poel and Royakkers 2011). However, this relation only makes sense when *internal preferences* are closely linked to *external behaviours*. This is the case in WEIRD cultures, which consider intentions and internal psychic states when judging whether actions are blame- or praise-worthy, as well as the sanction that blameworthy actions deserve (Robbins et al. 2017; Henrich 2020). Nevertheless, among non-WEIRD cultures, sanctions and judgments of praise- and blame-worthiness tend to be based on the outcomes of actions – for instance, if people are harmed and to what extent – rather than the intentions of actors (Feinberg et al. 2019). Of course, there is considerable variation between these extremes. For example, in Islamic religious teachings, intentions can play different roles: If one intends to do a good act but fails, then the act is considered good. If one intends to do a bad act but it fails, then the act is also considered good. It is only when one intends to and succeeds in performing a bad act that a bad act is considered bad (Sahih al-Bukhari n.d., 6491). The important point is that internal preferences are not always linked with external behaviours in the manner supposed by/that would justify the primacy of values.[1]

Thirdly, norms can better account for behaviours within and across groups. As Gray and Boling (2016, p. 973) note, while values are personally held, nonetheless they make sense only by relating to the perpetuation of broader system structures and normative commitments. Although values have been conceived in individualist versus collectivist terms (Triandis 1995; Ruby et al. 2012), collectivist and individualist cultures can manifest themselves differently. For example, Hofstede's Culture Compass shows both Singapore and Brazil as collectivist cultures, although Brazil is loose whereas Singapore is tight. Cultural "tightness" and "looseness" refer to the number of norms cultures have and how strictly they are enforced. "Tight" cultures are ones with more norms that are more strictly enforced, whereas "loose" cultures are ones with fewer norms that are less strictly enforced (Gelfand 2012). Similar to Singapore and Brazil, both New Zealand and Germany are countries with individualistic values, although Germany is tight and New Zealand is loose. Whereas individualism and collectivism concern values and self-concepts, what people think and care about, tightness and looseness concern norms, and how people behave. Thus, the centrality of values in design might not be wholly representative of a culture, if it is to omit considerations of collective behaviours.

4.2 Mosh Pits and Norm Sensitive Design

Having presented how norms function as predictors of behaviours, we now turn the attention to the example of mosh pits to further develop our argument about the limitations of the exclusive focus on values in design. Just consideration needs to be given also to how values may be embodied in terms of group behaviours, irrespective of cultural differences. For example, research into how individuals behave when moshing during the 2021 Astroworld Festival showed that the tragedy resulted less from what *anyone believed or valued individually* and more from what *everyone did*

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[1] We are grateful to an anonymous reviewer for bringing this point to our attention.

collectively (Washington Post 2021). Thus, mosh pits are an example of how specific norms of behaviour representative across cultural backgrounds may be prompted by designs. As such, mosh pits are a norm-sensitive artefact that highlights the need to complement VSD with considerations about behavioural norms within groups.

Moshing is defined as "a form of dancing involving intense and violent physical activity; slamming into other audience members and throwing mock punches and kicks" (Kahn-Harris 2006). According to Ambrose (2001), moshing emerged in the early 1980s in the heavy metal scene of Washington D.C. US, and is associated with heavy metal, and more recently expanded over other musical genres including punk, alternative rock and electronic music. The mosh pit is considered a vital part of the concert experience but is also a source of increased morbidity and mortality (Milsten et al. 2017).

Mosh pits were recently in the public attention following the tragedy at the Astroworld Festival in November 2021, when a crowd crush led to the death of 10 people. The reconstruction of the night's events conducted by Washington Post (2021) in collaboration with crowd experts found that the victims were in a section of the concert space that had a high density of people, leaving approximately 1.85 square feet per person (corresponding to $0.17 m^2$ per person). The audience space at the main stage was divided by metal barriers into quadrants. The design facilitated the high density of people reported in the section witnessing casualties at the Astroworld concert, by allowing for a continuous intake of people while inhibiting people to exit.

The Astroworld concert space provides an excellent example of why Norm Sensitive Design is so important. Research into the physics of moshing found that the movements of people "resemble the kinetics of gaseous particles, even though moshers are self-propelled agents that experience dissipative collisions" (Silverberg et al. 2013). In mosh pits, "people bounce around like the molecules in a gas" (Abrams 2013). Thus, the collective behaviour of people in mosh pits can be predicted using simplified models, irrespective of the individual demographic characteristics, beliefs, and values of the concertgoers. The research into mosh pit behaviour is already used for tracing new architectural design principles that aim to limit the risk of injury and mortality at extreme social gatherings (Silverberg et al. 2013), or in panic situations such as earthquakes or fires (Grossman 2013).

5 Discussion: Advantages and Prospects of Norm Sensitive Design

Since in some situations, norms and norm systems are more accurate indicators than values of the behaviour within and across cultural groups, a Norm Sensitive Design framework would help to better identify and understand users based on what they *do collectively* rather than what they *believe individually*. This approach advocates for understanding cultural groups not only in terms of *values* but also in terms of *norms*. As such, value-sensitive approaches to design can manage to truly account for societal preferences, both within and across cultural groups. The implication for design education is to draw attention to the natures of and differences between values and norms, as well as how they function differently between cultural groups.

Considering the evolution of norms and norm systems as reactions to common human problems and enhancers of cooperative group behaviours (Gavrilets and Richerson 2017), Norm Sensitive Design may have a broader contribution to fostering understanding and cooperation between cultural groups. As such, different norms and norm systems could be understood as diverse solutions to common human problems, similar to what Ess (2020) has described as a *pros hen* ethical pluralism (Clancy 2021). For instructional purposes, this point could be tied to engineering design work, for instance, reflecting on how all bridges serve a similar function, allowing passage over water, but that they are designed and built differently, depending on more specific circumstances surrounding this task, for example, the number of individuals, frequency, weather conditions, local natural materials and resources a.s.o.

Furthermore, Norm Sensitive Design has concrete implications for design processes, placing greater emphasis on *product prototyping* and *participant observation*. Since norms are concerned with behaviours, behaviours would be of primary consideration in design processes and research methods. The focus is thus shifted from subjective beliefs and feelings such as "satisfaction" to how behaviours are elicited, amplified, supplanted, or suppressed by technologies. Behaviours are affected by myriad unconscious and environmental factors (Bazerman and Tenbrusel 2012; Doris 2005). This has two implications for design work: First, it can be difficult to foresee or understand how technologies will affect behaviours outside of the environments in which they are used; second, humans are not particularly good at understanding why they behave the way they do. As a result, forms of user experience research, such as those based on interviewing and/or the assumption that people are good at accurately assessing themselves and their motivations (Murphy 2013), are limited in their ability to understand and predict behaviours. Instead, research can prioritize the deployment of prototypes within their intended environments, which are observed by those responsible for design work. These suggestions could be applied to curricular or extracurricular projects, for instance, that include time to observe participants using prototypes.

As Gray and Boling (2016) note, many designs affect social systems and behavioural norms over a long-time scale. By identifying norms, the design and implementation of technologies can be crafted around them, to encourage or discourage certain behaviours. To an extent, norm-sensitive design is already carried out in the fields of behavioural economics and social psychology, decision architecture and "nudging" (Thaler and Sunstein 2008). Technologies have the potential to change norms by dispelling "pluralistic ignorance," a lack of knowledge regarding what others do or think one should do, as has been done with practices involving binge drinking, hook-up culture, and genital mutilation (Schroeder and Prentice 1998; Prentice and Miller 1993; Reiber and Garcia 2010; Bicchieri 2016). For this purpose, NSD can align to critical endeavours, such as the hermeneutical inventories and frameworks for understanding and reinterpreting how norms are expressed in the language of design suggested by Bardzell et al. (2014), or the speculative designs of Dunne and Raby (2013), by aiming to question existing norms and the role of design in meaningfully subverting them.

Summing up, we propose a set of central questions that designers and design researchers can pursue when engaging in NSD. Given that moral design has been

identified among the goals of engineering ethics education (Martin et al. 2021) and is part of the curricular content for teaching engineering ethics (Martin et al. 2020, 2023), these questions can also be used by instructors to prompt students' reflection about design ethics:

Design question 1: *Under which conditions does design prompt norm internalization within and across cultural groups?*
Design question 2: *How are collective behaviours envisioned from the standpoint of technological designs?*
Design question 3: *How does technological design affect societal norms of interaction and behaviour?*
Design question 4: *How can design alter the societal norms of interaction and behaviour, and when this may constitute an overreach?*
Design question 5: *What design processes and research methods can help better understand and predict user behaviours?*

6 Conclusion and Implications

Empirical research has a consolidated history of treating participants who are "western, educated, industrialized, rich and democratic" as purveyors of universal claims, despite being some of "the least representative populations one could find for generalizing about humans" (Henrich et al. 2010). Yet the WEIRD perspective prevails in the theoretical conceptualization of VSD and DfV approaches.

Our contribution draws attention to the lapses of such bias in value-sensitive approaches in design. As such, it has two main aims: First, it aims to provide an empirical critique of the prevalence of a WEIRD perspective in value-sensitive approaches, adding to existing critiques about their cultural inadequacy raised by Albrechtslund (2007), Le Dantec et al. (2009) and Borning and Muller (2012). Second, it aims to propose norm sensitive design as a complementary approach to value-sensitive approaches to account more effectively for behaviours across cultural groups.

To address the first aim, we described the main tenets of value-sensitive approaches and their declared role of identifying and accounting for the ways technologies can promote or hinder the actuation of specific values. Since values are related to culture, VSD and DfV strive to account for the ways that cultures differ, as well as address the implications of these differences for technological developments. We provided three arguments for why this would be a mistake and why value-sensitive design approaches are misguided when considering the global environments of technologies solely through the prism of values alone. Values fail to do either the normative or descriptive work they are meant to do. Based on values alone, there is no good reason to prefer one set of values over another, and it is difficult to differentiate cultural groups and predict behaviours across them. The ostensible importance of values within VSD and DfV likely stems from their origins in the Western world, but there is widespread disagreement regarding the nature of values in general and which specific values should be prioritized.

For the second aim, we outlined NSD as a complement to value-sensitive approaches. NSD calls for considering norms and norm systems when designing and implementing new technologies. Versus values, norms serve as more accurate predictors or descriptors of behaviours. As such, rather than focusing on values alone, technological design can benefit from engaging with cross- and inter-cultural ethics of technology to explore the nature of norms and norm psychology and its integration in design. This engagement will further contribute to understanding the development and maintenance of technological designs within and across national boundaries.

The ultimate focus of VSD is not on values, but on embodying values in terms of behaviours within and across cultural groups. NSD can aid value-sensitive approaches to understand and inform collective behaviours, which would be impossible in terms of values alone. Our proposal is thus envisioned to contribute to an enhanced awareness and attention to how we incorporate WEIRD perspectives and practices through ethical lenses in technological designs. This is of heightened importance given that design has been passing along value-laden assumptions and perpetuating societal norms of behaviour, to the exclusion of historically marginalised cultural groups (Mhlambi 2020). To develop awareness, we provided a list of questions to aid designers and design researchers in engaging with NSD that instructors can also use in the classroom when teaching design ethics.

We conclude by welcoming further research on the development of norm sensitive design as a complementary framework to value-sensitive approaches. As such, research is needed to assess the empirical merits and challenges of NSD, especially in cross-cultural contexts. Such research may integrate the empirical findings and methods of social psychology, behavioural sciences and the evolution of social norms to elucidate the impact of norms on design and user experience and psychology. Research is also needed to shed light on the interplay between value and norm considerations in the practical work of designers themselves.

Declarations

Ethics Approval and Consent to Participate Not applicable.

Consent for Publication All the authors have agreed to the publication of this work.

Competing Interests The authors declare no competing interests.

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