SAFE-(FOR WHO?)-BY-DESIGN:

ADOPTING A POSTHUMANIST ETHICS FOR TECHNOLOGY DESIGN

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ABSTRACT

Safe-by-Design (SBD) philosophies are a series of design approaches that aim to incorporate human values into the early phases of technological design to direct the path of innovation into beneficial directions. The difficulty and necessity of directing advantageous futures of transformative technologies through the application and adoption of value-based design approaches are apparent, however, the questions of whose values are taken up are of critical importance. SBD philosophies typically aim to enrol the relevant stakeholders that may be affected by the emergence of such a technology. Nonetheless, regardless of which design approach is adopted, all the stakeholders that are enrolled are human stakeholders who propose human values. Contemporary scholarship on metahumanisms, particularly those on posthumanism, have decentered the human from its traditionally privileged position among other forms of life. Persuasive arguments have been forwarded that the humanist position is not nor never has been tenable, and as such scholarship has begun to provide a more encompassing ontology to the investigation of nonhuman values. As such, given the transformative nature that future technologies may pose on the earth and its many assemblages, not all the relevant stakeholders (i.e., nonhuman animals) are taken into the value-investigations of these design approaches. This research project aims to accomplish two primary objectives: (1) propose an argument that a posthuman ethics in the design of technologies is sound and thus warranted and, (2) how can existent SBD approaches begin to envision principled and methodological ways of incorporating nonhuman values into design. To do this, this MRP will provide a rudimentary outline of what constitutes SBD approaches. A unique design approach – Value Sensitive Design (VSD) – is taken up as an illustrative example given that it, among the other SBD frameworks, most clearly illustrates a principled approach to the integration of values in design.

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INTRODUCTION

Many of the events, interactions and processes that humans engage in are done by means of technological artefacts. The majority of our highly systemic and interconnected world is accounted for by the various technological instruments and systems that have become critical nodes to the continued fecundity of this infrastructural assemblage. Think of the electric power plants, the automated shipping vessels, the computer, the surveillance cameras at every street intersection and, of course, the smartphone in almost every person's hand. These objects are not some foreground that is imposed ad hoc on a 'natural' backdrop of nature, but they are instead enmeshed, heterogeneous symbioses that are built upon the foundation of other technologies that are at least partially responsible for their emergence. This is the technological milieu.

It becomes easy to miss the forest for the trees when we look at the current (and ever progressing) state of technology and forget the layers of preceding innovations that permitted today's state. Fire, gunpowder, steel metallurgy, and the air pump have all set the stage for later technologies. This progressivism has naturally lead to an inability to discretely separate any technology from its situatedness, making its context-independence anachronistic and non-representative. Thus, what we see in the majority of naturecultures (see Haraway, 2003) around the world is a co-constitution of technology and the social. A consequence of this is that a constrained landscape of potential futures is open to us, one that is delimited by this co-construction. How we design technologies then, based on how they can constrain our choices about the future, becomes a valuable question in the twenty-first century.

The trend towards further progress, 'modernisation', technological incorporation, transformation and in some cases transcendence (More, 2013), makes the turn towards design a question of particular salience. Because of this, what has been termed the 'design turn in applied

ethics' has emerged as an interdisciplinary field of study that seeks to make a practical impact on technological design to better direct the design and development of artifacts towards desirable futures (van den Hoven, Miller and Pogge, 2012; Couture, 2017; van den Hoven, 2017). Various technological catastrophes in the twentieth and twenty-first centuries have provided ample evidence for the need to re-evaluate how technological development is underpinned and eventually made ubiquitous, if at all (Petroski, 1994). It is foreseeable that without responsible research and innovation strategies and interventions, these incidents will continue into the future. This becomes even more pressing as technological innovations converge, pushing the limits of our moral intuitions (Umbrello, 2018c) and inducing novel and difficult-to-deal-with moral overload (van den Hoven, Lokhorst and van de Poel, 2012). To meet these issues, design philosophers have envisioned various methodologies and approaches that can be employed to help incorporate human values in early design phases. This safe-by-design (SBD) and design-for-values (DFV)[1] typically come in the form of principled and formalised approaches that designers can levy to account for the values of design agents and the enrolled design histories that are implicated by a sociotechnical-institutional innovation that is under consideration.

Despite these early efforts, and their successes in embedding values in design, these DFV approaches fail to account for the position of nonhumans in the technological milieu, relegating them in discussions to a static background. The ecological turn in STS (i.e., by scholars such as Bruno Latour, Donna Haraway, Graham Harman and Timothy Morton)[2] has forwarded strong arguments for the total interconnectedness of all forms-of-life and the symbiotic and asymmetric relations that these objects encounter with one another. For DFV approaches to be genuinely

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[1] The acronyms SBD and DFV are functionally equivalent, to this end I use them interchangeably for the purposes of style and to avoid repetition.
[2] See in particular: Haraway, 1991, 2016a, Latour, 1993, 2013, Morton, 2013, 2018a, Harman, 2016, 2018.

salient in what has been termed the sixth mass extinction event – mostly as a consequence of this anthropocentric, technological modernisation – they must account nonhumans as essential stakeholders in design considerations.

It is the purpose of this project to show both why and how nonhuman animals are fundamental to design approaches. In doing this, I employ the Value Sensitive Design (VSD) method from among the other DFV/SBD frameworks, as a way to demonstrate this incorporation. VSD is chosen from other approaches because it makes its conceptual investigations (i.e., its philosophical inquiries) more explicit in its methodology relative to the other options. In doing this – showing VSD's nonhuman severing and how it can be breached – will have implications that span across the entire design methodology discourse. If this paper is philosophically cogent, DFV/SBD approaches can be bolstered against anthropocentric bias as well as become ecologically sensitive.

To the best of my knowledge, this is the first concerted project to: (1) evaluate the merits of SBD approach by drawing primarily from the ecological literature in STS, and (2) determining how, in light of this ecological thought, can nonhuman animals come to be regarded as design agents during the value-considerations in VSD. Prior literature on DFV and VSD in particular have emphasized the structure of the approach itself (Friedman, 1996; Friedman and Kahn Jr., 2002), how these methodologies can be applied to current innovations (Friedman, Howe and Felten, 2002; Woelfer et al., 2011; Oosterlaken, 2015) as well as to speculative future innovations (Timmermans, Zhao and van den Hoven, 2011; Umbrello, 2018a; Umbrello and De Bellis, 2018). Although this research provides useful information for understanding SBD approaches and how they can function, they all remain anthropocentric in their value-investigations, not accounting for the necessarily broader implications, enrollments and

enmeshments of nonhuman agents. This paper is thus comparatively unique to this foundational scholarship as it draws from the foundational ecological literature central to STS, but also from the Italian discourse in the posthumanities that have made significant headway into the philosophical inquiries on nonhuman animals. It is this project's intention to spark debate and further discussion on the place of nonhuman animals within the design discourse.

To successfully tackle these considerable hurdles, this paper is organised into the following sections: § 1 will thoroughly outline the VSD approach as it is characterised in the existent literature, with primary emphasis devoted to its conceptual investigations. § 2 will work through the ecological literature, giving focused attention to the Italian discourse, why it is comparatively unique and what implications for nonhuman animals can be drawn, this section comprises the bulk of this project. § 3 provides some initial and cursory recommendations for how the values of nonhuman animals can be enrolled into design approaches. § 4 concludes by outlining the limits of this project's investigations and areas of potential future research.

LITERATURE REVIEW

This section presents a sufficiently thorough outline of the history of SBD approaches, with emphasis on VSD given its philosophical salience to this project. In doing this, I show the various instantiations and modalities that VSD comes in, its implications for value-inclusion in design, and begin to tease out areas for improvement.

A Brief History of Designing in Ethics

Over the course of the last forty years, the broad scope of the ethical issues that have emerged appears to have garnered more attention than preceding decades. Formalized lists, guidelines and issues have been composed with the aim of outlining some of the most pressing

practical and ethical concerns that face global ecosystems (van den Hoven, 2018). Issues such as climate change, the accessibility of healthcare products and services, and sustainable growth and energy consumption among many others pose difficult-to-answer ethical issues. These issues primarily emerge from how these issues are framed within specific socio-cultural contexts, what constitutes solutions as well as how to qualify sufficient outcomes to any proposed or operationalised actions. Further concerns and difficulties arise in determining and investigating the various stakeholder communities present in different, heterogeneous, and still often interconnected dynamic landscapes. The exponential growth of technological output often exacerbates existent ethical concerns as well as raises novel ones.

These difficulties resulted in two 'turns' in ethics that seek to tackle them head-on. The philosophical emphasis away from purely conceptual endeavours to sociopolitical dimension, which characterised a dramatic shift in the last decade of the twentieth century has been called the 'applied turn' in ethics (De Marco and Fox, 1986; van den Hoven, 2017). To this end, various institutions and organisations rose to collaborate formally and form both an intellectual and policy front that can make these ethical deliberations actionable such as the Institute for Ethics and Emerging Technologies, Future of Humanity Institute, Future of Life Institute, and the Global Catastrophic Risk Institute to name a few.

Still, the modern moral theories (i.e., utilitarianism, deontology, etc.) that have been the primary cornerstone of Western ethical study have been mostly sidelined given their difficulty in ascertaining 'correct action' and addressing the very intermingled, connected, and converging issues that emerge on account of transformative technologies such as nanotechnology, biotechnology, ICT, and cognitive technologies (NBIC). These post-Enlightenment ethical imperatives and universal prescriptions are potent only in prototypical cases (if at all) and are the

exception, not the rule (Johnson, 1993, 2014; Johnson and Lakoff, 2002). Their ability to provide salient guides remain ineffable when considered within the almost always nuanced, aprototypical, and interconnected technosocial landscapes.

To confront these novel and traditionally counter-intuitive issues, philosophers have made a marked shift away from the fundamental post-Kantian analysis towards a design orientation that prioritises design *as such* as the practical means to achieve normative operationalisation. Van den Hoven (2012) characterised this shift in orientation as the *design turn in applied ethics*. The primary contention that constitutes this design approach to ethics is based on the presumption made famous by Winner (1980) which suggests that products are not value-neutral, there is a value-ladenness is all design products that mutually co-constitute infrastructures, systems, networks and the plurality of life-worlds where these products are embedded (Winner, 2003; van den Hoven, Miller and Pogge, 2012).

Because technological systems and artefacts are inherently value-laden, they have the potential to both free and restrict action. A timely example is personal computers which allow for instant communication with loved ones and colleagues, and they permit the dissemination of knowledge, regardless of language or distance. However, in the same way, personal computers can be used to invade the privacy of others, spread false and often harmful information to voters and reinforce existing hierarchies of inequality by restricting these boons to those individuals who live within enabling infrastructures. Similar multi-use speculative accounts of how emerging transformative technologies have been undertaken that have proposed similar utopian and dystopian scenarios (Wiek, Gasser and Siegrist, 2009; Bostrom, 2014; Baum, 2016; Umbrello and De Bellis, 2018). For example, in discussing the dual-use facets of advanced nanotechnology (APM) for general material wealth, Umbrello and Baum (2018) state:

An additional factor is how the wealth from APM would be managed and distributed. All technologies evolve within the sociocultural context that they are developed or introduced in. The introduction of new technologies often reinforces existing social norms and structures. If APM and its products are restricted to a particular class or social order (e.g., as result of licensing costs and imposed restrictions), then the benefits of APM could exacerbate existing inequalities. Of particular concern is that APM could impoverish people who no longer have a role in the APM economy. Given the full range of potential applications of APM across the economy, this could make for an especially acute case of the more general phenomenon of technological unemployment. Similarly, in places with weak governance structures, APM wealth could fuel violence between competing factions, and in places with authoritarian governance, APM could fuel oppression, such that the population would have been better off without APM. (Umbrello and Baum, 2018, 66).

Although the this case is speculative, concerning the technology in question, the analysis remains particularly illustrative in drawing a picture of how the introduction, embedding, and co-constitution of artefacts within diverse societies and infrastructural norms can lead to radically different consequences, some of which just cannot be foreseen. Still, the constraining factor of the value that is embedded during technological design plays a large part in the execution of these consequences. The example raised by Winner (1980) regarding the New York architect Robert Moses is a particularly salient. Moses designed the overpass bridges that lead to his favourite (white dominated) beach to be purposefully low enough to prevent less-affluent individuals, primarily black communities, from taking buses to the spot given their inability to pass under them. Similarly, as personal transportation has become more ubiquitous and available (although not universal of course) the ability for low-income individuals to travel to this beach has changed. This is an example of how designed products, in this case, the low hanging overpasses, not only have embedded values, but how dynamic social processes and other technological accessibility can change the efficacy of how those entrenched values manifest themselves, and to what potency.

Technological Assessment and Designing for Values

One of the fundamental premises on which the *design turn* is built upon is a shift away from the static adjudicatory accounts of moral deliberations (absolute dilemmas, trolley cases, etc.) and towards envisioning ways to open up alternative future possibilities by intervening in design; by envisioning a third option (van den Hoven, 2017). One of the earlier efforts that emphasised the values that inhere in technological innovations can be seen in the practice of *technological assessments* (TA) (e.g., Arie, 1996; Decker *et al.*, 2017; Fisher, 2017; Zimmer-Merkle and Fleischer, 2017). Forming part of what has been termed the *responsible research and innovation* (RRI) discourse, TA was and is employed as an approach to providing policymakers and governing bodies tangible cost-benefits of adoption of specific innovations, rather than more general or encompassing technological artefacts and systems. This mode of inquiry however, as well as its various instantiations and flavours has been criticized as being problematic given the concerns of the scarcity of information regarding consequences of adoption early on, the ability and necessity for early design intervention coupled with the fact that when technology becomes ubiquitous directing it becomes incredibly costly if not impossible (see Collingridge, 1980). Still, TA provided the RRI discourse with informative tools and avenues that primed parallel approaches towards the necessity for anticipatory design and governance (te Kulve and Rip, 2011; Brey, 2012; Wender *et al.*, 2014).

Value Sensitive Design

The crux of VSD is premised on the necessity of accounting for human values during the early design phases of a technology (Friedman, 1996). Coined by Batya Friedman, VSD arose initially from the human-computer interaction (HCI) community to investigate how human interaction with information technologies and networks takes place and how it can be directed

via design (Friedman, Kahn Jr. and Borinng, 2008). Other design approaches within the HCI and ICT were developed concurrently, each of which prioritised different methodological tools or procedures. Examples include universal design, inclusive design, participatory design, and Worth-Centered Computing among others (Bødker, Kensing and Simonsen, 2009; Camara and Calvary, 2015; Waller *et al.*, 2015; Ruzic and Sanfod, 2017). Still among these existent frameworks, as well as other approaches that have not be attributed proper names, some scholars have argued that the VSD approach is the most encompassing, possessing the most extensive scope and most principled approach for the design of technologies with human values at its core (Le Dantec, Poole and Wyche, 2009; Brey, 2010; Vermaas *et al.*, 2014).[3]

Developed in the last decade of the twentieth century, VSD is argued to offer an "a theoretically grounded approach to the design of technology that accounts for human values in a principled and comprehensive manner throughout the design process" (Friedman, Kahn Jr. and Borinng, 2008, 70). Although initially used as a broad term for anticipatory approaches to design, Friedman later formalised the VSD into a formal framework which, soon after, began to take hold within the burgeoning RRI discourse (Friedman, 1999). Although Friedman remains perhaps the most prominent figure in the VSD literature, penning multiples journal articles and chapters, the approach has taken hold most firmly in the Netherlands, mainly by the scholars constituting the 4TU.Centre for Ethics and Technology[4] also, the similar Delft Design for Values (DDFV) Institute (4TU.Centre for Ethics and Technology, n.d.; TUDelft, n.d.).

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[3] For this reason, the VSD method is taken up as the comparative approach in criticising the value-investigations in the *design turn*.

[4] The '4TU' represents four technology-focused universities in mutual collaboration with one another. They are Delft University of Technology, Eindhoven University of Technology, University of Twente, and Wageningen University.

Given the importance of 'value' itself within the DFV tradition, and VSD particularly, the definition of values as such is of singular importance. However, Friedman never gives a full account of what 'value' consists of or in, instead opting for a more general account of value that is directly implicated within systems design. Friedman states that:

> We use a broader meaning of the term wherein a value refers to what a person or group of people consider important in life… values cannot be motivated only by an empirical account of the external world, but depend substantively on the interests and desires of human beings within a cultural milieu (Friedman, Kahn Jr. and Borinng, 2008, 2).

The authors proceed instead to provide a list of enrolled values that are of particular importance to system design and have since been used as the benchmark for universal applicability of the VSD approach; those values being

- human welfare
- ownership and property
- privacy
- freedom from bias
- universal usability
- rust
- autonomy
- informed consent
- accountability
- identity
- calmness
- environmental sustainability

(Friedman, Kahn Jr. and Borinng, 2008, 17-18)

Note that the latter may serve as an appropriate value for this project, as it can be construed as a value that maps on to that of the enrollment of nonhuman animals in the design process. However, each of the listed values designated by Friedman et al. are explicitly 'human values' and to this end must serve human needs primarily, with the 'values' of companion species being ancillary, if at all present. Environmental sustainability thus is not the preservation, protection or enrolment of ecological agents *for their own sake*, but instead "refers to sustaining ecosystems

such that they meet the needs of the present without compromising future generations [of humans]" (Friedman, Kahn Jr. and Borinng, 2008, 18).

Still, the theoretical foundations of these distilled values aim to address the relational, multi-use nature of technology. What VSD affirms then is not only along the lines of what Winner (1980) argued, that values are designed into technologies, but the manner in which the technologies are implemented and appropriated betoken specific values. To this end, the multi-use dimension of any specific technology can implicate a set of unforeseen values during design; this becomes ever truer across various societies and cultures where a multi-set of values emerge. Hence, proponents of the VSD methodology argue that the sociocultural milieu in which a technological innovation is being considered must, in a way, be situated; forfeiting the potentially disastrous goal of universal design (Nathan, Klasnja and Friedman, 2007; Nathan *et al.*, 2008).

At its inception, the VSD scholarship primarily focused on ways to formalise a design approach that would be able to be adopted by designers to account for values in design. Friedman and colleagues divided their principled methodology into three – a "tripartite" – analyses or "investigations" (Friedman and Kahn Jr., 2002). The three analyses are (1) conceptual, (2) empirical, and (3) technical, each of which does not stand apart, but forms what should be a self-reflexive and continually 'iterative' method for accounting values both during the early design phases and throughout development (Friedman and Kahn Jr, 2003). Here I will briefly outline each of the three investigations as conceived by Friedman et al.

Conceptual Investigation

Conceptual investigations are typically characterised as the philosophical leg of the VSD stool, and it marks the initial entry point for the methodology. Its primary aim is twofold: (1) it

begins by considering the technology that is in question and aims to identify enrolled

stakeholders. Two forms of stakeholders are typically defined, *direct stakeholders* which are

those individuals or groups that will implement the technology (the users) and *indirect*

stakeholders which are those that are nonetheless affected by the proposed artefact, but do not

implement it in the firsthand way that direct stakeholders do (Friedman and Kahn Jr., 2002). The

latter of which becomes of particular interest when considering the place of nonhumans in a

design framework. This point is discussed in the proceeding sections. An example of how a

conceptual investigation is carried out concerns looking at speculative intelligent agent

technologies such as lethal autonomous weapons (LAWS). Conceptual investigations may

allocate direct stakeholdership to both the soldiers implementing the LAWS as well as to those

who constitute enemy combatants. Indirect stakeholdership could be conceptualized as the non-

combatants who may be caught in the crossfire without any clear way to defend themselves, as

well as the designers of LAWS themselves who implicate notions of liability and responsibility

without having direct use of them in the field (Umbrello and De Bellis, 2018 discuss similar

examples of intelligent agent technology under the VSD framework).

(2) As critical as determining the stakeholders, is an investigation of the potential values

that those groups enrol in given the innovation in question. For example, a conceptual review of

advanced (mostly speculative) nanopharmacy technologies implicates a need to contextually

determine what values such as safety and efficacy, where safety is already discussed in regulated

under nonmaleficence[5] in the decision-making process of medical practitioners (for further

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[5] This is only one of a set of values that is context-specific to 'care' broadly construed within the medical domain. A VSD reimagining has been undertaken by van Wynsberghe (2012) that aims at a situated symbiosis of care-ethics and VSD as they pertain to the design of care robots.

conceptual investigations regarding nanopharmaceuticals see Timmermans, Zhao and van den Hoven, 2011). It is during this phase of analysis in a conceptual inquiry that value conflicts arise. Recourse to the existent philosophical literature is typically recommended to 'weigh' values and guide designers towards more salient avenues (van den Hoven, Lokhorst and van de Poel, 2012). The moral overload of values that may come into tension are not characterized as strong disjunctive dilemmas, but instead as restrictions that may exist within design space, and thus potential design solutions can come to bear to increase the salience of a design *flow,* which better accounts for initially conflicting values (Friedman, Hendry and Borning, 2017).

Empirical Investigations

   Empirical investigations typically involve the direct enrollment of identified stakeholder groups to evaluate their unique situatedness, their "understandings, contexts, and experiences of the people affected by the technological designs" (Friedman and Kahn Jr., 2002, 1251). Various methods have been proposed, mostly drawing from ethnographic and social-scientific toolkits that can allow designers to co-create and collect data that best reflects the desires of relevant groups. This can be done through the employment of participatory observation, survey, direct interviews, or even the use of *Envisioning Cards* (Friedman *et al.*, 2011). The values defined through initial conceptual investigations can then be revised and redefined during empirical elicitation. Similar empirical work is done to the stakeholder agents themselves, during this stage, the "issues of technical, cognitive, and physical competency of stakeholders" are brought under inspection here to determine that the relevant stakeholder values are sufficiently evaluated, typically through the elicitations of group representatives (Friedman, Hendry and Borning, 2017, 97).

Technical Investigations

The discrete function of this investigation is to look at the technology in question itself. Questions on how technical implementation of this technology can implicate the investigated values can be realised as well as the restrictions and constraints of values in contextual scenarios. To this end, the effect of the material constraints of the technical system on value tensions is brought into question. Because emerging values are often enrolled when technologies become ubiquitous and leave the design space, architectural imperatives for flexibility becomes enrolled. To this end, technical investigations often look for ways to design system architectures in ways that are receptive to emerging values over time and in different contexts (e.g., Waddell, 2002; notably Freeman and Borning, 2003).

In sum, VSD, emerging parallel to various other design methodologies that aspire towards value sensitivity during design considerations was founded and developed as a principled way of accounting for the sociocultural and ethical implications of HCI. The emphasis of VSD is on the co-interactions of various stakeholder groups – both direct and indirect – with information technologies, systems, and artefacts. Its central premise, realised through this emphasis, is the operationalisation and strengthening of human values through technological design (Friedman, 1996).

Although the approaches to VSD differ in their sociocultural context and the particular artefact in question, they commonly adhere to initially investigating the conceptual values implicated by a particular design in context, how those values can be defined, refined, and actualised in the early design phases (see for example van de Poel, 2017). The values that are distilled as pertinent to design are rendered as an a priori-operative necessity for design, meaning that they are defined in terms of functionality and as technically implementable by designers,

rather than abstract concepts. This is followed by empirical investigations which aim to determine the tensions and applicability of those values in design, and, if necessary, reiterate those observations back into conceptual investigations for reformulation and definition.

The reiterative nature of VSD makes it a non-absolutist design framework. Values are conceptualised, evaluated, and implemented into the design. Trials can then be conducted to determine if the design meets the value-specifications according to stakeholder desires and values if not, the tripartite investigations are returned to and modified differently to arrive at a more salient product. These short evaluative loops allow for continual changes and modifications to be made to allow for intermittent societal change to occur, rather than the rapid, often revolutionary changes that transformative technologies can ultimately induce.

This literature review has so far provided a cursory account of the history, motive, and function of DFV frameworks with particular emphasis given to the VSD method and its explicit philosophical implications. The remainder of this paper presents a discussion of what Timothy Morton calls the 'ecological thought', how this posthumanist position on the necessary interconnectivity of the biosphere has severe implications for technological design as well as how the Italian scholarship on this particular subject provides some critical insights that can be used to inform VSD, and, as a consequence, DFV approaches on the whole.

BRIDGING A *SEVERING* OF PRAXIS

Before any serious attempt to include nonhuman animals into a thoroughly anthropocentric domain, it is best, to begin with, a clear delimitation for what this paper aims to do as well as making explicit what are its limitations. The domain that VSD arose in and still bears a robust umbilical connection to is undoubtedly the analytic tradition of philosophy. The

literature that designers *ought* to consult throughout its value investigations is assuredly the ethical literature that falls within the arena of post-Enlightenment – mostly post-Kantian – thought which characterises the analytic tradition as a whole; i.e., living in Kant's shadow.

In following this intellectual tradition then,[6] the reader should make note that this project is not merely a 'potential path for nonhuman values in design', but the method by which this goal is articulated implicates far more. The very contention of drawing from a posthumanist tradition towards what has traditionally been an analytic praxis[7] plays a tumultuous game of trying to bridge the severing between the analytic and continental traditions of philosophy that, if anything, have been separating at a greater pace (Harman, 2018, see particularly Ch. 5). Although it is not the goal, in this dissertation, to explicitly achieve some homogenous unification between two discrete philosophical traditions; an asymmetric symbiosis between facets of the two are nonetheless implicated by engaging in this very project. It necessarily follows then that any single work that pursues such a goal should be met with a critical gaze, mainly when such implications are at stake. Any practical success, applicability or usability of the philosophical insights this project may or may not provide can only be determined *a posteriori*. Design is a naturally applied practice that, despite having conceptual parts, ultimately moves into the realm of the real, necessarily.

Still, taking on what traditionally have been marginalised actors: nonhumans, forms-of-life (Helmreich, 2009), or significant otherness (Haraway, 2003), what is needed is a thorough overview of the philosophical foundations from which these issues most potently emerge,

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[6] In situating this paper then, as Donna Haraway perceptually argued (Haraway, 1988), and myself as its author – lest I try to pull the trick of an objective, gods-eye-view in representing this thesis, it becomes prudent to continually contextualise what is being said and why it is being said at all.

[7] Note that Umbrello (2018) has discussed the applicability of intersubjectivity (a primarily continentally-derived notion) towards DFV approaches. However, this is the exception and not the rule.

posthumanism itself. Because this paper draws from this thought-tradition as the crux of its thesis, a distilled account would only be marginally beneficial. Although no single paper could provide a total account that could serve as conclusive (totality and absolutism are indeed not endorsed here), a rounded explication of posthumanism (and its Italian flavour) is certainly warranted.

Posthumanism and Reclaiming Animality

Posthumanism is a strange, multifaceted and difficult-to-atomise collection of thought. This is part and parcel due to its obscure origins and the variety of ways that it is used and defined (see for example Ferrando, 2013). Common to this hermeneutic plurality of posthumanisms is that the central, privileged place of humans that has been the heritage of theological and philosophical history is untenable, if not illusory (Fuller, 2013; Sorgner, 2014).

Various fields including critical studies, philosophy, anthropology and sociology among others have appropriated the term for various goals and with differing interpretations. The theoretical foundation of posthumanism, particularly that of contemporary posthumanism (explicated most clearly by Caffo, 2017), although often confusing and clouded in jargon and obscurantism encompasses what has been called 'ecological thinking' and the ground-breaking philosophical move of flattening ontology (Morton, 2012, 2018b; Harman, 2016). What exactly does this mean? It means that 'humanity' *in itself* is a fragile concept, or even one that is illusory, built upon false notions of the necessity of human cognitive superiority (Fuller, 2013). When humanity is decentered, both from the universe's centre (as Copernicus suggested) and from the biosphere (as Darwin argued) then the special place that humanity endowed itself becomes tender and easy to bruise (Caffo, 2017).

Ecological thinking becomes the natural consequence of this decentring, this movement towards the fringes of thought (Morton, 2018b). Nonhuman animals and other forms of life come into the fold on an equal ontological basis as a result of the dissolution of the human ontological pedestal. Speciesism becomes nothing other than a tool of economy that drives the humanistic conceits embedded in the hypocritical infrastructures and techniques and is thus an ethical choice. Inconvenient truths concerning the absence of reasons to massacre millions of animals become apparent and imminent (Caffo, 2013b; Caffo and Cimatti, 2015; Marchesini, 2017). It follows then that the most authentic starting point for ontology is a flattened one, one in which animality is equal for all life forms, not one that begins with human superiority (i.e., the tradition of theology and humanism). This implies the need to reclaim animality (Caffo, 2013a).

Because the philosophical focus of this paper is on the ontology of nonhumans in design, the Italian posthumanist literature naturally comes to the fore. As mentioned, posthumanism is a varied set of principles, originating and used in different ways across disciplines. What makes the Italian tradition unique is that the few posthumanist scholars (they are self-described as such) arose from within the animal ethics discourse, making the Italian flavour of posthumanist particularly attuned to thinking about nonhumans. Hence, the works of Leonardo Caffo and Roberto Marchesini become of primary utility here. Both of which publish primarily on the posthumanist intersections with animal studies.

To this end, the following arguments employed for this reclamation are utilized to inform ecologically conscious design salience.

Metamorphosis

Within the classical humanist tradition handed down since Plato and made most explicit through theological institutions and philosophies, animals *as such* do not 'exist'. Along a similar

thread as Heidegger, whom philosophy was famously built on the forgottenness of *being*, ironically excluded the *being* of other forms-of-life that were not Dasein, or not German-Dasein (Harman, 2018). The being of others (nonhumans) – *other-being* – has been traditionally marginalised, if not merely regarded as unsubstantiated according to the inherited 'Great Chain of Being' of theology that entitles the immateriality of the human soul as the object of ontic privilege. This is what the Italian scholar of posthumanism, ontology, art, and architecture Leonardo Caffo calls *speciesism*; it is the "engine of economy" and a tool of 'concealment' used to *de-being* (my neologism) other forms of life, thus making their tool-use (as food) more palatable (Caffo, 2017, 9).

Speciesism, then, becomes a part of the ethical nomenclature, the reasons that were employed to support the massacre and continued slaughter of millions of animals becomes necessarily void. A new starting point must be induced then, one that begins with equal animality. Doing so permits a more authentic ontological onset, rather than affirming the privileged place of humans/human-being *a priori*. As a consequence, then, *anti*-speciesism runs contra to the anthropocentrism of humanism and contributes to the growth of posthumanism (Caffo, 2017, 20). It should be clarified that 'anti-speciesism' as such is not a negation of 'species' but that of the 'ism' of exception.[8] Still, anti-speciesism can be taken as a form of power-politics, used to oppressively flatten the ontologies of the various forms of life and the plurality of un-totalizable phenomenologies. What is needed then is a weak form of anti-speciesism that acknowledges the heterogeneity of beings and to envision the potential open futures of possible worlds other than the one under criticism at any moment. What this allows

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[8] This is starkly in contrast to the Nietzschean strategy of transcending animality towards the Übermensch, (Morton, 2017 discusses the Nietzschean strategy as self-defeating in trying to affirm a flat ontology, favouring a different philosophical approach he terms 'rocking').

then is the emergence of a larger 'togetherness' rather than a 'sameness' that ferments

intersubjective respect rather than projected uniform qualities.[9]

A metamorphosis towards a new social ontology becomes necessary. Nonhuman animals

are not objects, or automata as Descartes suggests, that have ontic status merely to be the objects

of gaze (Cottingham, 1978; Caffo, 2013a). The specious notion of human/animal dichotomy is a

constructed historical phenomenon; the semantics of animality have similarly been used as a

socio-historical tool for discrimination (Marchesini, 2010, 2017; Caffo, 2017). However, modern

developments in zooanthropology have clearly observed that nonhuman animals are capable of

complex social interaction and phenomena (Marchesini and Tonutti, 2007; see also Sax, 2009,

2016). Social ontology then must bridge a significant gap between social studies of animals and

inherited philosophical ontology of animals (Caffo, 2014).

Metaphysics

The privileged position of human-*being* has been historically and philosophically

assumed across multiple schools of thought. Ptolemaic cosmology for example (that of

geocentrism) is a particularly erudite metaphor for this entitlement, i.e., 'man as the centre of the

universe', or more to the bone, 'man as the centre of ontology' (Caffo, 2017, 27). Naturalistic

discoveries have shown that this geocentrism is false (i.e., the move towards heliocentric). What

is usually assumed by posthumanist thinking is that the stories, which foundationalized this

geocentrism is consequentially false.[10]

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[9] Haraway (2003) provides a good way of envisioning this togetherness of various naturecultures between humans and dogs. One that is based on finding common respect for difference rather than anthropocentrically anthropomorphising behaviour and project anthropic consciousness to nonhuman beings as a way to relate.

[10] However, such a philosophical move is based on questionable logic and borders on committing the genetic fallacy. Still, the theological and purely coincidental observations of the pre-moderns can be criticised on their own ground, to which I contend them to be similarly false nonetheless.

Similarly, the later Kantian conception of the *transcendental* is even more devastatingly anthropocentric. This critique of Kantianism (and the post-Kantian philosophy that dominates the Anglo-American analytic tradition) is one of the standard features of posthumanism, and more broadly the Speculative Realist movement gaining steam in modern continental philosophy (Meillassoux, 2009; Bryant, Srnicek and Harman, 2011; Harman, 2018). This critique of Kant explicitly aimed at what Meillassoux (2009) called *correlationism*, is the critique suggesting what exists is solely the correlate between the subject and the object (the subject always being the human). Although Kant is generally understood as being correct that direct epistemic access to *das Ding an Sich* is impossible, all of the speculative realists (and their posthumanist cousins) agree that Kant was not Kantian enough, meaning that he did not push his philosophy to its logically philosophical end,[11] that being object-object correlations exist, not only can the human subject not have direct access to any other object (the illusive *thing-in-itself*) but neither can any other object. A strong form of realism is then naturally conferred by this mode of ontology, beginning on an equal ontological footing rather than a priori attributing of the correlating power of reality to only a particular type of object (i.e., humans).

By a similar token, Kant's partially finished project is a radical philosophy that is philosophically geocentric. The centre of the circle of reality in which humans have placed themselves is the very circle they created by/for our own reason (Caffo, 2017, 30). To some extent the implications of this philosophical inheritance has been acknowledged in the discourses of sustainability and the need to protect and ameliorate the earth, however, the sustainability discourse (sustaining what exactly?) only extends so far in this direction that it does not

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[11] Like Heidegger's claim of Dasein being particularly human, and mainly German at that, in contrast to making it the feature of all lifeforms and beginning on a more egalitarian ontological footing.

jeopardize the stability of the financial elite or the anthropocentric privilege that we created and gifted ourselves (see notably Morton, 2016).[12]

So then what is the consequence of heliocentrism as a historical development? The Copernican revolutions resulted in a consciousness shift that moved the human from the cosmological (ontological) centre and to the periphery; one planet among others in a vast universe. Philosophically, then, the anthropocentrism that was packaged with geocentrism must similarly be abandoned; this privileged space of centrality must be discarded, it does not exist. What this means is that everything can begin from a more philosophically genuine position of equal ontological footing in the periphery. The sensation of estrangement becomes the philosophical foundation for posthumanism. Because the centre becomes vacuous and the periphery crowded, the ecological thought can be born, one based on an acknowledgement of the common substances that constitute biodiversity and a reconceptualisation of non-anthropocentric space (Caffo and Marchesini, 2014; Caffo, 2017).

All things exist then on a necessarily connected, *enmeshed* (see Morton, 2012) ecosystem that is composed of inexhaustible objects that are greater than the whole. The parts (objects, entities, actors, etc.) are *lifeworlds* in themselves, never exhaustible through a literal definition of atomization, nor by their effects on other objects (Harman, 2016). The depth of their being is never directly accessed, but always remains veiled and more than what it appears.

Posthumanism then can be understood as a 'rebirth'; our substantial form must be altered as the means to conquer the anxiety that comes from the geocentric-heliocentric shift, both in its

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[12] The sustainability discourse has been quite egregious given its association with renewable energies. The counter-literature has discussed how the discourse on sustainability is instead directed at merely sustaining currently destructive practices that may consequentially lead to the continued and unmitigated use of environmentally devastating forms of energy and fuel development (Banerjee, 2003; see particularly Umbrello and Baum, 2018 who discuss the use of future nanotechnology as a means of lowering the threshold for continued fossil fuel use).

cosmological and philosophical sense. The movement from centre to the periphery is an unquestionably dangerous shift given the infrastructures, networks and assembles inherited and built upon that substantiate what has been argued to be an illusory conception of the 'human' and its place in the world.

What this means then is contra to Heideggerian metaphysics; we can alter our forms, and we (humans) are not possessed by *being* as such. This has consisted of the abandonment of western absolutism for a new role, a role *among many* towards the affirmation of animality. On the periphery, our roles continuously shift as we tangle with other beings. What should not be the aim then is the creation of a new circle or centre in the periphery, but to understand that all beings are infinite in their enmeshments (this is made most explicit by the figure of the 'cyborg', see Haraway, 1991, 2003). The conception of the cyborg and the centre-periphery shift means that anthropocentrism is the emergent quality of a form of 'local anthropocentrism' more specifically. This specific form of anthropocentrism privileged not just all humans, but a subset of human 'types' in particular: white, heterosexual, male, and western. On the periphery, whenever these categories change, the unveiling of *being-as-animality* becomes clearer.

Once we shift from the centre, we see that this metaphysics entails an ethics, not only of the 'human as the ideal' but the 'ideal of human', both of which are symbolic vestiges of an excessive and exceeded past.

Materialism

Theological creationism, particularly of western proclivity, is substantiated on narratives of God creating 'man' to dominate other forms of life:

> Then God said, "Let us make humankind in our image, according to our likeness; and let them have dominion over the fish of the sea, and over the birds of the air, and over the

cattle, and over all the wild animals of the earth, and over every creeping thing that creeps upon the earth." (Genesis 1:26)

The emphasis here is on verticality, on dominance over divine creation and the ontological entitlement of one form of being over others. The through-tradition has been the heritage of western philosophy and humanism as such. Still, this God/Human dichotomy, which is almost univocally rejected by posthumanism (as are all dichotomies and bifurcations), has been addressed through various philosophical recourse. Nietzschean power politics being one such recourse, as too the Sartrean approach to understanding liberty. All of this is done in a way to evaluate the inherently missing divinity that embroiled the angst of human self-importance.

Darwinism on the other hand, like the Copernican revolution, revaluated the hierarchy of being and moved away from the top-down 'great chain of being' with God at the pinnacle and humans not far lower, dominating over the 'lesser' lifeforms gifted to them. Darwin instead showed a bottom-up progression of lifeforms that are made of the same substances. Rather than the ontologically superior substance of 'soul' bestowed to humans, Darwin showed humanity, and all other life, as the product of a chaotic, rather than divinely ordered process. What Darwinism does then, is open up philosophy to what is outside humanity. A metaphysics of ecology, of monogenesis, is born from Darwinian material investigations (Armelagos and Gerven, 2003; De Waal and Ferrari, 2010). This opening up to animality is the fundamental philosophical tool that Darwinism has unveiled.

In sum, what contemporary posthumanism does then is exposes an ontological continuity, based on monogenesis, to other forms of life. This proposes that individuals live in a perpetual state of anticipation, in the present, concerning the things external to them (Caffo, 2017, 56). This applies to the individual human and thus orients the singleton to those like themselves, in this case, all beings. From here a new form of ethics can be envisioned.

A Companion Ethics

What does this entail for morality as it exists? The current Moral Law Theory tradition of moral theorising (utilitarianism, deontology, and offshoots) are post-Enlightenment inheritances based on humanistic vestiges (Johnson, 1993; Johnson and Lakoff, 2002). This anthropocentric morality must be abandoned. Our new habitat on the fringes is one with a clear sight of a damaged planet, one in ecological crises (Morton, 2018b).[13] This truth becomes remarkably apparent when a species (humans in this case) radically destabilise its own survival. This crisis provides a fermentation ground for the posthumanist to be birthed. Body-Oriented ethics becomes the most obvious here, one in which the subject does not exceed the limits and rights of the body of other, without consent, except when this excessiveness is necessary (i.e., self-preservation) (Caffo, 2017, 62).

Similar to the philosophies of Singer and Deleuze, the body becomes the boundary of inviolability of moral actions (Deleuze, 1988; Singer, 1998, 2011). The environment that houses humans is in crisis as a result of an ethics blind to the bodies of others. A posthumanist understanding of this does not discriminate against sex, ethnicity, or the preference of the individual. Being-in-the-world naturally, and always, potentially implicates a certain level of violence. As such, this implicates all life-forms as a part of a single painting; an assemblage of systems and nodes.

Body-Oriented ethics then is the adaptive mechanisms (to use evolutionary terminology) that posthumanism levies to *be-in-the-world* with other forms of life and to heal a damaged

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[13] This has been referred to as the 'sixth mass extinction event' and has be the subject of the philosophical and geological literature under the term 'Anthropocene' (Zalasiewicz* *et al.*, 2010; Lewis and Maslin, 2015; Haraway, 2016b; Waters *et al.*, 2016; Frank, Kleidon and Alberti, 2017; Latour, 2017a)

planet. Whereas transhumanism (what Fuller [2013] calls *ultra*-humanism) conceptualises

human limits as a resource, posthumanism argues that humans do not have to become

functionally immortal to continue as they do today. Instead, humans must learn that the

posthuman is not something that has to be consciously brought into being (i.e., with a technofix

(as argued by Bostrom, 2005)), but that humans were always-already posthuman.

This philosophical ethics then requires a theory of anticipation that allows the posthuman

to develop and take hold. Design, as a merger of art and architecture, which takes into account

this posthumanist ontology is primed as a candidate for a newly formulated ethical theory that is

non-anthropocentric.

DESIGNING ANTICIPATION

Anthropocentrism must be subjected to crisis if we are to affirm a realism concerning

objects[14]. This realism is the consequence of the dissolution of anthropocentrism and the Kantian

subject (exclusively human)-object correlation. Object-object relations correlate each other

independently of human consciousness. As a consequence, every form of life perceives the world

in its own way, a plurality of inexhaustible phenomenologies (Nagel, 1974; Bogost, 2012;

Harman, 2018). Hermeneutics exists in relation to a single, real world that exists and becomes

available to interpretation.

Philosophy thus provides the initial ontological landscape can then be built upon.

However, alone it is insufficient; what is necessary is the marriage of ontology with architecture

and art. A theory of anticipation, built viz. these three can be used to form the structure for the

posthuman to grow in (Caffo, 2017; Caffo and Muzzonigro, 2018). What this can mean is that

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[14] Objects not to be confused with things being 'objectified', but instead referring to all entities, events, etc. including nonhuman animals.

posthumans[15] must *live their environment*, rather than *in* it, abandoning the post-phenomenological conception of 'nature' as a static background for human action (Rosenberger and Verbeek, 2015). Along the lines of Haraway's *Staying with the Trouble* (2016), posthumans must seek to live in the places left abandoned and desolated by excessive human consumption (Haraway, 2016a; Caffo, 2017, 71). The wastelands of capitalism can provide a fruitful breeding ground where posthumans and their varied between-species relations can flourish (Haraway, 2015; Lowenhaupt, 2015; Caffo, 2017). Art and architecture, then, poise themselves as the best candidates for giving a substantive praxis towards the actualisation of posthumanist theory. What architecture does is graft onto the foundations of mutual, co-habitated spaces without destroying, protecting forms of life without isolating them from one another (Caffo, 2017, 75).

Doing this allows for new spaces of hybridisation to be constructed. The hybrid co-constructed with companion species is not simply reducible to the sum of its parts. Hybrids should be understood metaphorically, rather than literally (although the latter is a speculative possibility); hybrids are an instrument for understanding that forms of life are nuanced, interconnected and not easily – if not impossible – to be demarcated by clear boundaries. This hybridisation should be understood in the terms offered by the evolutionary biologist Richard Dawkins, that all living entities exist along a continuum with all other entities (Randerson, 2009).[16]

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[15] The term refers to the always-already posthumans of philosophical posthumanism and not to the other interpretations of post-humans such as that envisioned in transhumanism. For a more precise discussion of this distinction see (Ferrando, 2013b).

[16] More literal conceptions of hybridisation have retarded the progress of philosophical posthumanism as accounted herein. This is primarily caused by the transhumanist (i.e., *ultra*-humanist) domain in which the concept of hybridisation has arisen. The will towards progress and human betterment has infected the discourse. To this end, a more metaphorical definition of hybridisation has greater utility in understanding human-nonhuman relations and *being-with* other forms of life (Rikowski, 2002; Henry, 2014).

What architecture does for the posthuman is aid in preparing them to live in micro-communities, to live in accord and mutual respect with nature, without discriminations of moral types or the creation of substance hierarchies of dominance. Roles are instead assigned to actors according to their proclivities, desires and competencies (Caffo, 2017, 97). This should not be confused with the grand, universal narratives of utopia that have often been rejected by post-modern thought (Kellner, 1988; Sim, 2001). Instead, the question of how to 'become better' will remain existent as inter-species communities are ipso facto dynamic.

This dynamism, however, requires anticipation as its key towards relative stability. *Ex abrupto* changes at a substantive level could prove disastrous for these precarious communities (Lowenhaupt, 2015 illustrates this precarity with mushroom pickers). Instead, semiotic changes and the potentiality of their *relata* are what is called for instead. This should not be construed as a call for revolution, but rather as a philosophical shift towards being exemplary: i.e., exemplify what is to be a new species (a heterogeneous hybrid of beings) that is continually looking for ways to survive a damaged planet (Haraway, 2016a; Morton, 2016; Caffo, 2017; Caffo and Muzzonigro, 2018).

DESIGNING TECHNOFUTURES

At this point, it warrants revisiting what this project has done so far and perhaps even to draw some initial conclusions before moving forward. The first part of this paper has provided a literature review of DFV methodologies, highlighting the VSD approach in particular because of its erudite emphasis on consulting philosophical literature and operationalising on the ethical theories distilled from those investigations. The proceeding section took a starkly diverse approach, both stylistically and philosophically. Whereas the former could be said to be a traditional analytic analysis, the latter is markedly continental in origin and execution.

Although some have argued that the analytic/continental severing is illusory, or merely a social construct – as if the latter had no bearing on reality – the fact stands that, at least in practice, what constitutes the two (scholars, literature, thought) remains clearly demarcated, and in many cases, ignored by the other tradition (Levy, 2003; Prado, 2003). Still, as suggested at the opening of the previous sub-section, this project contends that a bridging of praxis is needed. The adoption of the analytic modes of technological innovation, although potent, lack a fundamental ecological consciousness, the very same consciousness that the contemporary continental tradition strongly argues maps directly on to reality (Morton, 2018a).

So how can this be done? Firstly, it should be noted, both because of the constraints of this paper and because of the project overall, that any form of totality, homogeneity, or clearly demarcated principled method is not proposed, nor could there ever be. Proposing a clear set of design rules descends purely within an analytic axiom, something that posthumanism does not affirm. It necessarily follows then that a hybridised approach is necessary, at least initially to satisfy functional imperatives for concurrent transformative technology development.

Constructing a Hybrid Project

To reiterate, philosophy, art and architecture, together forming a hybrid, are the necessary tripartite motor for change and transformation. What the hybrid permits is an envisioning of past errors not as mere consequences that are static, unchanging and necessary, but as contingent, embodied and causal. Past errors are continually present and affective, influencing both the present and the future. The scaffolding of earlier technologies, as the RRI discourse suggests, limits and constraints the open futures for current and forthcoming innovations which are built upon them (Stahl and Coeckelbergh, 2016; Jirotka *et al.*, 2017; van den Hoven, 2017). This entails a reflexive element when envisioning future innovations also; those imaginaries and

design spaces not only shape the future but affect the present and the hermeneutic frameworks applied to the past (Grunwald, 2014; van der Burg, 2014).

What the *sixth mass extinction event* (anthropogenic climate change) suggests than is the necessity to transform and shift away from current destructive paths, and to envision new modes of being of how not only diverse peoples and groups can come together, but how a *third space* between peoples (human and nonhuman) can be constructed (Caffo and Muzzonigro, 2018, 58). Some necessities arise from the formation of this *third space*: it must promote a dialogue that is:

1. Explicit

2. Public

3. Accessible to all interested/relevant stakeholders

Part of what VSD can and should do then is make it central to motivate for the construction of this third space in which it can also operate as a design space. Actually doing so does not come without difficult nor without methodological manipulation. However, the founders intended that VSD be flexible and integrate seamlessly within the design context that it is adopted. What is offered here, however, is slated to be six guidelines for a *soft universalism* that DFV frameworks, in general, should adopt as starting premises. They are as follows:

1. To accurately envision co-habitable, symbiotic futures with nonhuman beings it becomes necessary to discard the moral law theories of morality and adopt an embodied ethics[17] that can be used as an anticipatory landscape for coming to a greater understanding and respect for the identities and relations with other entities, not only is this a more accurate mapping of how human moral deliberation is cognitively undertaken, but it allows for

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[17] Judith Butler, although not an ontological realist in the sense that is actively proposed by this papers ontological investigations nonetheless provides a salient analysis of what a body-based (embodied) ethics looks like (Butler, 1993).

intersubjectivity between peoples to take place (Haraway, 1988; see particularly Johnson, 2014; Narvaez, 2016b, 2016a; Gibbs Jr and Hampe, 2017).

2. Hybridization and a realist ontology adduce the decoupling of humanity from its theologically and humanistically traditional centre (Harman, 2016; Morton, 2018a). The peripheries are where all *being* resides and where transformation, hybridisation and a space of respect and symbioses can flourish. This shared space permits distribution of agency and area for mutual co-habitation (Caffo and Marchesini, 2014; Haraway, 2016a; Morton, 2017; Caffo and Muzzonigro, 2018). A distribution of agency towards an ecological definition of identity (rather than the individualist one) is ontologically warranted, above and beyond the illusory ones still held and passed down as part of the heritage of theology and the agricultural-age societies(Morton, 2012, 2016; Caffo and Muzzonigro, 2018).

3. Unlike Latour's oppressive ANT of immanence, these third spaces not only acknowledge the necessarily contingent connections between all entities but their discrete heterogeneity (Harman, 2016). Hybridization is *ipso facto* a constitution of heterogeneity, and as such represents the distinct, yet enmeshed entities of which it is composed (Haraway, 1991; Caffo and Muzzonigro, 2018).

4. An *imaginative rationality* becomes necessary for the broadest set of possible futures to be envisioned, hence sanctioning organic changes to take place as needed. This consists of curating how futures are imagined, but without authoritarianism taking hold. This curating should be restricted *inquantum* as (1) permits: the restrictions of an embodied ethics.

5. Design should be a collaborative, collective and shared set of practices and instruments that promote the distribution of agency and respect for a shared space (Latour, 2017b; Caffo and Muzzonigro, 2018; Morton, 2018a). Forces of domination or hierarchy should then be rejected to allow for symbioses to occur from any agent.

6. Past projects must be understood as symbiotic; exerting asymmetric affects that impact the present and future. The ontic structures on which these past projects are built call into question not just what actions are undertaken today for the future, but the framework on which those actions are undertaken, i.e., how they constrain and promote specific categories of actions.

If we take into account some of these basic framings towards a posthumanist design landscape, it is fitting then to question exactly what is implicated in design? Firstly, it implies *ecognosis* ('eco' for ecological and 'gnosis' deriving from the Greek for 'knowledge') as a necessary set of contingencies for ontology (Morton, 2016). Primarily, it is an attunement to the necessary enmeshment of nonhumans to humans, both biologically and at the cornerstone of cognition and imaginative reasoning.

Similarly, it implies the dissolution of the aesthetics/design dichotomy that is typically sidelined (i.e., appearance/beauty vs function/utility). This dissolution then leaves not only the objects function unmolested, but also its potentiality. The consequences of the marginalisation of aesthetic beauty are evident in modern architecture design, favouring utility over appearance as if one were independent and contrary to the other. However this separation is illusory or untenable, the decision to force this separation becomes one of ethical importance (Winner, 2003 makes a clear case for how this can lead to drastic consequences). For example, allowing aeroplanes to filter dirty air from the front (for those willing to pay more) on towards the back (cheaper seats)

(Gerchick, 2013); permitting clay roof tiles to allow for city birds to nest and remain safe from the restricting elements (Beekmans, 2012); or too allowing ICT devices to produce 'electrosmog' that disorientates and harms bees (Warnke, 2009). There is no longer any *over yonder* in which our waste and pollution can be sent without a reflexive feedback effect (Morton, 2016, 2018a). This is the consequence of ecognosis, knowing that all beings inhabit a single real world that is composed of interconnections that never make up a unified, definable whole.

What this perpetual intersubjectivity involves then is that design can never be unified or absolute, nor has it ever been. There exists no demarcatable totality of interconnections that is explicitly and distinctly larger than the sum of its parts (as both materialists and idealists are wont to argue). Intersubjectivity and the contingent relations that necessarily assemble agents means that the designs that are chosen constrain and restrict possible futures. In searching for a cure to the ZIKA virus, we make the ethical choice to design futures that favour humans over the organism (and perhaps we should). Similarly, in including sheep, we naturally exclude that which would endanger that inclusion (sheep-killing diseases, foxes, etc.). The ethical/political choices that constrain the open-future possibilities here are biocentric in their privileging, yet arguments nonetheless could be warranted to design along those lines. What design then has to account is not towards perfection, but towards the best possible futures that can be envisioned, and to continually remain flexible to emerging and surfacing future avenues for design. The nonhuman can no longer be marginalised as merely an 'other' whose being is markedly independent of that of *Dasein*; that was a false starter and was never ontic.

Attuning to Representation

The previous sub-section provided some rough guidelines, premises and a generally more authentic mindset that designers should employ when seeking to create and enter a design space.

A prima facie response could be levied that those premises lack any operationalisation factor, making any principled way of integrating them in a formalised way difficult, if not impossible. Moving then towards best possible futures would assume a holism in design, one that is universally applicable and salient. What is argued, however, is that such a holism is illusory, and any argument for it in the past unfounded. Instead, salient design should shift away from the inherited anthropocentrism that has dominated technological innovation, a centrism that has caused unprecedented ecological devastation and continues to do so under an erroneous conception of the privilege of human-*being* and the necessity of the superiority of the constitution of the cerebellum[18] (Fuller, 2013; Umbrello, 2018b).

The inception of the Anthropocene as a geological era where the anthropic impact on the earth's biosphere has become observable, and part of the geological strata should shift attention towards the anthropogenic, asymmetric symbioses that humans exert on the biosphere. Still, this project concerns the design-for-*beings* in a way that affirms the dynamism of our assemblages. Although I have provided at least six framing principles to lead towards a more authentic design space, an initial, albeit ad hoc step can be taken by ongoing DFV projects to align their design investigations along this posthumanist framework. One such avenue that can be taken has arisen out of the marriage of both moral philosophy as well as animal ethics; contractualism.

Contracting Nonhumans

Although contractualism can be used to refer to a number of position regarding agents who come into 'contract' or agreement with one another, the use of the term employed here is derived from the moral philosophy of T.M. Scanlon that was originally presented in his opus

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[18] The latter, in reference to the once thought superiority of the human rational mind as a necessity (as argued by theology and Enlightenment philosophy), rather than the product of evolutionary contingency, as argued by Darwin.

What We Owe to Each Other? (Scanlon, 2000). Scanlon's conception of contract/agreement is narrowly defined, rather than the broader connotations that it could imply, as such, he defines the heart of contractualism saying that:

> An act is wrong if its performance under the circumstances would be disallowed by any set of principles for the general regulation of behaviour that no one could reasonably reject as a basis for informed, unforced, general agreement. (Scanlon, 2000, 153)

The focus of Scanlon's moral predicate is on wrongness rather than correct/good action. What is correct is merely the negation of what is wrong, and what is wrong is what is not justifiable, or disagreeable to contracting agents. The crux of determining predicate limits of wrongness or agreeableness rests in the human ability to adjudicate what cannot be rejected rationally. The emphasis here, and within contractualism in general, is on rationality as the primary tool of moral deliberation (i.e., of entering into and consolidating a contract). As this paper has already assessed, the reason/desire, reason/imagination dichotomies are vestiges of an anthropocentric theology and faculty psychology that formed the foundations of pre/post-enlightenment thinking. The dichotomies are illusory.

Further, given this explicit weight placed on the faculty of reason in entering in to a contract, Scanlon, and other make a clear case that nonhuman animals, lacking the faculty of reason to the degree that humans do (a contentious argument), just cannot be given the moral status of humans, as they cannot come into contract with themselves or humans in general (Carruthers, 1992, 2011). Yet, given the entitlement afforded to reason in contractualism, the moral theory has nonetheless gained popularity within the animal ethics discourse as a potential route to integrate nonhuman animals into the moral landscape and afford them equal moral status.

Paradoxically, it is contractualism's overtly anthropocentric core that undermines itself towards nonhuman enrollment. As it stands, the theory accounts for human actors as the sole proprietors of moral standing, this extends to all humans, regardless of their cognitive or physical states. It necessarily follows then that infant children, as well as those with cognitive impairments, are also involved as agents with full moral status. However, both intuitively and functionally, those agents, simply due to their developmental or cognitive states, lack the very faculty necessary to qualify as a contracting agent.

Any moral theory worth its salt, intuitively at least, must afford moral status to the most vulnerable members of society. The logical rejection of these members would render contractualism untenable as a moral theory that could ever be put into practice. Still, supporters rightfully argue that the consequence of not enrolling these members would stress our moral intuitions to such an extent as to induce societal upheaval and destabilise the moral landscape (Carruthers, 1992). The solution proposed then is through the concept of a 'trustee' or representative (rational human) that can represent the interests of those actors, thus, by proxy, extending full moral status on to those agents. The point here is that, regardless of the consequence of not engaging such actors (a similar notion of the rejection of nonhumans could lead to similar upheaval)[19] the extension of full moral status is based on the notion of existing as members of the same species, and not the reason-faculty that substantiates the theory ab initio.

Still, contractualism's emphasis on wrongness as the predicate for moral agreement is one of the strengths that makes it preferable to other ethical theories such as utilitarianism, despite the latter's inclusion of animals. This is because the conception of wrongness in

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[19] Imagine that the state mandates the euthanisation of all pets/animals within the polis. The companionship that exists intersubjectively between species, particularly human-nonhuman could foreseeably result in a similar destabilisation of society (Swanson, 2014 provides an erudite analysis of this very point).
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contractualism permits trustees to determine what is ipso facto owed to animals, rather than the

suffering predicated by utilitarianism (Scanlon, 2000, 183; Talbert, 2006; Rowlands, 2013).

Nonetheless, contractualism does not, nor was ever designed to provide an absolutist or complete

theory of morality. Scanlon himself claimed only to have scratched the surface of what a

contractualism could be. That being said, if we reject the anthropocentrism that this project has

argued to be in itself illusory, then that of contractualism similarly dissolves. The consequences

are that the membership to the species homo sapiens is arbitrary at best, and the extension of the

consequentially self-affirmed moral status follows suit. The interconnectedness of the biosphere,

mutual symbioses and the asymmetric affects of object-object relations makes the exclusion of

nonhuman animals from moral theorising an archaic anthropocentric delusion.

What design can then do is begin its conceptual investigations with the tool of the trustee

in mind, or part of the formal toolbox repertoire. VSD's designers, when constructing

stakeholder analyses to determine who the relevant groups are should stray outside the anthropic-

box to which design is traditionally relegated. What this necessarily entails then is that

designated specialists should be responsible for representing the potential interests of the

biosphere outside the correlationist circle, that of the human. This could mean determining what

potentially deleterious effects a technological innovation could have on the environment, not for

the sake of sustaining human progress, but for the sake of the environment overall.

VSD's built-in flexibility and reflexivity make it the most obvious candidate among the

existent SBD methodologies for this type of incorporation. A mainstay of VSD is that it should

seamlessly integrate into whatever specific domain that adopts it. This promotes a higher

probability that firms and designers will adopt it. Similarly, the vast swath of literature that

explicates its potency in directing design towards desirable ends makes it particularly apt for its

adoption into new modes of thought, mainly, in extending the members of stakeholder communities to the broader biosphere, rather than the artificially constructed isolated 'human' stakeholder.

This project then, in promoting reflexivity and situatedness, does not nor cannot provide a full account of how VSD or DFV approaches more generally can be reconstructed *in toto*. Instead, what I have sought to do instead is reconceptualise what design means. I have shown that design, although recently marked by philosophical/ethical investigations, remains unrepentantly anthropocentric. The second part of this project has shown that the posthumanist discourse provides strong arguments against the rooted socio-cultural notions of humanism and anthropocentrism. The consequence of this analysis has shown that the 'human-in-isolation' is an illusory concept, there exists nuanced, contingent and complex interconnections that constitute the biosphere, and reflexively, co-constitute every constituent agent as a result. Design then can no longer be relegated to a small corner of this domain of interconnection, and an ecological shift in consciousness must be adopted in design should we wish it to remain salient over time.

To this end, this project has provided some preliminary guidelines that can serve to frame design projects with an ecological mindset. The constraints and efficacy of this proposal are yet to be determined, although may remain nonetheless informative. The following concluding section highlights some of this project's limitations and proposes some potential avenues for future research projects that may prove fruitful towards the promotion of what can be called (the yet to occur) *ecological turn in design*.

PROJECT LIMITATIONS AND FUTURE RESEARCH

DFV methodologies in design have become widely discussed within the RRI discourse of the last 30 years. The turn towards technology in STS and its emphasis on the politics inherent in designed artefacts have initiated investigations into the roles that various actors play during the various design stages of technology and, as a consequence, how values through technology can be directed toward intended outcomes.

These design methodologies have investigated the impact that various stakeholder groups have on what values are designer into or out of technologies as well as how those values are expressed over time. Rightfully so, these methodologies underscore the values of designers and how they can implicitly embed specific values in design (Couture, 2017), but they also look at the impacted parties that both, directly and indirectly, come into relations with those products. Unfortunately, the values implicated and the stakeholders enrolled have been limited to humans only; relegating any values that concern the environment or nonhuman animals to ancillary levels and how the effect on those agents may impact humans either positively or negatively. This background placement of nonhuman agents has been the primary concern of this project as well as how to bring them to the foreground in design consciousness.

This paper then proposes that an extension of what constitutes stakeholders in DFV approaches is required, not as a second-order consideration for humans, but for those stakeholders per se. In doing so, I proposed several framing tools to reconceptualise how to approach design and to create more inclusive design spaces that acknowledge the plurality of phenomenologies that are implicated and existent alongside human agents. Similarly, I proposed the philosophical theory of contractualism as a preliminary, ad hoc heuristic that can be adopted by designers today as a way to begin this re-envisioning. What is needed still is how conceptual investigations can be undertaken that formalise an expanded contractualism towards enrolling

nonhuman stakeholders. The introduction of trustees for these marginalised groups in design teams was proposed as an initial suggestion; however, practical research must be conducted to determine the long-term effectiveness of such a route. Determining if such a strategy can take hold a priori is contentious.

Additionally, what is perhaps needed most in DFV research is the inclusion of the Franco-German (continental) traditional of philosophical inquiry. As things stand, the consultation of the philosophical literature in conceptual investigations (VSD in particular) is restricted to the Anglo-American tradition of analytic philosophy. As this paper argues, the most salient discussions of the phenomenologies on nonhumans animals and ecology, in general, have emerged from the latter. Strong arguments proposed by this philosophical tradition for the ecological thought as ontic warrants its inclusion in design, as design has substantial material implications for the biosphere at large.

Finally, and following the previous point, is that DFV (or future approaches to design) must investigate how objects (entities) come into symbioses with each other. What has become apparent, contra Latour is that there are asymmetric relations between objects, many of which serve as event horizons, i.e., points-of-no-return. What this means that some relations change their constituent objects irrevocably. A self-evident example is anthropogenic climate change and mass diversity loss. What design has to account for is ways in which to anticipate symbioses and their effects on entities. Anticipatory design, in light of this re-imagining of ontological relatedness, is by no means evident. Future research strategies need to explore how symbioses are formed, how technology limits and constrains these relations and how, despite some irrevocable changes, can desirable futures nonetheless be realised.

CONCLUSION

Designing for values has made a dramatic impact on the motivations behind technological artefacts and how those artefacts implicate values. What has become most overt is the need to direct technologies towards mutually desirable futures. Concurrently, design trends have realised that the varied naturecultures of different groups push moral intuitions and design approaches to their limits (Umbrello, 2018c). This issue is exacerbated by the advent of the transformative NBIC technologies that implicate and overload moral values. The issue is further intensified when the inexorable impact of human innovation on the biosphere is considered.

This project is comparatively unique as it extends the contemporary continental traditional of ecological thinking to the traditionally analytic domain of DFV. The recent inauguration "Welcome to the Anthropocene" is arresting, it implicates the weighty impacts of human quotidian on the once static background of 'nature' (Slaughter, 2012). The *sixth mass extinction event* makes ignoring the impact that designing has on the biosphere unsupportable. Design then must take up the ecological thought if it is to remain ontologically authentic and relevant, doing otherwise (i.e., continuing as per course) has naturally recalcitrant consequences. To this end, what this project has proposed is an exploratory set of design principles that can help designers to frame design goals and to direct design flows towards an ecologically conscious end. Similarly, a contractualist theory of morality that can include nonhumans is proposed as a provisional heuristic that analytic designers can adopt to initiate this transformation of consciousness. Although this paper has forgone concrete holism, as it runs contrary to the posthumanist analysis that is taken up, it nonetheless offers some worthwhile principles that can be used to bring about a much needed *ecological turn in design*.

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