The Symbols of the Divine: Approaching a Post-human Ontology of Digital Design via the Study of Discards

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Recibido: 20.04.2022
Revisado: 13.05.2022
Publicado: 30.06.2022
Como citar este artículo
Cowlishaw, T., 2022. The Symbols of the Divine: Approaching a Post-human Ontology of Digital Design via the Study of Discards. *Inmaterial. Diseño, Arte y Sociedad*, 7 (13), pp.14-34
DOI 10.46516/inmaterial.v7.142

Abstract

Thinking about design in post-human terms (Forlano, 2017) challenges designers to consider the effects of their designs on the more-than-human world, and in particular to consider non-human actors as users of our designs (Forlano 2017, Cruickshank & Trivedi 2017). However, the *post-human* turn also calls into question the modernist assumption that "good design" is predicated on notions of instrumental use, which underpins user-centred design, the dominant perspective in digital and interaction design. I propose an alternative, based on Willis's ontological designing (Willis 2006) and Yuk Hui's digital ontology (Hui 2016), which highlights the role of ongoing care and maintenance in the ontology of the digital, and argue that discards, and in particular digital discards, have a peculiar ontological status within this theory that offers promise for future study of digital design beyond instrumental use, and its entanglements with the more-than-human.

Keywords
interaction design, infrastructure, post-human design, discards, ontology

Resumen

Pensar en el diseño en términos posthumanos (Forlano 2017) reta a las y los diseñadores a considerar los efectos de sus diseños en un mundo más-que-humano, y en particular a considerar a actores no-humanos como usuarios de nuestros diseños (Forlano, 2017, Cruickshank & Trivedi 2017). No obstante, el giro posthumano también cuestiona la noción moderna de que el "buen diseño" se basa en el uso instrumental, la cual sustenta el *User-centred Design* (diseño centrado en el usuario), la perspectiva dominante en diseño digital y diseño de interacciones. En el siguiente artículo propongo una alternativa, basada en el *Ontological designing* de Anne-Marie Willis (Willis 2006) y la ontología digital de Yuk Hui (Hui 2016), que recalca el papel de los cuidados y el mantenimiento en la ontología de lo digital. Además, argumento que los desechos, y particularmente los desechos digitales, tienen un estatus ontológico peculiar dentro de esta teoría, que muestra nuevas vías para la investigación sobre el diseño digital más allá del uso instrumental y de sus enredos con lo más-que-humano.

Palabras clave
diseño de interacción, infraestructuras, diseño posthumano, desechos, ontología.

1. Introduction

> *"This place is a message… and part of a system of messages… pay attention to it! Sending this message was important to us. We considered ourselves to be a powerful culture. This place is not a place of honour… no highly esteemed deed is commemorated here… nothing valued is here."*
> (Trauth et. al 1993)

The problem of designing *long-term nuclear waste warning messages*, such as the above message taken from the Sandia Report, highlights both the importance of incorporating post-human perspectives in design practice and one of the principal challenges in doing so, as well as pointing towards the potential role of *waste* in offering an opportunity to research and overcome these issues.

The Sandia Report was commissioned by the Waste Isolation Pilot Plant, a deep geological repository for nuclear waste in New Mexico, USA. It dealt with the question of how to indicate the danger of nuclear waste to anyone who might accidentally or intentionally encounter it, over a timespan likely to outlast human civilisation.

As any designer who has spent time thinking about the ecological sustainability of their work knows, design as a discipline has effects on the world that go beyond the scope of the solely human. The things we design and bring into the world have a direct impact on ecosystems, economies and societies beyond their immediate context of use - not just in terms of the kind of *deep time* (McPhee 1981) design challenge that the Sandia Report refers to, but also in terms of what are sometimes dismissively (Parvin & Pollock 2020) termed "unintended consequences" in the present and near future: effects displaced from the immediate anticipated context of use in geographic or temporal terms, or impacting actors outside their anticipated sphere of influence. Design for more-than-human worlds clearly requires us to engage with all of these, but also poses a more fundamental challenge to a conception of design steeped in the values of humanist modernism. For design in the modernist tradition - the use of the designed object as a means to an end (*instrumental use*) is everything - form follows function (Sullivan 1896), and function implies a human subject as a *user* of the designed object (Redström 2006). Therefore, the problem of designing long-term nuclear warning messages does not solely call into question our powers to predict, anticipate or extrapolate such remote futures, but requires a more fundamental shift away from thinking in such instrumental terms. Through centring the presence and role of *wastes* - matter which is no longer *useful* - it

decentres the human-centric idea of use as function, and draws attention to more-than-human agencies which are not analogous to (and cannot be extrapolated from) our own experience as humans, as well as making legible the lives of designed objects in time scales beyond the human, through their continued existence after they have ceased to be useful.

The need to think about design beyond the instrumental is of broader political concern – Federico Campagna (Campagna 2021) argues that such an instrumental view of the world impedes our ability to imagine or speculate about possible futures at all. For Campagna, this instrumental point of view is a consequence of an all-encompassing hegemonic metaphysics of the world which he terms technic - a worldview in which objects are defined solely by their role in maintaining and propagating the system of technic itself, in which all things exist solely in their capacity as Heideggerian standing-reserve - as potential for future instrumental use within a system that can do nothing but perpetually expand itself. For Campagna, this essence of technic as "*the spirit of absolute instrumentality*" is both the engine of the perpetual growth and *hyperproductivity* which threatens our existence as a species, and the principal impediment to our imagining solutions to such existential problems.

This preoccupation with the instrumental is particularly apparent in the field of digital design[1], whose dominant paradigms - *User experience*, and *User-centred design* (Norman 1986) - reify the idea of a human user, and define the role of digital technology solely as something to be used instrumentally by those users. In addition, to date, there is very little work on the *materiality* of the infrastructures which underpin the objects of digital design, which have their own ecological effects and entanglements with the more-than-human. While sustainability and ecological impact are routinely considered in physical product design practice and pedagogy, for example (see e.g. Bhamra & Lofthouse 2008), in the field of digital design, until now, comparatively little attention has been paid to the sustainability and ecological impact that the material infrastructures underpinning our designs have on the wider world. This is the case despite the importance ascribed to them in work from other fields - such as the effects of e-waste recycling on diversity of soil microbiomes (Liu et. al. 2015), or the carbon emissions caused by the extreme energy use of cryptocurrency mining and blockchain technologies (Li et. al. 2018).

[1] In this paper, I use 'digital design' to refer to any design practice for digital media, which is to say, whose resulting object exists as *digital objects* in Yuk Hui's (2016) sense.

Therefore, I propose that in order to effectively reason about and imagine a digital design which engages with the more-than-human, we must both de-centre the notion of instrumental use as a guiding principle, and turn to perspectives that incorporate the materiality of the digital and its infrastructures as sites for designing, and as objects of design. Further, I propose that both these things can be achieved by turning our attention to *digital wastes* - digital objects (such as data, files, media or applications) which have been discarded, and as such are no longer considered *useful*. Following what Steven J. Jackson terms "The world-disclosing properties of breakdown" (Jackson 2014), I argue that designing and researching with digital wastes offers a path to imagining and deriving practical methods and tools for a digital design which engages with the more-than-human world as more than just another source of potential *users* - a necessary step towards engaging with the post-human in digital design, as ideas of "users" and "use" rely on a humanistic schema for understanding the world, and ignore both the wider role of design artefacts as material infrastructure, and the ontological role of *designing* in making and re-making the world.

In the remainder of this paper I first provide a review of existing work on post-human design before presenting my argument that a post-human digital design requires attentiveness to both the material infrastructures of the digital and the role(s) of designed objects beyond use, and further, that this can be investigated through speculative research work with digital wastes.

2. Background – posthumanism in design

In recent years, an increasing amount of attention has been paid to the challenges of considering the perspectives of more-than-human actors in the design process, and incorporating them as users or stakeholders. Laura Forlano (Forlano 2017) offers an overview of this work, highlighting the way in which post-human perspectives highlight the *ontological* role of design - the role of designed objects as "sociotechnical systems which are both socially constructed and society shaping". However, her review does not challenge the primacy of instrumental use as a guiding principle for design, instead encouraging designers to consider "who or what – human/non-human, human/animal, individual/organisational/network – are the users, and for whom or what should the design be desirable?"

Leon Cruickshank and Nina Trivedi (Cruickshank & Trivedi 2017) also challenge the assumption of human primacy in the design process, offering a reassessment of

User-centred and Human-centred design in light of developments in post-human thought, and considering the problem of both non-human animal actors and "new technologies with an active form of agency" as stakeholders in the design process. They argue that Norman's earlier work on user-centred design provides a potentially "better and more progressive" frame [than human-centred design] for thinking about the actors that engage with design outcomes. However, beyond just considering the role of more-than-human actors as users, they also highlight the fact that we need to consider them as participants in the design process, and caution against the dangers of anthropomorphism in the ways in which we interact with them.

However, it could be argued that framing non-human actors as *users* is itself a form of anthropomorphism, as shown by Martin Tironi and Pablo Hermansen in their work considering the role of more-than-human stakeholders in the design process. Their work echoes that of Cruikshank and Trivedi in that they consider the role of more-than-human *participants* in the design process, rather than simply as the ultimate users of designed objects. However, what is particularly notable about this project, is that its original impetus was to enrol animals in a design project to act as a form of *idealised* user: "Animals, understood as organic machines, would serve as ruthless users [...] who are indifferent to explanations and justifications, but who are able to express their preferences through their behaviour." (Hermansen & Tironi 2018). However, in practice, this exercise called into question the centrality of the user in design when considering more-than-human-worlds: "The user-centred method and its 'political ontology' [...] evidenced insufficiencies to face the complex qualities of prototyping with animals". Hermanson & Tironi posit that the inclusion of more-than-human actors as participants in the prototyping process offers an alternative, arguing that the "material fragility" of prototyping and its "successive failures" afford a situated perspective on interspecies relationships and a becoming-together in more-than-human worlds, through thinking "in the presence of" rather than simply "about" more-than-human actors. (Tironi & Hermansen 2018a). They argue for "an end to the idea that the final device should be a stable solution to a clearly determined problem for a very well defined user" (Tironi & Hermansen 2018b).

Jelle van Dijk also challenges similar humanistic assumptions, but with a focus on the field of agentive technical actors such as "AI" (Van Dijk 2020). He argues that the framing of such actors as "autonomous", "smart" or "intelligent" invokes the logic of cartesian dualism, which, he argues, is a humanistic form of reasoning and an anthropomorphic fallacy, instead arguing that such actors should be viewed as "*at best part of our extended living bodies, through which we make sense*". This criticism

is echoed in work by Betti Marenko and Philip van Allen (Marenko & van Allen 2016), who argue that this framing of agentive technology as rational or cognitive underpins its perceived role in the "task-oriented and efficiency-driven" instrumental framework of interaction design. They point out that these interactions between agentive technical actors and humans "generate scenarios characterised by 'noise', uncertainty and indeterminacy" which provide a productive opportunity to "broaden the cognitive spectrum" of our understanding of these actors and their interactions, and specifically, argue for a revised view of such technologies based on deploying the idea of *animism* as a speculative research method. Following Latour (Latour 2014), they argue that animism "offers a way of thinking about interaction differently: neither from the perspective of the user, nor from the perspective of the object", which affords a more nuanced understanding of "the multiple agencies with which [we] are more deeply entangled every day". For Marenko and van Allen, this understanding is explicitly entangled with the *material* nature of digital media, a *re-embodiment* of the agency we ascribe to it – echoing the call by Rowan et. al. (2015) for a *materialist* and *subject-decentred* view of post-human design in order to reveal "*more complex relationships between subjects and objects – between materialities and desires. Between tendencies, propensities, viscosities and porosities*".

Marenko and van Allen's work also calls for attention to be paid to the temporal dimension of digital media, arguing that the status of digital data as an active entity is in part drawn from its possession of a *history*, echoing Lindström & Ståhl (Lindström & Ståhl 2019) who claim that design's status as a "future-oriented" discipline, focused on the making of new things, crowds out the work of considering for "*what is made, replaced, left behind, and becoming waste*", and argue that a renewed attention to wastes is essential to re-imagining design as an ongoing *caring* process (Puig de la Bellacasa 2017) which engages with the *aftermath* of designed objects as well as their useful life.

3. Design as ontology, ontology as infrastructure

The ontological role of designing is a common theme in the post-human design literature. In particular, a central thesis of this ontological view of design, of relevance to the post-human perspective, is that it allows for the perspective that "*things themselves as well as people design*" (Willis 2006). This is true in the sense that they express "*horizons of possibility*" for interaction with them (analogous to *affordances* visible to a user or subject, familiar and amenable to the user-centred approach), but more problematically for a use-focused view of design, the ontological view

of design argues that these horizons of possibility act on humans in their role as designers, leading to a *double movement*, in which "*we design our world, while our world acts back on us and designs us*". This is an explicitly *subject-decentred* position, according to Willis, which calls into question the idea of a privileged human role of 'designer' or 'user' entirely, suggesting an ongoing process of designing in which human and non-human actors continually co-design one another.

Examined in the context of contemporary work on digital ontology, this has particular significance, suggesting an ontological approach to digital design which decentres instrumental use and highlights the materiality and relationality of the artefacts it generates as *digital objects*. Yuk Hui (Hui 2012, 2016) offers an ontology of such *digital objects* - "objects that take shape on a screen or hide in the back end of a computer program, composed of data and metadata regulated by structures or schemas" - arguing that concentrating solely on either the abstract, immaterial existence of digital things, or on their material existence, such as patterns of charges or magnetic polarizations within computer storage, yields a reductionist view of their ontology. Instead he proposes a relational, embodied perspective, arguing that the ontology of such digital objects is based on a process of *datafication* which *gives rise* to the possibility of connections between systems, platforms and databases which form networks, and in turn, to their infrastructure - entangling digital objects and material infrastructures in a mutually supporting web, rather than a dualist hierarchy in which the material supports the digital but sits apart from it. Analogous to Willis's double-movement of mutual designing between objects and humans, we therefore arrive at a mutual-designing of digital objects and their supporting infrastructure. This allows the material existence and entanglements of digital objects to be incorporated into the *subject-decentred* ontological view of designing, in contrast to other existing theoretical approaches to the materiality of digital design (eg Wiberg 2018), which, while expanding the purview of digital design to include the material, maintain a focus on the instrumental use of designed objects by a human user.

Hui's work also elaborates an important property of the ontology of digital objects relevant to a post-human view of digital design, in that their ontology is explicitly *relational*. Hui argues that digital objects are given *form* through metadata schemes and protocols which define existence in terms of its *relatings*: "the individual does not exist within its own terms but is always related or linked to something else external". Hui's relational ontology gives rise to both digital objects and their material infrastructure, and functions through a process of *knowledge representation*, recalling in the digital realm Donna Haraway's (Haraway 2003) injunction, when writing about companion species, that "beings do not pre-exist their relatings".

Of particular note for an ontological view of designing with the digital is the fact that this relational quality "constrain[s], enable[s], limit[s], and shape[s] the ways in which those representations can be created, transmitted, stored, manipulated, and put to use" as Paul Dourish describes in his 2017 Essay, "*The Stuff of Bits*" (Dourish 2017). Dourish examines various examples of the *materialities of information representation*, and demonstrates the way in which material qualities of digital hardware and networks are entangled with political and social choices about information representation through formats and protocols, and the ways in which these protocols in turn give rise to and are shaped by institutions and manners of communicating - and as such, these representations embed a practical politics which is "ever-local" and "ever partial" (Bowker & Star 1996). María Puig de la Bellacasa (Puig de la Bellacasa 2017) characterises such *knowledge politics* as an *ongoing, practical* process which should be seen as a matter of *care*, following Joan C. Tronto's definition (Tronto 1993) of care as "everything that we do to maintain, continue and repair our world [...] which we seek to interweave in a complex, life-sustaining web". Highlighting that the ontology of the digital rests upon practical, caring, ongoing relations of maintenance calls into question the framing of digital design as *innovation* (Russell & Vinsel 2016), which, as argued by Elizabeth (Dori) Tunstall, is implicitly bound up in neocolonial and human-centric values (Tunstall 2013), and instead points towards the multiple relationships between human and more-than-human actors which sustain the ontology of the digital in an *ongoing* manner.

A practical illustration can be seen in the example of the Github Arctic Code Vault (Github 2019), a project announced in 2019 by the Github source code archive[2] service and the Long Now Foundation[3] to archive all the open-source software stored in Github's code repository, in a remote vault in Svalbard, where it is claimed that it would be safely preserved for at least 1,000 years. Such preservation projects rest on the idea that the thing to be preserved is already a perfected and self-contained artefact, rather than an entanglement with an always-ongoing process of maintenance, care, and creation, and also presuppose the future *value* of the artefact to be preserved, which implies a strictly linear trajectory of human (and only human) progress. The object selected for preservation has value now, in modernist, human terms, and therefore it is presumed that it will continue to do so in the future. The assumptions embedded in this perspective deny the necessity of this sort of ongoing maintenance work in the maintenance of our society, by implying that such

[2] https://github.com

[3] https://longnow.org/

'deep time' archives contain all that is necessary to recover the status quo after some apocalyptic event. In addition, they also privilege a linear, human-centric, (or in this case, capital-centric) view of progress: "*Thinking of the far future as the long now has the effect of reducing one's engagement with it to an awesome continuum in which a singular vision of 'the human' predominates, and is preserved*" (Skrimshire, 2018). This raises a question which points towards an opportunity for digital design research to further probe these questions: If the ontology of digital objects and their material infrastructure is intimately bound up with ongoing relations of care and maintenance, what happens when these relationships are interrupted, thwarted, or otherwise come to an end?

4. World-revealing wastes

> "*Like the satellite in miniature in the film Valis, the microform of it run over by the taxi as if it were an empty beer can in the gutter, the symbols of the divine show up in our world initially at the trash stratum.*"
> (Dick 1981)

The vision of the Github Arctic Code Vault offers a stark contrast with the Waste Isolation Power Plant mentioned at the beginning of this article. While the former's ongoing relevance is predicated on the continuing existence and relevance of a society and infrastructure resembling our current one, the latter is intended as a reminder of our ongoing material effects (in the form of our wastes) in *whatever futures might transpire*, and in doing so, point towards the speculative power of thinking more closely about wastes and discards.

More concretely, following Steven J. Jackson's appeal to "T*he world-disclosing properties of breakdown*" (Jackson 2014) I propose that thinking with and through *digital waste* - digital objects in Hui's sense (Hui 2014) - such as media, files, data or documents, which have reached the end of their life as useful objects, either through discard, corruption, or lack of ongoing maintenance - offers a particularly fertile site for investigating the material, more-than-human entanglements of digital design beyond solely relations of use, as the act of discarding something implies the absence of caring relations, rendering the effects of their removal more legible.

Wastes, or use-less objects, are particularly curious when considered within Yuk Hui's digital ontology, due to the pivotal role of the *user* within it. The ways in which digital objects appear to us as things to be interacted with is pivotal to Hui's

ontology: "they are actually objects that we drag, we delete, we modify and so on." (Hui 2012), and as such the *user* actively forms part of the associated *milieu* which gives digital objects their ontological stability. Building his ontology of the digital object upon Gilbert Simondon's idea of the *technical individual*, which "supports the functioning of its inner structure *at the same time* as it is able to adapt an external milieu to its functioning" (ibid). Thus, the role of the digital object as being available-for-use is actively implicated in its ontological stability. Therefore, digital wastes, following my definition above, appear to have a curious liminal existence in Hui's ontology - outside of the context of use, it might be argued that they cease to exist as objects.

The study of wastes is also directly implicated in the broader question of *instrumental use*, and the types of interactions and relationships with objects we might have beyond it, following the work of Georges Bataille. *In The Accursed Share* (Bataille 1988), Bataille argues that waste, squander and sacrifice function as ritual acts with a particularly important social role, in that they restore an intimate or *sacred* relationship with objects that had been degraded by instrumental use:

> *"Sacrifice restores to the sacred world that which servile use has degraded, rendered profane. Servile use has made a thing (an object) of that which, in a deep sense, is of the same nature as the subject, is in a relation of intimate participation with the subject." (ibid)*

This relationship of 'intimate participation' that Bataille describes echoes Hui's assertion of our active ontological role in the existence of digital objects, as part of the associated milieu that gives them stability. As such, the unstable state of digital wastes within Hui's ontology does not offer a challenge to his argument, but rather an opportunity for us to experience more directly and intimately our role as active participants in the ontology of digital objects, rather than solely as users of them as tools for some instrumental function.

Bataille's identification of waste with ideas of the sacred or transcendent also has echoes in Mary Douglas's *Purity and Danger* (1966), from which we can get a glimpse of how the role of wastes as sacred objects might be usefully applied in design. Douglas bases her analysis on the idea of wastes as "matter out of place" - anomalous things which exist outside a dominant system of categorization (reinforcing the fundamental connection between wastes and the *knowledge politics* which undergird our ontology of the digital). For Douglas, waste is intimately connected to beliefs about the ordering principles of the world, and practices around waste

and hygiene function ritually, as creative acts - a "positive effort to organise the environment", a role which echoes that of design, and a means of practising a form of *speculative ethics* as it is described by Puig (Puig de la Bellacasa 2017), in that it provides us with an opportunity to imagine and bring about preferable futures through these ritual acts.

This creative or speculative property of ritual use of waste is, for Douglas, a means of "creat[ing] unity in experience" (Douglas 1966), again pointing towards a way of calling attention to our ontological entanglements with digital objects, and, for her, as much as for Bataille, this role is completely distinct from any sort of instrumental use: "instrumental efficacy is not the only kind of efficacy to be derived from their symbolic action. The other kind is achieved in the action itself, in the assertions it makes and the experience which bears its imprinting" (ibid).

Douglas's conception of waste as "matter out of place" also points towards the potential role of waste in articulating an alternative to the totalizing instrumentality of *Technic* as described by Federico Campagna. In Technic's ontology, entities exist only in as much as they fit into a system of language or categorisation: "*it is exactly presence, rather than life or existence, that provides that dimension onto which notions of instrumentality and productivity can take place*" (Campagna 2021). Waste in the Douglasian sense, then, is a remainder which refuses to conform to this positional ontology but still exists, offering an example of what Campagna terms the Magical - "*a world-making force that allows us to be at the same time inside the world, and outside from any world*". This existence beyond Technic's positional ontology of use echoes Immanuel Kant's philosophy of aesthetics, which holds that aesthetic judgements must be *disinterested* from instrumental use. Wastes then, when apprehended as sacred, ritual or aesthetic objects, not only offer a connection to the ineffability of material existence beyond the limits of instrumentality - the "symbols of the divine" that show up in the *trash stratum* (Ford & Martell, 2018, quoting Dick 1981), but this connection also, following both Campagna and Douglas, has speculative, world-making potential.

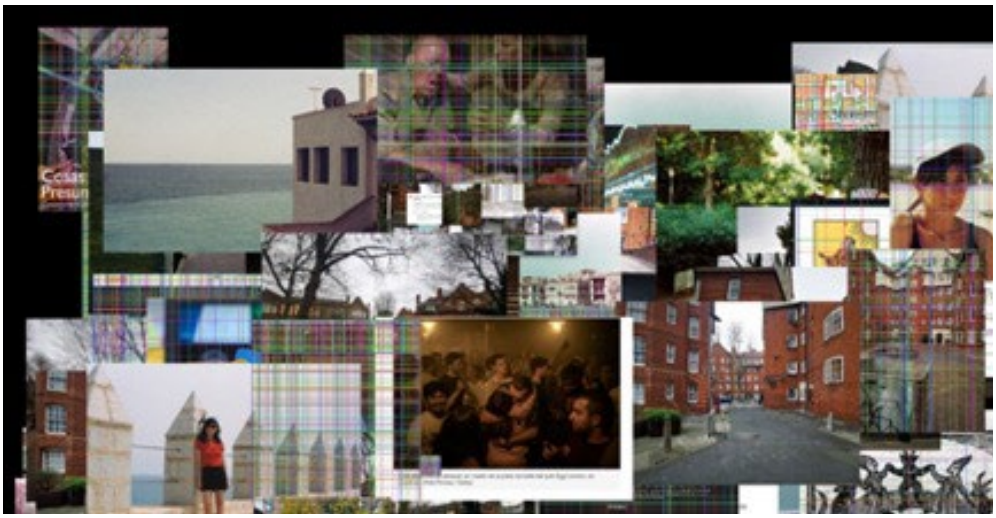
As such, digital wastes, through the absence of care given to them, enable us to interrogate the ways in which digital objects and their design are bound up with ongoing relations of maintenance and care, the ways in which they engender and inhabit relations with human and more-than-human actors beyond solely instrumental use, and the ways in which they shape, and are shaped by the material infrastructures of the digital.

This points to a promising avenue for future practical work - interrogating how digital wastes might be employed as part of a speculative, critical design process (Dunne and Raby 2007, 2014) that both brings to light the relations of care and maintenance that are ontologically entangled with the products of digital design, and interrogates both human and more-than-human relationships with them that go beyond *instrumental use*, by treating such wastes as material for design exercises which value the ludic, aesthetic, or ritual over the utilitarian.

Existing work on the social entanglements of physical wastes also offer some insight into how this theoretical work might be operationalised in the form of practical methods for design research and prototyping for the more-than-human, in particular, the work of Blanca Callén Moreu and her collaborators. For example, their work on *intimate entanglements* with discarded objects (Callén Moreu & López Gómez 2019), investigates how work with wastes can probe relationships between humans and objects which go beyond the instrumental, and work on *vulnerability tests* (Callén and Sánchez Criado 2016), which explores material relationships of care for objects, and their role at the end of an object's useful life.

5. Current / future practice

I have been actively exploring the practical applications of *digital wastes* in digital design through my practice over the last 18 months, both as a form of practice research (Camps & Rowan 2019) intended not only as a further material exploration of the substantive themes presented in this paper, but also as a demonstration of how digital wastes might be beneficially, and more generally, incorporated into design practice generally. My projects have focused on the role of digital wastes in design practice in diverse contexts and different scales. Here I present a preliminary overview of two ongoing projects which deal with two contrasting fields of application: the first is an autoethnographic examination of intimate, personal relationships with digital objects (evoking Georges Bataille's idea of sacrifice as a restoration of intimacy with the object) and the role of digital wastes in memory and forgetting. The second, by contrast, is a participatory project exploring how the idea of digital waste might allow us to critically examine the role and biases of data-collecting systems at a municipal level, as well as providing a path to speculating about more just, inclusive alternatives, following Mary Douglas's idea of the ritual use of waste as a performative, creative act. Both these projects are currently work-in-progress, and I plan to publish a more detailed account of both in the future.



5.1 Everything we had forgotten was indeed lost (2021–)

Everything we had forgotten was indeed lost[4], is a computer screensaver. When activated, it iterates through every image file in a computer's "trash" folder, presenting it on the screen, while simultaneously overwriting it with a small amount of noise - randomly changing pixels or lines so that the image decays gradually over time - in a manner analogous to composting or physical decay, as well as the process by which deleted files on a computer are gradually overwritten with new data. As I use it, it confronts me with my deletion history, granting me the capacity to be surprised or question my own previous decisions, and allows for a period of repentance, in which I can recover an only-slightly-damaged copy of a file I might later regret deleting. Over time, however, all is irretrievably gone forever, absorbed by entropy, bringing a finality to this deletion process and the possibility of renewal. This ongoing process places me into a relationship of *intimate participation* with the deletion algorithm. Its visibility means that my choice to intervene by 'rescuing' a file or not, comes to matter.

[4] Title taken from the Ted Chiang short story 'Exhalation' (Chiang 2019) which deals with similar themes of the mechanics of memory, forgetting, and entropy

5.2 Excesos Extrasensoriales (2022–)

Excesos Extrasensoriales is an ongoing participatory research project in which we apply the theory of digital wastes outlined above to interrogate the biases and selectivities inherent in the view of the world demonstrated by municipal open data archives such as the Madrid Open Data Portal (Ayuntamiento de Madrid, 2022). Tracing the systems of categorisation used in the taxonomy of such data and following Mary Douglas' injunction that such systems of classification also invariably produce an excess, or waste - "matter out of place" (Douglas 1966), our group of participants investigated the erasures implicit in the categorisation of certain people, agencies, things or activities as "others" within this taxonomy, and through this process returned them to visibility - highlighting the speculative, world-making properties of wastes and their use in design.

6. Conclusion

In this paper I have argued that the primacy of *instrumental use* in the field of digital design presents a challenge for the development of a post-human theory and practice of design, as it assumes a modernist, humanist idea of utility as a primary good. Building on the work of Anne-Marie Wilis (2006) and Yuk Hui (2012, 2016) I have outlined the way in which the relational nature of *digital ontologies* require an ongoing relationship of care and maintenance for digital objects which problematises this view, and have further argued that the peculiar status of digital wastes and discards within this ontology, as objects which are no longer used or cared-for, offer a means of interrogating the possibility of relating to digital objects, through design, in ways that go beyond the instrumental.

The argument for a move away from the primacy of *use* and *user-centeredness* seen in a variety of work dealing with the question of design for more-than-human worlds is of particular importance to design for digital media, not just for the historic importance granted to such perspectives in digital design, but also because such perspectives do not account for the materiality of digital infrastructure, its entanglements in the world, and its mutually- dependent ontological relationship with the objects of digital design themselves, a relationship which is deeply dependent on ongoing relatings of care and maintenance. Digital wastes, through the absence of these relatings, offer a promising avenue for further research of these themes, and articulation of an alternative approach to digital design in more-than-human world by two means: Through examining ways in which digital wastes can be employed to call into question the primacy of *instrumental use* in how we conceive of our relationships with the products of digital design, and by illustrating alternative forms of relating to the digital, for example, those that are intimate, sacral, indeterminate or ineffable.

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