# Designing with posthuman kinship. outlining new human-non human collaborative design approaches

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## Abstract

Technology has increasingly become embedded in everyday activities, an extension of the human body, identity, and abilities. Our relationship with technology is becoming more symbiotic, leading us to establish new intimate and affective relationships. Following feminist philosopher Donna Haraway's concept of *making kin* (Haraway, 2016) with human and non-human creatures to 'rebuild' the world, the first part of the paper investigates the development of *kinship* between humans and technological artefacts, and how these relationships can become a key element for a posthuman approach to design, identifying posthuman entities and their network of interactions. Specifically, it reviews literature from Science and Technology Studies (STS), Multi-species ethnography, and Haraway's works. These theories and theoretical models underpin new methodologies and practices in the field of design that are breaking out of the boundaries delineated by the human-centred design (HCD) perspective and are expanding the interest of design beyond humans, addressing the non-human entity as part of a complex network of actors that dialogue, co-evolve, and co-operate in the evolution of the social order and the world.

These transformations are challenging designers to question the centrality of humans (and of designers themselves) in the design methods, structures, and models, as well as focusing on how new artefacts will interact and relate with humans, the environment, and other non-humans. The second part explores the potential contribution of a posthuman-centred design approach in developing human-non-human collaboration with a focus on care environments, considered a frontier. The analysis of two exemplary cases in the evolving context of care practices identify the entanglements with assistive devices, the emergence of the hybrid combination of human-technology in the care settings, their engagement with the environment, and the consequences of this increased permeability of technologies in everyday life. Finally, by mapping the values of a design practice involving non-humans, the paper considers how *posthuman kinship* could be drawn upon to contribute to both design research and development of technological artefacts within healthcare and care practices, stimulating posthuman design-driven forms of social and technological innovation.

## Author keywords

Posthuman Design; Posthuman kinship; Human-technology interaction; Healthcare practice; Assistive technology.

## Introduction

This paper merges sociological theories with design practices influenced by posthuman theories investigating the emerging phenomenon of posthuman kinship (or more-than-human kinship) trying to answer three research questions: Why are posthuman kinships relevant to design? How does design change when we consider posthuman kinship? How can these relational dynamics and capabilities of non-humans be considered when designing future technological artefacts? The paper aims to contribute to developing a collaborative design methodology in which posthuman kinship represents an evolutionary step to be considered in designing technological artefacts and interactions between humans and artefacts.

## Emerging forms of kinship between humans and technological artefacts

Over recent years, an increase in academic interest has been seen in the social interactions between humans and non-humans, particularly in sociological analysis on human attitude towards technological artefacts. Our relationship with technology, now symbiotic and constitutive of everyday life itself is changing, leading to the creation of more 'intimate' relationships on an emotional level. Through advances in robotics, artificial intelligence, and *affective computing* (Picard, 1997), new forms of interactions and relations with technological artefacts are developing. The key element in the discussion of the role of non-human agents in the creation of social relations is *agency*, the socio-culturally mediated "capacity to act in a way that is not entirely attributable to the inputs of one's action." (Volonté, 2017, p. 38).

The capacities that are perceived in non-humans with agency are manifold. Nass revisited social psychology experiments that analysed person-to-person responses in social interaction, replacing two human subjects with a human and a non-human (Nass et al., 1995, 1996, 1999; Nass & Moon, 2000, as cited in Cerulo, 2009). The results show that the communicative capabilities evolution of technological artefacts led to a change in their perception, evoking a sense of intersubjectivity and encouraging a social response (Reeves & Nass, 1996; Nass & Brave, 2005; as cited in Cerulo, 2009). Turkle reported similar results in her studies of the interaction between humans and robots. Experiments between 'smart' robots – capable of recognising their owners, obeying commands, and adapting their personality – and elderly people suffering from dementia led to an improvement in emotional states, reducing anxiety and favouring the feeling of companionship (Turkle et al., 2006; Turkle, 2007; as cited in Cerulo, 2009). Children, on the other hand, perceived robots and related to them as autonomous and almost living beings (Turkle et al., 2005; as cited in Cerulo, 2009), while recognising they were not actually alive.

The above investigations show the human/non-human interaction from the human's perspective, in which people endow objects with social capabilities. Theoretical ideas and empirical studies from HRI (human-robot interaction), on the other hand, focus on the robot capabilities and skills which allow them to be recognized as social actors in interaction. Breazeal maps several attributes of social robots – robots that are able to "conveying intention in a human-perceptible way, and are empowered to resolve goals with fellow agents, be they human or robot" (Daily et al., 2017, p. 217). Moreover, eight classes of robots based on their *social-ability* are identified (See Breazeal, 2002, 2003; Fong et al., 2003). Therefore, technology is co-protagonist and *actant* (Latour, 1992) in the definition of society and in the way people interact and relate with other entities due to its inscribed social characteristics.

The co-evolutionary dimension of technology and society (Figure 1), opens reflections on the posthumanist movement, which stems from the need to redefine the concept of the human, determined by the onto-epistemological, scientific, and biotechnological developments of the twentieth and twenty-first centuries (Ferrando, 2013). Posthumanism can be defined as post-dualism, unhinging the Western exclusivist and binary vision, which places two elements in conflictual opposition, favouring an inclusive and pluralist dimension that integrates the human and the non-human. Haraway (2016) proposes a new posthuman geological epoch, the *Chthulucene*, to overcome the Anthropocene, in which humanity, which considers itself superior to any other form of life or matter, has irreparably compromised its relationship with the world. The main purpose is *making kin*, to create relationships with other creatures to 'rebuild' the Earth. These new forms of kinship, which cross species, environments, biological, and social relationships result in the creation of assemblages of more-than-human entities. Making kin is to be pursued by cultivating *response-ability* (Haraway, 2016, p.28), the ability to care for others, where *care* includes "*everything that we do* to maintain, continue and repair 'our world' so that we can live in it as well as possible. That world includes our bodies, our selves, and our environment, *all of which we seek to interweave in a complex, life-sustaining web*" (Tronto, 1993; as cited in Puig de la Bellacasa, 2017, p.3, emphasis added by Puig de la Bellacasa).

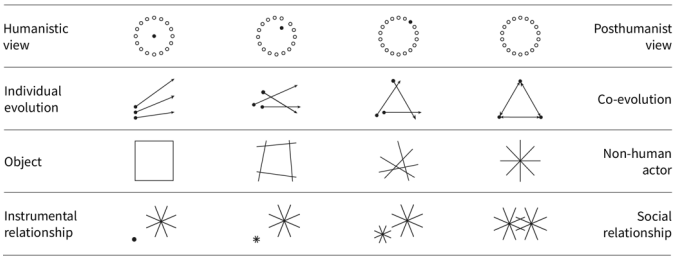


**Figure 1.** The key concepts for shifting from a humanist to a posthumanist perspective.

The new role of care-giver, confidant, and collector of intimate and personal life, previously reserved exclusively for other people, allows technology to replace, build or augment personal bonds with humans, which will be defined, borrowing Haraway's concept, as *posthuman kinship*. Kinship is therefore an exchange, a desire for human and non-human self-revelation; it is care because it is not an exploitative but an affective relationship; it is adoption, because the human has a lack, which can be somehow filled by adopting a technology, creating a bond; it is affiliation, thanks to the technological artefact the human being becomes part of a posthuman network. The emergence of this phenomenon opens up new challenges that can stimulate designers to focus their attention on the evolution of these complex socio-technical systems, transitioning from a human-centric towards a post-human, inclusive and collaborative perspective. The type of relationship and the emotional responses vary according to the context and the characteristics of the technological objects and will become fundamental elements in the design of new artefacts, particularly from an ethical, political, and moral point of view. It will be increasingly important to understand what the consequences will be – intended and unintended – of this increasing permeability of technologies and of the effects of these relationships in everyday life.

## The concept of posthuman kinship and the implications for design

The advent of a posthuman society, based on emerging kinship systems between humans, technologies, and the environment, can stimulate the evolution of design-driven forms of innovation, as it is characterised by the connection of human and non-human design agencies. Posthuman kinship thus becomes a relevant element for posthuman design because it identifies all more-than-human entities and their networks of relationships. Only by considering the plurality of all entities, their language, and relationships, it becomes possible to design for a posthuman world. Design has the operational power to transform tensions in society into innovations and is therefore considered as one of the most suitable tools to facilitate a transition towards a posthuman, inclusive and pluralistic perspective. Posthuman design is capable of connecting and co-operating human and non-human entities in innovation processes. Alongside Human-centred design (HCD), in which the human is at the centre of the design activity, new visions are being developed, expanding the field of interest of design beyond human-centredness. Currently, there is not a codified more-than-human design practice like the HCD standard (ISO 9241-210:2019). This may be because considering the posthuman as integrated and central in design is still an emerging practice, or perhaps because the quantity and heterogeneity of these new entities do not allow

the definition of a single or unified methodology. At the present time, given the emergence of the phenomenon, it is interesting to map and study exemplary cases of projects and design experiences in which a kinship-like evolution of the relationship between human and technology is evidenced and in which themes and issues pertaining to the transformation of participatory and collaborative design approaches and processes in a posthuman perspective are identified. Forlano (2017) traces emergent discussions relevant for the development of a posthuman approach to design crossing from ANT, object-oriented ontology, transhumanism, and multispecies ethnography, and proposes practices that, while not identified explicitly as posthuman design, focus their attention on the interrelations between humans and non-humans.

A posthuman design methodology defined *Xenodesign*, implemented by Johanna Schmeer (2021), proposes transversal engagement approaches for including multi-entity non-human agency in design, merging discursive design methods with speculative realism and ethnographic practices. The combination of traditional ethnographic methods with design practices is also at the foundation of Anne Galloway's *More-than-human design approach* (Galloway, 2013), as well as Elisa Giaccardi's research on things as co-ethnographers (Giaccardi et al., 2016). Ethnographic research, such as environmental observation and participant observation, becomes one of the main tools to investigate, empathise, and learn about non-humans, as well as expressing the point of view of the non-human, both actively and passively. Indeed, also in the field of ethnography, the re-discussion of human exceptionalism has begun, with the need to refound ontology, epistemology, and ethics in a posthuman perspective, also reasoning about the development of new methods to analyse reality with the aim of highlighting how gender inequalities are produced, enacted, and materialised in complex systems (Hamilton & Taylor, 2017; Taylor & Fairchild, 2020).

One example is *Thing Tank* (2016), an IoT research project developed by Giaccardi et al. in which a kettle, a refrigerator, and a mug were connected to autographers (small cameras with sensors), which provided information on the use patterns, the relationships between the three smart objects and other co-inhabitants, and their trajectories and movements in space and time. The concept of co-inhibition is at the heart of the *Mitigation of Shock* project, first presented in 2016, by Superflux. In this installation, set in a London flat in the year 2050, a station for growing food occupies the space previously designated for relaxation. People thus find themselves reflecting on the need to share space and establish relationships with other living species and non-human entities, all co-inhabiting the same flat. A different approach on the relationship between living entities, designers, and technology, is proposed by Neri Oxman. Using computational design, synthetic biology, and digital fabrication, Oxman designs products through the method of *form-finding*, overturning the traditional conception of design in which the material is considered secondary to form. The structures, now organic, are no longer limited by the assembly of parts of 'dead' materials with defined properties, but grow and adapt to their environment, just like living beings. Manufacturing is no longer a method of production, but takes on a generative value (Oxman, 2011).

In the above examples approaches and projects, speculative design occupies a pivotal role, for several reasons. Speculative design is future-oriented and exploration-oriented, and lends itself to designing for the consequences, not necessarily positive or negative, but merely alternative, of scientific, technological, social, and cultural innovations. This discipline, therefore, does not follow human-centred practices based on needs and problem-solving, because its main purpose is *problem-finding*. The creation of scenarios, through storytelling, diegetic prototypes, and other media, allow projects to be placed in an application context that promotes understanding and create a direct link with the environment in which the ethnographic research took place. Ethnographic analysis cannot be carried out in an aseptic environment, and consequently the resulting projects are also deeply integrated. Another element to consider is that even projects dedicated entirely to non-humans presuppose a fundamental human component, given by designers who interact and design for non-human entities. Likewise, non-humans are not only those at the centre of the design interest and to whom the design outcome is addressed, but also have the role of co-participants and co-designers.

## Exemplary cases of posthuman kinship in care practice

Moving from theory to practice, we can observe that the theme of posthuman kinship is present in the experimental projects and in the personal-professional experiences of designers but is not yet consciously focused on at the design level, again. This new intimate dimension becomes particularly relevant in healthcare environments such as nursing, care, therapy, rehabilitation, and *ageing in place* – "the ability to live in one's home and community safely, independently and comfortably, regardless of age, income or skill level" (Kim et al., 2017; in Mois & Beer, 2020). Recent technological, demographic (e.g., ageing population), and social developments, as well as the pandemic, have placed the healthcare sector in a leading position for the innovation, enhancement, and adoption of new technologies (Capone, 2022) – e.g., genomics, nanotechnologies, AI, digital health, robotics, and wearable devices. Moreover, innovations in public health through services of telehealth and remote patient monitoring are leading to combined and personalised data-driven care delivery models – inpatient, community, and home-based care –, with predictive analytics to support wellbeing, prevention, and the overall patient experience. While these are not the exclusive fields in which the relationships unravel, these contexts address aspects and feelings of the human being such as loneliness, illness, boredom, and the strive for affection, consideration, and care. People (or patients) profoundly rely on technologies, and, on the other hand, technological artefacts operate in close relation with the human subject, allowing the redistribution of emotional power between them.

Certainly, one of the most iconic examples is that of care robot PARO, a zoomorphic companion robot developed by Takanori Shibata, who actively engage humans' emotions and encourage patients to carry out interactions with it as they would with other humans, while also having a positive psychological and physiological effect: it improves the relaxation of people with dementia, reducing aggressive behaviour, and mediating the interaction with other patients and with the caregivers. AI controls its behaviour according to touch and sound stimuli; it learns to react to the voices it frequently interacts with; moreover, it shows emotions of surprise, happiness, and anger, and cries when it does not re-

ceive enough attention. But PARO's strength is its innocent and pure appearance, with white fur and large, deeply human eyes, which aim to trigger an emotional reaction of affection and parental instincts. Turkle argues that robots like PARO provide the illusion of a relationship. People who have difficulty sustaining human relationships turn to companion robots, replacing and sometimes denigrating more socially demanding interpersonal connections with simpler, more stable ones (Turkle, 2011). On the other hand, humans are inherently social beings. The emotional relationship between humans and technology is unidirectional, as there is still no technology that can match human emotions. However, the behaviour of technology towards humans is not static, but generates a significant emotional response in humans (See also Breazeal, 2001, Breazeal et al., 2016, Esposito et al., 2016, Feil-Seifer & Matarić, 2011, van Maris et al., 2020; on the interaction between children with autism and robots see e.g., Billard et al., 2007, Dautenhahn & Werry, 2000, Golestan et al., 2017; on elderly and robots, see e.g., Fraune et al., 2022, Lee et al., 2006, Pirni et al., 2021).

PARO and other socially assistive technologies, as well as social robots designed for entertainment (an example is Sony's pet robot Aibo), already have an inscribed social interaction component. They have been developed to assist the human with general or specific needs such as learning, training, rehabilitation, or daily activities either at home or in care facilities, but also to provide intellectual, social, and emotional care (Mois & Beer, 2020). However, the development of a symbiotic and intimate relationship between humans and technologies also occurs with technological artefacts that were not specifically designed to have a social interaction. This is the case of embedded devices, grafted into and onto the body, and mainly used in the medical field for people with impaired bodily functions. These devices have a tangible physicality, and the body is no longer composed only of organic elements, but becomes a virtual body, due to the interaction of both genetic and technological information codes, with the skin as interface. Therefore, pacemakers, cochlear implants, diabetes' insulin pumps and monitoring systems, among others, are also to consider for the development of a new emotional, but also physical relationship with the human, and together, they navigate the environment and interact with other entities (humans or technological) as a configuration human/machine. The grafting leads to a co-evolution of both parts into a new combination, a biological and long-term, or even life-long, interaction, often indispensable for the survival or improved health of the person. But this new reality is not always accepted, especially if related to a chronic illness, and rather than working symbiotically, this system could cause, like any relationship, *friction* (Forlano, 2022).

In *Hacking the Feminist Disabled Body* (2016), through an autoethnographic research – "an autobiographical genre of academic writing that draws on... the lived experience of the author and connects researcher insights to larger social, cultural, and political issues" (Poulos, 2021, p. 4) – Forlano outlines the tensions she encounters daily after *adopting* different medical devices for the management of Type 1 diabetes, highlighting the ways she disobeys them and vice versa, how they negotiate and collaborate, and the small invisible labour, "repairing, maintaining, fixing, adjusting and troubleshooting" (p. 7), they require. Despite the increasing attention on the development and improvement of medical technologies, companies' focus is techno-centric, on the transmission, measurement, and display of accurate data, rather than on the daily experience (Forlano, 2016), which translates in small hacking and medical disobedience acts. Acknowledging the pivotal role of technological devices in participating and negotiating the world, Forlano promotes a shift in the human-centred design perspective towards the "embodied practices and lived experience of everyday routines, habits and rituals through participation in socio-technical systems" (para. 9), considering the human/technology relationship as a hybrid stakeholder.

## Conclusions

The analysis of kinship between humans and non-humans can play an increasingly central role in the design of technological artefacts. Therefore, the first task of the designer is to create awareness and critical consciousness towards this approach, which is already happening, informed by the communicative, interactive, and emotional capabilities of technology. Moreover, the fact that humans super-value the interactive and emotional capabilities of existing technological artefact indicates that future, more sophisticated technologies will be even more emotionally charged. The type of interaction and kinship that is created will vary depending on the capabilities of the non-humans, the condition and feelings of humans, and how humans and non-humans interact. It is important to analyse these elements considering not only the current level of interaction with technology, but also foreseeing possible future developments, in which technology will be increasingly symbiotic and less separable – physically, intellectually, and emotionally – from humans. Furthermore, knowing the new ways of interaction and kinship, not only from a design perspective but also, and above all, from an ethical and moral point of view, offers new insights, design opportunities, and questions that designers are called upon to anticipate and answer. This paper, through the analysis of the abovementioned examples, shows the position of designers who study posthumanism in various ways. Even if there is no explicit reference to the theme of posthuman kinship in their ideas, elements of reflection emerge that can be traced back to the evolution of the relationship with technological artefacts in the following ways:

- the importance, at the design level, of considering both the human perspective on how people interact with technological objects, as well as the sociological study on how these objects actively interact with humans, other entities, and the environment. Questioning existing relationships between designers, end-users, and technologies, leads to the need to redefine the activities of designing relationships of use of technological artefacts, overcoming HCD approaches;
- the importance, at the design level, of analysing and understanding how the interaction between individuals and technological objects occurs and is modified in spatiotemporal contexts. That is, how individuals and technologies act together in a context by modifying, changing, and co-evolving it over time. Posthuman kinship is fluid and changeable, and has its own temporal and spatial development;
- the importance, at the design level, to understand posthuman design as a form of responsible design, which aims to consider the social contexts where

technologies will act and, above all, the values, needs, and requirements of all posthuman entities not in terms of technological solutionism but in generative and collaborative terms;

» the importance, at the design level, to understand posthuman kinship as a way of defining posthuman networks, to which human and non-human entities belong. Technology could build different intimate, personal and daily relationships with each entity it interacts with, unravelling new posthuman familiar structures, in which each member has a role and establishes unique bonds with the others. The theme of 'familiarity' in posthuman kinship can be declined in two ways. First, it refers to the trust established between humans and non-human entities, considering the inherent power dynamics that exist between them. Second, it considers the possible hereditary character and content of this relationship, which evolves and is passed down over time;

» a reflection on the evolution of the concept of inclusiveness in the field of design. In posthuman design, an increased focus on the diversity of the users involved is inevitable. In addition to considering the variation in capabilities, needs, and aspirations of users, inclusive design is confronted with overcoming the diversity (and distinction/separation) between human and non-human entities. Each entity, with its own needs, relationships, modes of interaction, and roles is considered during each design phase;

» finally, the recognition and realisation (by human designers) that posthuman designers are a recognised set of human and non-human entities that activate, research, operate, and participate in design processes. Posthuman design already expresses increasingly intense forms of symbiosis and collaboration between humans and non-humans due to the increasingly common and inseparable ability to deal not only with problem-solving, but with problem-setting and problem-finding. Fostering collaboration is the real challenge between technicians and design technologies, and post-human designers and projects.

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