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DESIGN FOR SUSTAINABLE ENTANGLED HUMAN-NATURE SYSTEMS

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ABSTRACT

Humanity must rapidly transition towards sustainable futures. Reaching planetary sustainability requires care for nature and radical transformation of human-made systems. Human and natural systems co-exist in extensive, complex, multi-layered entanglement. Design for sustainability and, ultimately, all design, will need to be transformed towards design for sustainable entangled human-nature systems. This paper outlines six developments to support this transformation. It suggests that all design projects must (1) be viewed as interlinked to human-nature systems and their sustainability, (2) include natural systems and entities as key stakeholders, and (3) include transdisciplinary perspectives on the entangled systems and sustainability. Moreover, design could adopt the connectedness with nature (CWN) concept from environmental psychology and (4) set high CWN score as competence for designers, and (5) an additional entrance criterion for design schools. Finally, (6) design should redefine its socio-cultural concepts and theory to increase care about and design for sustainable entangled human-nature systems.

1. INTRODUCTION

Recently, sustainability has become a household topic. Focusing on own needs and wants, humans have failed to sufficiently acknowledge and respect the needs of the natural systems. Now, humanity has to rapidly develop genuine care for nature and its survival and, through that, transition towards sustainable futures. Though there is no single, clear vision of sustainable futures (Miller, 2011), some characteristics are clear. Sustainability is a property of the whole system rather than of its elements or sub-systems (Gaziulusoy, 2015). It can only be reached if the sub-systems acknowledge the challenges in the whole system and guide their actions towards solving them (Gaziulusoy, 2015). The strong sustainability concept views that humans and human-made systems are sub-systems embedded within and entangled with natural entities the natural systems (Neumayer, 2003). They are dynamically linked and interacting in numerous ways and on different levels. The notions of care proposed and described by Puig de la Bellacasa (2017) echo this position as they accentuate the interconnectedness of humans and nature and the need to extend care beyond humans. These positions challenge the deeply ingrained, centuries-old views in Western culture of the separation of humans from and domination over nature (Zylstra et al., 2014).

A shift needs to happen in the human systems, e.g., energy systems and societal structures, and human-nature relationships, cultures and mindsets for them to account for the needs of joint human-nature systems (Blythe et al., 2018; Gaziulusoy, 2015). Design, consciously or not, plays a role in shaping and orchestrating this shift. Design is one of the professional activities that shape the society while explicitly focusing on certain aspects, e.g. usability or commercial viability of design outcomes, and disregarding the others, e.g., in many cases, the long-term societal and environmental impact. In the past decades, design for sustainability has emerged to bring forward the need to consider and care for the environmental impact already during the design process. Currently, design for sustainability is an

evolving area of design which works with product, product-service system, spatio-social and socio-technical system innovations towards sustainability (Ceschin & Gaziulusoy, 2016). However, designing for the entangled human-nature systems and their sustainability is not explicitly addressed in design for sustainability.

To reach sustainable futures, design for sustainability and, ultimately, all design could be clarified as design for sustainable entangled human-nature systems. Design projects should take into account the entangled systems and, based on the needs of these systems, transform the human systems to be sustainably embedded in the natural ons. Such activity would go beyond the level of socio-technical innovation towards sustainability (Ceschin & Gaziulusoy, 2016). It would require a diverse, extensive understanding of the complex entanglement of humans and nature and consideration of its elements, interrelations and processes. Currently, designers lack the needed knowledge and know-how to design for these systems. Moreover, design for sustainability is only a part of the design field, yet the pressure of environmental crisis might require all areas of design to design for the sustainability of entangled human-nature systems. Therefore, this paper strives to build an initial understanding, in relation to design practice, of these systems and human perception of thm. It then outlines six potential developments for the current design and design for sustainability to evolve towards design for sustainable entangled human-nature systems.

2. ENTANGLED HUMAN-NATURE SYSTEMS

The human-nature systems are composed of countless, interconnected elements; they are complex, tightly interlinked, dynamic and include varied interactions and feedbacks between the elements (Hull et al., 2015; Ives et al., 2018; Schoon & van der Leeuw, 2015). This entanglement is challenging to understand holistically, and every discipline and individual build their own perception of the entanglement according to their ontological, epistemological and personal views.

At least seven types of entanglement can be identified at four societal levels (Chen, 2017; Ives et al., 2018; Ives et al., 2017; Zylstra et al., 2014). The seven types of human-nature connections are as follows:

- Physiological: human physiological processes depend on elements in nature, e.g., sunlight, oxygen, water;
- Material: all materials originate in nature;
- Experiential: humans physically interact with nature by, e.g., walking in the forest;
- Cognitive: humans build and carry knowledge, beliefs, values and attitudes about nature;
- Emotional: humans feel affect and emotions towards nature;
- Philosophical: humans philosophically conceptualize own relationship with nature;
- Spiritual: humans hold religious or spiritual beliefs about nature.

These connections are arranged from outer – here the physiological - to the inner – here the spiritual. The outer connections are more experienced by the body while the inner ones by the mind. They can overlap and are not mutually exclusive. Thy are also present at four levels within society: individual; community, e.g. a professional community; local society, e.g. residents of Finland; and global society (Ives et al., 2018; Ives et al., 2017; Muhar et al., 2018; Zylstra et al., 2014). Outlining the levels of connection in the natural world lies beyond the scope of this paper.

2.1. MODELS OF UNDERSTANDING ABOUT HUMAN-NATURE SYSTEMS

The seven types and four societal levels outline the arena for existing and potential perspectives on human-nature systems. The arena already includes many frameworks and models, see Binder et al. (2013) for a brief review. Each model represents human-nature connections and entanglement differently because it is rooted in the discipline and reflects its purpose and ontological and epistemological positions; thus, each model is always partial and biased. However, transdisciplinary research, that incorporates knowledge of different academic disciplines and non-academic actors (Hadorn et al., 2008), can provide a more holistic yet nuanced picture of the human-nature entanglement (Chen, 2017; Duile, 2017; Muhar et al., 2018). Such a transdisciplinary view on the entanglement is crucial for advancing sustainability (Miller, 2011; Schoon & van der Leeuw, 2015).

Each individual and collective also view and understand the human-nature entanglement differently. The view is shaped by multi-layered and dynamic lenses of interpretation. An individual's lens is built upon many factors, including but not limited to time; place and purpose of the interpretation; professional training, culture, value system, and understanding of own relationship to nature (Chen, 2017; Ives et al., 2018; Muhar et al., 2018; Raymond et al., 2013). When part of a collective, the individual lenses intertwine with the perspectives of that collective and the social-cultural concepts, social-cultural subsystems and situational factors (Muhar et al., 2018). The social-cultural factors include, e.g., beliefs, values and norms, the visions of nature and environmental worldviews (Muhar et al., 2018). The social-cultural subsystems include, e.g., the economy, technology and governance systems (Muhar et al., 2018). Meanwhile, the situational factors include, e.g., where, when and why a person interprets own relation to nature (Muhar et al., 2018). They also include group culture, norms, peer pressure and social structures of the society (Muhar et al., 2018). Thus, one person can have several lenses of interpretation which they dynamically switch according to a particular role, space or time (Muhar & Böck, 2018).

3. (DIS)CONNECTED WITH NATURE

Nevertheless, environmental and conservation psychologists have developed a concept – connectedness with nature (CWN) – that aims to holistically represent the way a human views nature. "CWN is a stable state of consciousness comprising symbiotic cognitive, affective, and experiential traits that reflect, through consistent attitudes and behaviors (sic.), a sustained awareness of the interrelatedness between one's self and the rest of nature" (Zylstra et al., 2014, p.126). CWN summarizes how a person understands nature, themselves and own role within it: being a master, a steward, an equal part or a servant of nature (Raymond et al., 2013). It also seems to reflect how much a person cares about nature and its needs. CWN is an umbrella concept for similar propositions, e.g. nature relatedness (Nisbet et al., 2009) and connection or connectivity to nature (Tam, 2013; Dutcher et al., 2007). CWN is currently presented as a spectrum, and varied scales and assessment methods aim to asses an individual's CWN (Abson et al., 2017; Zylstra et al., 2014). Low sense of CWN, referred to as disconnect from nature, is viewed as one of the causes of the environmental crisis (Abson et al., 2017; Ives et al., 2018; Zylstra et al., 2014). Meanwhile, higher CWN has been linked to increased pro-environmental behaviour (Ives et al., 2018; Zylstra et al., 2014). Therefore, increasing CWN could assist in transitioning towards more sustainable futures.

Low CWN is prominent in the Western societies which seem to have 'forgotten' the human-nature entanglement (Zylstra et al., 2014). Westerners view themselves as disconnected and independent from nature. The sole concept of nature, which is defined as something opposed to humans and their culture, reflects and engrains this separation (Chen, 2017; Raymond et al., 2018). The concept of human-nature systems and CWN are also rooted in the dichotomy of humans and nature. Nevertheless, they set the scene for a more interconnected understanding of the human-nature relationship and systems.

3.1. RECONNECTING WITH NATURE FOR SUSTAINABILITY

CWN can be increased on the individual, collective and disciplinary levels. On the discipline level, transdisciplinary research approaches and systems thinking are needed (Schoon & van der Leeuw, 2015) to explicate how each discipline links to human-nature systems. On the individual level, CWN can be built in structured ways, for example, via workshops and retreats for experiencing nature, or semi-structured practices, such as festivals, being in nature, gardening (Zylstra et al., 2014). On the collective level, it can be fostered via boosting eco-literacy education or collective engagements in nature and other community activities (Zylstra et al., 2014). For a review of CWN-boosting activities see Zylstra et al. (2014). CWN can be fostered at all of the seven types of connections outlined above. However, building the inner - spiritual, philosophical, emotional, cognitive - CWN is seen as stronger leverage for systemic changes towards sustainability (Abson et al., 2017; Ives et al., 2018). Meanwhile fostering of outer - experiential, material, physiological - CWN can play a supporting role (Ives et al., 2018), because increase of connectedness in one type could foster an increase in other types as well. Further research and validation of CWN concept, measurement scales and increase strategies are needed, both in psychology and in relation to design practice. However, such research lies beyond the scope of this exploratory paper.

4. DISCUSSION

This brief initial review of entangled human-nature systems and how humans understand them can be summarized in three key insights. (1) Human-nature systems are (indisputably) entangled. (2) This entanglement is complex and requires transdisciplinary understanding. (3) Western societies, individuals and disciplines are disconnected from nature, and the shift towards sustainability requires building an understanding of and care for the entangled human-nature systems. These insights suggest further developments for design.

The entanglement of human-nature systems suggests a two-fold development. First, it accentuates that every design project is linked to human-nature systems, and every project either promotes or hinders their sustainability. Of course, evaluation of this is challenging due to the fluid concept of sustainability and debatable impact of a single project on the whole system. Nevertheless, every project – from graphic to digital, to industrial, to service design - should become instances of designing for sustainability of the entangled human-nature systems. Second, human-nature systems and relevant natural sub-systems and entities must be included as stakeholders in each design project. Currently, it is rarely done. The included stakeholders define the problem space and, thus, also the solution (Scupelli, 2015). Having natural systems and entities as stakeholders would make their sustainability-related needs more visible, which would enable more open, transparent negotiations on whether these needs are accounted for. Discussions on more-than-human perspectives and stakeholder representation are emerging, but more research is needed. Design researchers and practitioners, sustainability scientists and other experts must jointly outline which natural entities and sub-systems, e.g. individual animals or ecosystems, through what approaches, e.g. via representation by experts or direct participation, and to what extent, e.g. as sources of inspiration or active co-designers, should be involved in design processes.

As no single discipline can provide a holistic view of the human-nature systems, design must be informed by transdisciplinary models of understanding. These models should be informed by traditional (Western)

research and other, e.g. indigenous or practitioner, sources of knowledge. Designers should become comfortable engaging with varied domains of knowledge and fostering the creation of transdisciplinary knowledge among disciplinary experts and other stakeholders.

The evolving concept of CWN also provides a lens to reshape design. First, design community could focus on fostering CWN of individual designers by setting it as one of the key required competences. Through CWN assessment spectrums, design researchers and educators could assess the current level of CWN among design practitioners, researchers and students. The results, combined with advancing research on CWN, could inform pathways for increasing CWN among designers. Activities that foster CWN, e.g. conscious yet unassuming observations of nature, could become a part of design education. St. Pierre (2017) has explored the application of these activities to design education at Emily Carr University in Canada, but it is challenging to find her and similar perspectives in the mainstream design research literature. Second, research suggests that CWN is extensively developed in childhood (Zylstra et al., 2014). Thus, a high score on a test measuring CWN could become an additional entrance criterion at design schools. Finally, design should reshape foundations of design theory and practice to explicitly consider, value and care for entangled human-nature systems. Social-cultural concepts of design, especially the values, ethics and mindsets underlying the discipline, must be re-established to support discipline's CWN and sustainability of entangled human-nature systems. Such development could happen through including natural entities as stakeholders of each design process or through the definition of good design as design that supports the long-term sustainability of the entangled human-nature systems.

5. CONCLUSIONS

Humanity needs to rapidly transition towards sustainable futures. Reaching sustainability at the planetary level will require a transformation of human-made systems according to the sustainability needs of the entangled human-nature system. This transformation could be supported by increasing the connectedness to nature of the Western societies and their communities of practice. In this context, design theory and practice would need to evolve towards designing for sustainability of the entangled human-nature systems. Six developments could support this evolution:

- Every design project has to be seen as inherently entangled with and impacting the sustainability of human-nature systems;
- Every design process should recognize natural systems and entities as stakeholders and explicate and account for their needs in relation to sustainability and the design process;
- Design processes and discipline overall should be informed by transdisciplinary research on human-nature systems and their sustainability;
- Design education and practice could set connectedness with nature as one of the key competences of a designer and focus on increasing while training them;
- Design schools could set high connectedness with nature score as one of the entrance requirements; and
- Design should shift its theoretical foundations and social-cultural concepts towards care for and connectedness with nature and design for sustainable entangled human-nature systems.

These six developments would support the transition of design to satisfy the urgent and growing need of caring for the world and design for sustainability transitions.

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