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Critical Reflection 1 - Our Symbiotic Life

Since the term and concept were first coined a decade-and-a-half ago, design fiction has served a role as a valuable tool for exploring technologies and their possible uses in the near-future just beyond the abilities to create functional prototypes.[1] Indeed, some scholars have gone so far as to identify that the greatest strength of design fiction is in its ability to act disruptively to conventional ways of thought[2] and to allow designers to explore the granular implications of a technology[3], long before any physical device is deployed or even available. In this way, one might situate design fiction primarily as a tool to reflect on what is unknown or unforeseen with a given technological design space.[4]

It is with these principles in mind that it might be worth interrogating whether or not the work outlined by Budinger and Heidmann[5] on futuristic co-existence with plants might fall short of exploring truly unconsidered outcomes. Building upon an earlier surveys of possible environmental future scenarios[6], Budinger and Heidmann seek to envision possible ways humans might adapt to global climate futures alongside the flora of their immediate environment. They do this by drawing upon four future scenarios based upon the intersection of high- and low- challenges to adaptation to climate change and high- and- low- challenges to mitigation of climate change. For each of these scenarios, they created design fictions accompanied by various levels of "mock-up" prototype to help illustrate their concepts and elicit greater participant engagement with the narrative. From these fictions, they then endeavoured to explore dynamics and relationships between humans and plants in each case.

However, there are clear indications of a possible methodological flaw in their research, namely that in constructing their design fictions, they centred the tone of their fiction on preconceived value judgements about the underlying socio-economic and political scenario borrowed from previous researchers. In the scenario where the future is filled with sustainable technological solutions and global cooperation, their fiction is naturally one about positive tech integration and mobile communal gardens, while the future inhabited by isolationism, nationalism, and rapid climate change presents a future of collapsing agriculture and hostile weeds. Indeed, even in the "Highway" future characterized by consumerism and economic progress, in comparing their fiction to the work of Carole Collet they conclude, "[a]lthough a sustainable solution for food and material supply is presented, plants are exploited as production factories and genetic material is edited extensively."[7] These imagined futures of human-plant coexistence are wholly uncontroversial given their associated broader social context, and perhaps even likely or expected, but in that case, do any of them provide new knowledge?

In each of the above scenarios, the researchers overfit their design fiction to the future their fictions are designed to inhabit. In a future of social harmony, they imagine a harmonious relation

between humans and plants, whereas in divided futures, plants are construed as hostile. In none of these scenarios do the researchers aim to "disrupt" the conventional narrative of the socio-economic futures through their design fictions, and as a result, they seemingly fail to add any greater depth to the discussion that wasn't inherent to the initial scenario itself.

Only in their final scenario, "the bottle garden," do Budinger and Heidmann break somewhat from the strict premise of the context borrowed from their predecessors. In this case, they take a proposed future where society is highly stratified, beset by climate challenges that only those with wealth are able to overcome, and rather than model their human-plant relationship after this stratification, they introduce co-adaptation and resilience. In the face of this stratification, disadvantaged communities rely on bioelectric algae to afford them access to electronics and digital media, while the algae in turn benefits from human cultivation. This design fiction imagines a countercurrent within the prevailing narrative of the scenario, and so is able to provide a far more nuanced account. Rather than a wholly optimistic or pessimistic outlook, this scenario offers complex relationships not only between humans and plants as they rely on each other, but is also able to contemplate how humans might interact with each other surrounding these plants (i.e.: stratified control of algae agriculture).

In summary, the strength of design fiction comes from its ability to challenge existing assumptions about technology and society, and provoke discussion about the role technology plays. By overfitting an imagined technological application to the dominant dynamic of an imagine future, we learn little about the intricacies of the system. It is only be disrupting the assumptions of the system that the granular questions of interest fall out. How might vandalism play a role in a future of communal gardens? How might isolationism positively influence the management of invasive species? Can any sort of sustainable future co-exist with consumerism and capitalism more broadly? These are question Budinger and Heidmann seemingly fail to engage with entirely because their design fictions follow their dominant premise too closely, leaving us with little to reflect on after we are done reading their paper. Only when they establish a design fiction at odds with the dominant theme (the bottle garden) are fruitful avenues opened up for further exploration.

Notes

1. Mark Blythe, “Research through design fiction: Narrative in real and imaginary abstracts,” *CHI ’14* (April-May 2014), DOI: http://dx.doi.org/10.1145/2556288.2557098.

2. Bruce Sterling, “Fantasy prototypes and real disruption,” (closing keynote, NEXT13 Conference, April 2013) NEXT Conference, YouTube, https://youtu.be/M7KErICTSHU.

3. Julian Bleecker, “Designing Futures, Designing Fiction: How to imagine the future,” (seminar, Stanford Seminars, November 2017) standfordonline, https://youtu.be/iH8X6Bcs7w8.

4. David Adam, “Science and Culture: ‘Design Fiction’ skirts reality to provoke discussion and debate,” *PNAS* 117, no. 24 (June 2020): 13179-13181, DOI: 10.1073/pnas.2008206117.

5. Katja Budinger and Frank Heidmann, “Our Symbiotic Life: An Exploration of Interspecies Relations,” *DIS ’19* (June 2019): 1349-1362.

6. Brian C. O’Neill, Elmar Kriegler, Kristie L. Ebi, Eric Kemp-Benedict, Keywan Riahi, Dale S. Rothman, Bas J. van Ruijven, Detlef P. van Vuuren, Joern Birkmann, Kasper Kok, Marc Levy, and William Solecki, “The roads ahead: Narratives for shared socio-economic pathways describing world futures in the 21st century,” *Global Environ. Change* (2015), DOI: http://dx.doi.org/10.1016/j.gloenvcha.2015.01.004.

7. Budinger and Heidmann, “Our Symbiotic Life,” 1356.

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Critical Reflection 2 - Exploring the Design Space of InterActive Urban Environments

In *Exploring the Design Space of InterActive Urban Environments*[1], van Renswouw et al. endeavour to explore a variety of avenues for integrating technology into urban spaces to promote physical activity. They do so by first taking a benchmark survey of existing installations combining interactive technology with public spaces, and then proceed to ideate a variety of concepts within several broad classes of intervention, from which they elaborate four detailed case studies. Central to this exploration is the premise that the, "[d]esign of 'activating' urban environments can be an effective trigger to subconsciously nudge people into moving,"[2] however it bears more closely examining this assumption, while simultaneously considering if technology is the most efficient and sustainable means of effecting such "activating" environments.

Adjacent to this examination of technological urban environments, research on more traditional playgrounds offers useful insight into the ability of engaging environment to motivate moderate-to-vigorous physical activity (MVPA). In a survey of U.S. neighbourhood parks, Cohen et al. found that the number and kind and playground features, and by extension affordance the playground offered, co-varied significantly with both time spent at the park as well as the amount of said engaged in MVPA across age demographics[3]. The findings that total number of features correlated positively with attendance and depth of engagement is certainly suggestive that variety and novelty are strong motivators of physical activity, but this is further underscored by the finding that the features most strongly associated with attendance and MVPA were spinning equipment, and splash pads[4]— types of activity not typically available in one's own home. This principle has long been known in the domain of theme parks, that "[an experience] must overwhelm, play to more senses, and provide a real physical experience that can't be replicated in the living room,"[5] but a similar study comparing U.K. and U.S. parks found that features as simple as climbing equipment being shaped like a ship[6] were sufficiently novel to promote higher use and engagement, even long after the playground had opened[7]. Though van Renswouw et al. express concern that technological novelty might rapidly wear off[8], it would seem this is only a risk if the tech integration focuses too strongly on a single modality of interaction, which unfortunately many of their proposed design sketches do.

At the same time, if novelties as low-tech as "being shaped like a ship" are sufficient to drive higher physical engagement, as Talarowski et al found, it could easily be asked if tech integration is even an appropriate approach to user engagement in physical activity. For example, are such methods sustainable from both a maintenance and environmental standpoint? Again, borrowing from theme parks, it's a common theme to reflect upon the fact that maintenance crews are not often as technologically adept

as the initial designers, necessitating high-tech systems either be limited in the duration of their lifespan, or else designed with a certain amount of self-maintenance or automated calibration[9].

As for the questions of environmental sustainability, a very recent survey of global trends in waste electrical and electronic equipment (WEEE) found WEEE was actually increasing as a result of the current rapid development of new generations of electronic devices, growing ubiquity, and challenges to efficient recycling of such materials[10]. Against this background of increased waste material, driving mineral extraction due to sub-standard recycling practices, and increased plastic, metal, and chemical pollutants, it seems unlikely that a highly tech-integrated urban experience can achieve even a neutral environmental impact without an extended lifespan and careful consideration of end-of-life materials management.

For these myriad reasons, it should be clear that the question of using technologically interactive urban environments to promote greater physical activity among the public is a much murkier question than simply if such technologies can elicit the desired behaviour. Though research from playgrounds and theme parks indicates interactivity can promote higher engagement, this seems to be more due to a diversity and novelty of experiences rather than any particular degree of technology involved, while issues of maintenance and environmental sustainability call into question the viability of any proposal unable to offset its technological footprint with a robust and extended lifespan. Though the paper offers a useful preliminary exploration of types of interventions and possible affordance, further study is undoubtedly merited to determine in what ways these modalities might be integrated into richer, longer-lasting experiences, while also addressing questions of sustainability. Moreover, it might be of even greater value to explore which traditional features of public active spaces can be augmented with minimal technological enhancement, generating new and engaging experiences for the public with a reduced electronic footprint.

Notes

1. Loes van Renswouw, Steven Vos, Pieter van Wesemael, and Carine Lallemand, "Exploring the Design Space of InterActive Urban Environments: triggering physical activity through embedded technology," *DIS '21* (June 28-July 2, 2021): 955-969, DOI: https://doi.org/10.1145/3461778.3462137.

2. Ibid, 956.

3. Deborah A. Cohen, Bing Han, Stephanie Williamson, Catherine Nagel, Thomas L. McKenzie, Kelly R. Evenson, and Peter Harnik, "Playground features and physical activity in U.S. neighborhood parks," *Preventive Medicine* 131 (2020), DOI: https://doi.org/10.1016/j.ypmed.2019.105945.

4. Ibid, 5.

5. Jesse Schell and Joe Shochet, "Designing Interactive Theme Park Rides," *IEEE Computer Graphics and Applications* 21, no. 4 (2001): 13, DOI: https://doi.org/10.1109/38.933519.

6. M. Talarowski, D.A. Cohen, S. Williamson, and B. Han, "Innovative playgrounds: use, physical activity, and implications for health," *Public Health* 174 (2019): 105, DOI: https://doi.org/10.1016/j.puhe.2019.06.002.

7. Ibid, 107.

8. van Renswouw et al., 958.

9. Mark Mine, David Rose, Bei Yang, Jeroen van Baar, and Anselm Grundhöfer, "Projection-Based Augmented Reality in Disney Theme Parks," *Computer* 45, no. 7 (July 2012): 35, DOI: https://doi.org/10.1109/MC.2012.154.

10. Olanrewaju S. Shittu, Ian D. Williams, and Peter J. Shaw, "Global E-waste management: Can WEEE make a difference? A review of e-waste trends, legislation, contemporary issues and future challenges," *Waste Management* 120 (2021): 556, DOI: https://doi.org/10.1016/j.wasman.2020.10.016.