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Published in:

Proceedings of the 3rd Conference on Conversational User Interfaces, CUI 2021

DOI:

[10.1145/3469595.3469602](https://doi.org/10.1145/3469595.3469602)

Publication date:

2021

Document Version

Peer reviewed version

[Link to publication in Discovery Research Portal](#)

Citation for published version (APA):

Rough, D. (2021). Conservation through Conversation - A Provocation. In *Proceedings of the 3rd Conference on Conversational User Interfaces, CUI 2021* (pp. 1-3). Article 7 (ACM International Conference Proceeding Series). Association for Computing Machinery (ACM). <https://doi.org/10.1145/3469595.3469602>

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Conservation Through Conversation - A Provocation

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ABSTRACT

The world is in the midst of an ecological crisis. Biodiversity is plummeting, the ice caps are melting, rainforest wildlife is being slaughtered wholesale for palm oil plantations, and we're consuming far too much of the planet's resources. The volume of carbon dioxide being pumped into the atmosphere, warming our planet, and destroying the environment, is unsustainable. CUI research won't matter if humanity itself can't provide its side of the conversation. This is everyone's problem, and everyone can be part of the solution, whether it's eating less meat or not binning our recyclables. Can we, as CUI researchers, do anything more specific? I think we can, and should, be making the conversation about conservation.

CCS CONCEPTS

• **Computing methodologies** → **Discourse, dialogue and pragmatics**; • **Human-centered computing** → **Natural language interfaces**; • **Applied computing** → *Environmental sciences*.

KEYWORDS

conversational user interfaces, voice user interfaces, ecology, environmental science, behaviour change

ACM Reference Format:

Daniel Rough. 2021. Conservation Through Conversation - A Provocation. In *CUI 2021 - 3rd Conference on Conversational User Interfaces (CUI '21)*, July 27–29, 2021, Bilbao (online), AA, Spain. ACM, New York, NY, USA, 3 pages. <https://doi.org/10.1145/3469595.3469602>

1 INTRODUCTION

Do you sometimes feel like your research doesn't matter? Well, I do, although not always my research specifically, but really a lot of what we as a research community are doing in general. I'm not trying to be rude, or nihilistic; I'm thinking about the bigger picture of planet Earth, of the sustainability crisis we're facing, and of the impending irreparable destruction of life as we know it if we don't make radical changes. Will your research matter when the planet is overheating, causing a loss of land that can be inhabited or cultivated, giving rise to a global food shortage, major conflicts and famine?

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CUI '21, July 27–29, 2021, Bilbao (online), AA, Spain

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ACM ISBN 978-1-4503-8998-3/21/07...\$15.00
<https://doi.org/10.1145/3469595.3469602>

Doom and gloom is likely not what you signed up for and I'm sorry, but while the frontiers of CUI capabilities are pushed forwards, research prospects are bright and future directions are burgeoning, I want to provoke the idea that none of it matters if humanity isn't around to reap the long-term benefits. I'm neither an ecologist, nor an environmental scientist, nor a climatologist, an oceanographer, a zoologist, or anyone with qualifications to assert what you and I need to do to stop this impending disaster. These voices exist, however, and we all need to be heeding their warnings.

2 WHAT DOES THIS HAVE TO DO WITH CUI?

It has everything and more to do with us, for there is a place for us CUI researchers in this mishmash of smaller problems that have united together into this Very Big Problem. We can't solve all the smaller problems. In fact, we're only really good for solving one of the smaller problems, and maybe having a tiny bit of influence in the others.

If you have read this far, I have undoubtedly failed to motivate you, but there is some positivity in all this. We, the CUI community, have a burgeoning, state-of-the-art knowledge of artificial intelligence, cognitive and social psychology, human-computer interaction, speech technology, and a breadth and depth of domain-specific knowledge. These technologies are going to play a key role in our future and, as I will try to persuade you of in this paper, can assist in the extension of humanity's future beyond that which we are destined to terminate with our current global practices.

3 HAS ANYONE ELSE LOOKED AT THIS?

Unsurprisingly, there are a large number of large conferences dedicated to tackling all the planetary problems I've mentioned and more. We have thousands of experts researching and publishing in ecology, zoology, meteorology, oceanography, climatology, and other significant components of this crisis. AI has promising overlap with such fields, made abundantly clear in collections such as "*Artificial Intelligence in Conservation*" [2]. Yigitcanlar et al. provide an informed perspective on smart cities for protecting residents from natural disasters, and preventing them as far as possible through sustainable practices [14]. Huntingford et al. discuss in detail the use of machine learning methods for increasing knowledge and understanding of climate systems [8].

HCI, while less prevalent, also has applications to conservation and sustainability. Caraban et al. review technology-mediated 'nudges', including many examples of those towards sustainable behaviours [5]. Similarly, Ferris et al. demonstrate a virtual reality dystopian future of a flooded Melbourne impacted by climate change, with the aim of making climate change threats more concrete and prompting sustainable behaviours [6]. More positively,

Gulliksen describes the significant role HCI and user-centred design practices have played, and must continue to play, in healthcare technologies in developing nations [7].

In short, AI and HCI have a clear role to play across the spectrum of conservation and sustainability research. As something of a child of these two big fields, I think CUI research should start pulling its growing weight, too.

4 WHAT DO WE DO THEN?

I don't have a roadmap or some sort of recipe that elaborates on how we should imbue our conversational user interfaces with the capacity to express suggestions for reducing the severity of this situation that the planet, and consequently you and I, are in. Indeed, as the reviewers of this paper kindly pointed out, I don't seem to have much idea what I'm trying to say at all. But here we are, so let us look at some of the domains that we can potentially influence and problems we can potentially solve, with an aim to stimulate some better ideas.

4.1 The power of a voice

Now I am not suggesting for a minute that we all have some sort of holier-than-thou voice assistant that screams at us for bringing a steak pie into the house or overfilling our kettles. That said, a voice is powerful. It was the compelling narration "A Life on Our Planet" by Sir David Attenborough [4] that provided the impetus to write this paper. While this was an N-of-1 case study, with myself as the N, it nevertheless makes clear that the voice of a respected authority explaining, in sincerely grave tones, the perils facing our planet, was enough for the participant to decide to write this in the hope that maybe the CUI community can make something of this scattered commentary.

The auditory modality of a conversational user interface is not just for convenience or accessibility (although the latter is especially important). It is a channel that is inherently anthropomorphic [11], and carries with it, through paralinguistic cues, the persuasive elements of a human oration that simply cannot be represented on a page or screen [13]. Therefore, it carries a greater potential power to persuade than, say, an activist's blog post, a conservation organisation's formal report, or indeed, this paper. So, why not use our CUIs as persuaders to engage in the individual, relatively small actions that can amount to a local, national, international, and eventually global change? Recent work has shown that, under certain conditions, conversational user interfaces can be effective persuasive agents [10]. Precisely what these conditions are, and how they can be altruistically exploited, remains work for the future - work that I think we could, and should, be doing.

4.2 The Aging Population

There are only so many people we can sustain on the planet at any one time. This is known as the 'carrying capacity' of a species [3]. We are approaching 'peak human', which for all intents and purposes is good, but it does present a problem - we have an aging population and a lack of a younger population to support them. Developed countries with a low birth rate and low death rate, particularly Japan, have had to consider encouraging more babies to

provide an adequately sized working population, or require the retired population to go back to work [15].

In this case, I'm not suggesting that CUI research could tackle the climate crisis directly, but instead could support the people of nations that are going through this necessary stage of population development to mitigate said crisis. Despite fears that robots will come and take our jobs, that might indeed be a solution [1]. A larger workforce will be necessary to sustain the quality of life of the growing aged population, so jobs will not be lost to AI - people could work in harmony with embodied intelligent agents as colleagues [12]. Of course, working in harmony requires collegiality, and improving relationships between humans and AI will be a step towards seeing a robotic workforce as aiding, not invading.

4.3 Alexa, save energy!

I'm not a fan of the "Alexa, (research problem)" title format, but imagine if it were that simple? A single command that would reduce our energy usage and therefore, of interest to the majority of consumers, reduce our electricity bills? Of course, this has to come with conditions such that we can maintain the comfort of our household members as a high priority. Our systems would need to learn our preferences and routines, but also understand when these are disrupted or changed for whatever reason. As a personal example, I am a late sleeper, so it might be fine to run the noisy washing machine at midnight during off-peak electricity hours, but what if I'm having an earlier night? Should the washing machine run or not? Maybe a clever conversational user interface could recognise this change in routine and ask me in case I've forgotten - making a smart decision, but keeping me in control. As I'm heading out the door, I could shout to Alexa that I won't be home that evening. It might ask when I'll be back, and adjust the heating schedule accordingly. Would I want that? Probably not, but a smart home that has a dialogue for discussing energy-saving routines could be far more convenient than fiddling with a GUI-based manual adjustment of preferences, and far less dystopian than a fully autonomous house that takes too many liberties.

Smart homes are maturing beyond the Jetsonian vision, connecting to smart grids, which are part of a growing smart city infrastructure that are key to reducing emissions and contributing to a healthier environment. While the cost of smart home tech is surely still the limiting factor of adoption, the cession of control also sits uncomfortably with homeowners. We shouldn't see energy saving as a purely technical optimisation problem, but as a part of the social system within a home [9], and encouraging "conversational" adaptivity could be one way of making smart home technology seem less alien.

5 CONCLUSION

This has been written quite informally - to keep in the spirit of a provocation paper, to emphasise that I am not qualified to provide answers, and to make it that bit more personal; I admit there are no novel ideas or especially strong arguments here. Instead, I would like us to consider where our planet is headed, and what we can do in the effort to steer it on the right track. Proposing that we should all work towards a sustainable, healthy planet for future generations is not, I hope, all that provocative.

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