

Futuristic Senses: Approaching HCI Students' Perceptions of the Future of the Senses Beyond Science-Fiction

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Discussions about the intersection of science fiction and future design have become integral to Human-Computer Interaction (HCI). However, multisensory research is rarely part of this discussion, although food and taste often appear as narrative elements in science fiction, e.g., in the film *Soylent Green*. Therefore, we surveyed HCI Masters students (n=48) who attended a seminar on science fiction to investigate how they think 1) food and 2) the senses will change in the future. This small study attempts to explore HCI students' expectations about the future of the senses. We clustered and coded the responses and found that their expectations for the future of the senses were vaguer than their expectations for the future of food. For example, 12 people do not expect the future of the senses to change. We draw implications for HCI programs and research. We argue that teaching gustatory interfaces, multi-sensory research, and science fiction-related research should be more integrated into HCI programs.

CCS Concepts: • **Human-centered computing** → **HCI theory, concepts and models**.

Additional Key Words and Phrases: Science-Fiction, Gustatory Interfaces, Multi-Sensory Research, HCI education

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1 INTRODUCTION

In recent years it has become increasingly evident that Human-Computer Interaction (HCI) and Science-Fiction (SF) are mutually influential and cannot be seen as separate [6, 12, 15]. Science fiction literature influences the HCI community, including designers, and they, in turn, influence science fiction creators [14]. A well-known example is the *communicator* from *Star Trek*, which showed the desire to see each other visually while talking across distance. Food and multisensory technologies are often part of science fiction, such as in the stories of *Soylent Green* or *The Platform*. However, it is surprising that food and multi-sensory interfaces are rarely part of the intersectional discourse of HCI and SF. While SF-inspired research, namely design fiction and speculative design, is a common approach in HCI, it is less common in gustatory interfaces- or multi-sensory research. We wanted to determine if this lack of representation in research reflects HCI students' perceptions and expectations of the topic. We see great potential in bringing ideas of technological development to the public through science fiction narratives, where they are critically reflected and questioned.

As food narratives are more popular in SF than sensory representations, we wanted to identify differences in students' expectations for the future of the two. Therefore, our research question is *How do HCI students expect*

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the future of food and the senses to be? Therefore, we conducted a questionnaire in which we asked the students (n=48) to tell us *How do you think food will change in the future?* and *Do you think our sensory perception (taste, smell, etc.) will change in the future due to technology? If so, how?* We then clustered the responses and found that they had very concrete ideas about the future of food but were rather clueless about the future of the senses. For the future of food, students expected to see a shift in meat consumption, such as lab meat. They mostly did not expect such changes for the future of the senses. We interpret this as the research field of smell and taste interfaces being relatively unknown citeObrist.2014, Ranasinghe.2011. Furthermore, they were more specific about technological developments in food design, such as 3D printed food, than about the senses, as they mainly imagined the augmentation of the senses. In conclusion, we suggest that multi-sensory interfaces and their future should be integrated into HCI programs. Science fiction-related methods such as design fiction should be used in teaching.

2 STATE OF THE ART

Especially with the adaptation of the design fiction method in HCI, exploring science fiction has become popular, as Marcus [15] shows. "Sci-fi movies and videos can serve as interesting, valuable material on which to run heuristic evaluations of the designs, to study future personas and use scenarios, and to inform designers of possible future technological, social, or cultural contexts"[15]. Furthermore, Lorenčik et al. [14] elaborated on science fiction and its influence on AI and vice versa as a co-development of artists and researchers inspiring each other. In addition, Jordan et al. [10] highlight the importance of adapting science fiction for HCI education. This is emphasized by Marcus [15], who sees sci-fi makers as the first user-centered designers of HCI and sci-fi media as "test beds" for future designs. Consumers are also being "softened up" for what they might expect in the coming years, which can be a chance to discover users' wants and needs [15]. Russell also emphasizes that science fiction is not about a single future but many possible futures. [20] Meanwhile, there is a growing body of research in the HCI community on the future of human-food interaction (HFI), such as playful interaction [22], 3D printing, [8, 11], and personified food [23]. Furthermore, Altarriba Bertran et al. [1] demonstrate the link between food, taste, and socio-cultural circumstances. However, speculative design or design fiction approaches are not as widespread within the branch, although science fiction shows a wide range of human-food interactions, such as augmented or printed food (*Star Trek*). Food functions as a narrative driver, reflecting social distinctions (*The Platform*, *Snow Piercer*, *Soylent Green*) or even determining the fate of the entire Earth due to climate change (*Interstellar*). Furthermore, food in sci-fi often indicates how far the altered world is from the present [19]. While there is a lot of popular literature analyzing food in science fiction [7], it seems to be an under-researched topic in academia. Perhaps it is so universal that it seems "banal" [24]. Nevertheless, we found interesting speculative approaches to Human-Food Interaction ([3, 5, 9]), while they were rare for taste interface research. While HFI research was expanding, research on smell, taste, and temperature interfaces was also developing. This branch explores, for example, the simulation of the senses by taste interfaces [17, 18] or the stimulation by multisensory characteristics, for example, the effect of music on taste [21]. In particular, "thinking with, designing for, and interacting through taste" [4] is challenging. However, such interfaces are rarely depicted in science fiction compared to human food technologies. This may also affect the knowledge of such research among the general population and HCI students. Therefore, we want to explore how HCI students expect the future of food on the one hand and the future of senses on the other hand and derive implications for future research directions and possible requirements for HCI teaching.

3 METHOD

We sent the questionnaire to 51 HCI Master students (female=26, male=24, prefer not to say=1) who had registered for a science fiction-related seminar. We received 51 responses to the demographic question but only 48 to the

future of food question and 47 to the question on the future of the senses. We decided to use this sample to explore the knowledge of HCI students interested in science fiction. The international HCI Masters students originate from Bangladesh, Costa Rica, Germany, Iran, India, Lebanon, Mexico, and Pakistan. They came from a variety of educational and professional backgrounds. All students had at least a Bachelor's degree. Their age ranged from 18 to 44 years. Participants were not graded or received any incentives for their participation. The questionnaire was anonymous. In addition to demographics, we asked them 1) *How do you think food will change in the future?* and 2) *Do you think our sensory perception (taste, smell, etc.) will change in the future due to technology? If so, how?* After receiving the responses to the questionnaire, we clustered them into main categories according to Mayring's content analysis [16].

4 FINDINGS

We found that many answers fit into more than one category. Therefore, we assigned more than 48 (sub)categories. We also eliminated three responses that were unclear in their meaning. We clustered twelve main categories for **food**:

- **General statements** (Yes [1]; No [3]; Don't know [1])
- **Artificial connotation** (Artificial laboratory food [11]; Printed food [5]; Genetically manipulated [3])
- **Health** (More nutrients [3]; Healthier [6]; Optimised [2]; Personalised [3])
- **Meat and animal products** (e.g., "Eat less meat" [9])
- **Sustainability** (e.g., "more sustainable options" [6])
- **Accessibility** (e.g., "more accessible" [2])
- **Taste** (e.g., "technologically advanced taste" [2])
- **Growing Food** (e.g., "optimized harvesting processes" [2])
- **Processing/Cooking** (e.g., "easier cooking process" [9])
- **Locality** (e.g., "more local food" [2])
- **Food culture** (e.g., "cross-cultural food" [2])
- **Additional technologies** (e.g., "sensors on everything" [3])

For the question about the change of **senses**, we developed eight main categories:

- **General statement** (Yes [3]; No [12]; Don't know [6])
- **Enhancement** (e.g., AR technologies [6])
- **Brain interface** (e.g., "electrical signals to the brain" [2])
- **Embedded in other technology** (e.g., smart home [1])
- **Natural alteration of senses** (e.g., "bad eyesight due to increased screen time" [3])
- **Improvement** (e.g., "AI maximizes senses" [6])
- **Unpredictable** (e.g., "Who knows?" [3])
- **Questioning reality** (e.g. "questioning *what is real?*" [2])

5 DISCUSSION

We see that the students had more concrete and varied visions of the future of food than of the senses. Their answers to the first question were manifold. For the senses, the answers were less concrete and more speculative.

The answers to the food question were mainly about artificial and animal food, such as lab meat. Only one person considered insect-based food, although this is a trend we are seeing in the present, while 3D printed food was considered quite often by students. This may indicate that the influence of technology is more prominent than actual changes in food. Furthermore, only two responses in the 'food question' considered taste, stating: "Food will change because due to technological advances taste and preferences will change over time" and "It will hopefully be very tasty, but at the same time optimized to be healthy (healthy chocolate, pizza, etc.)." Notably,

this response was given about the future of food, but no such responses were found concerning the question about the senses. From this, it seems that the food context allows for different answers than the senses. On the contrary, one person also mentions the enhancement of food when answering the question about the senses.

In response to the second question about changes to the senses, they gave general answers rather than a detailed and complex description of what would change. Other than 'it won't change,' the main response was enhancing natural senses and augmentation. The change in the senses was often perceived as inherent, e.g., sitting too long in front of a screen causing a vision change. They also considered changing the senses through external technology, such as augmenting things or manipulating them, for example, through brain-computer interfaces. We found less about the stimulation of existing senses and more about their manipulation through optical augmentation.

Returning to our original argument, where we examined science fiction as a potential influence on the perception of young designers, we see our exploratory study as supporting this thesis. For example, the perception of lab meat is also depicted in Margaret Atwood's *MaddAddam* trilogy [2]. We could also observe that the issues of social distinction (such as the accessibility of food) were only related to the future of food, while this was not considered for the senses.

However, we see a need to teach students the importance of, for example, gustatory interfaces in the context of mixed reality technologies and their social implications. This could also serve to understand and overcome the *Collingridge dilemma*, which describes the double bind of predicting the societal impact of a technology that is not yet widespread and may turn out to be too speculative [13]. Discussions about the representation of food and the senses in science fiction also offer a great opportunity to learn about perceptions of the future.

To expand on these findings, we would like to encourage further in-depth interviews with HCI students and promote actual design fiction workshops as a method in the classroom. Although this small study was rather a first attempt to gain insights, we conclude that there is a need to support knowledge about multi-sensory technologies in HCI education. Furthermore, we position ourselves to include science fiction discourse to discuss probable futures of food and design processes, e.g. through design fiction, which provides a good surface for interdisciplinary discussions.

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