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Comber, Rob, [Choi, Jaz Hee-jeong](#), Hoonhout, Jettie, & O'Hara, Kenton (2014)
Designing for human–food interaction : an introduction to the special issue on 'food and interaction design'.
International Journal of Human-Computer Studies, 72(2), pp. 181-184.

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<http://doi.org/10.1016/j.ijhcs.2013.09.001>

Title: Designing for Human-Food Interaction: an introduction to the special issue on 'Food and Interaction Design'

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While food has appeared in Human Computer Interaction (HCI) research to some extent from the turn to everyday activities, in its own right HCI research on food, or 'Human-Food Interaction' (HFI), has emerged as an area of significant interest in the HCI community in the last few years (see for example Choi, et al. 2012, Comber et al. 2012). In these few years, 'food' and what is loosely referred to as 'food practices' – for example, shopping, eating, cooking, growing, and disposal – have grown out of the periphery of HCI research to become a central topic of interest in and of themselves. To date, research endeavours have cut across HCI, where there are significant technical and computational challenges in fields such as vision (Martin, et al. 2013, 2009, Mankoff, et al. 2002, Narumi et al., 2012; Kitamura, 2009), ubiquitous computing (Chi, 2008, Gao, Costanza, and schraefel, 2012, Hooper, et al. 2012, Kalnikaite, 2011, Kranz, 2007, Päßler, 2011), 3D fabrication (Wei, 2011b), human-computation (Linehan, et al. 2010, Noronha, et al. 2011), and physiological computing (Ranasinghe, et al. 2011, Narumi, et al. 2011). Such a growing body of work has also been co-evolving with interests in understanding food practices as a socio-cultural artefact: food plays a central role in our health (Comber, et al. 2013, Parker et al. 2013, Orji et al. 2013), well being (Grimes and Harper, 2008), social lives (Barden, et al. 2012, Hupfeld and Rodden, 2012, O'Hara et al. 2012, Wei 2011a, 2011b), and in environmental sustainability (Choi and Blevis, 2011, DiSalvo et al., 2010, Clear et al., 2013) in the production (Lyle et al., 2013, Odom, 2010), transportation and distribution (Ilic, et al. 2009), consumption (Clear, 2013), and waste of food (Farr-wharton et al., 2012, Ganglbauer, et al. 2013, Thieme, et al. 2012, Comber, et al. 2013). HCI research on human-food interaction is now leading research and development in other related fields such as psychology (*cf.* Spence and Piqueras-Fiszman, 2013).

Human health and wellbeing, in particular, has been an area that has seen a proliferation of interest within HCI. Food related disease and malnutrition, including obesity, contributes significantly to increased risks of cardio-vascular disease, various cancers, diabetes, and overweight (Donaldson and Scally, 2009). Precise figures are difficult to calculate. However, the World Health Organisation (WHO) reports that simply not eating enough fruit and vegetables alone is estimated to contribute to 1.7 million deaths each year (WHO, n.d.) and cumulative figures for the contribution of food related disease to risks such as CVD, increased cancer risk, diabetes and overweight, could account for well over 50% of deaths worldwide. In response, HCI has begun to investigate novel interfaces to support traditional nutrition assessment, such as portion estimation for diet intake (e.g. Chaudry, et al. 2012, Comber, et al,

2012), while also looking to extend personal and public health interventions. To this end, the wealth of HCI research on behaviour change and persuasive technology (e.g. Orji and Mandryk, this issue), virtual reality and perceptual cues (Narumi et al., 2012), socio-cultural food practices (e.g. Comber et al. 2013, Choi et al., 2011, Maitland, 2011, Grimes and Grinter, this issue), have begun to shape a HCI agenda on healthy lifestyle, diet and nutrition. Equally Nutrition researchers have begun to turn their attention to HCI when developing assessment tools and interventions (e.g. Arab, et al. 2011, Foster et al. 2013, Mulari et al. 2013) with promising results at the population level.

Energy use and food waste across the food lifecycle also significantly contributes to environmental issues, and is estimated to be producing, for example, 27% of green house gas emissions in the UK alone (Clear, et al. 2013). Alongside uses of technologies for monitoring and managing energy and water use, sustainable human-food interaction has a considerable potential to contribute to environmental sustainability. HCI research already contributes to this endeavour through pervasive systems (e.g. Thieme et al. 2012), through new methods and systems to understand food practices (e.g. Ganglbauer et al. 2013, Ilic et al. 2009), and through persuasive technology design (e.g. Farr-wharton et al., 2012). In short, food, and our interactions with it, is one of the most significant factors in our own and the environment's health.

Yet food should not only be seen as a problem. Grimes and Harper (2008), for example, points to the possibility and necessity to see technology and design interventions in this space as more than simply corrective. Food is, and always will be, something that connects people together and which has the potential to inspire and engage us in new and exciting experiences (see Spence and Piqueras-Fiszman, 2013 for some discussion of the future of dining experiences). Thus, in the last few years, new discourses of food and alternative food cultures have grown in numbers and prominence. In the face of the globalisation and homogenisation of food markets, public awareness of food experiences as a source of identity, health and well-being has taken root in mass and new media communication (Lee, Samdanis and Gkioussou, this issue). While the golden arches of Macdonalds may be recognised by more people around the world, gastronomic tourism has also grown in popularity to be considered to both support economic and cultural sustainability (Hjalager and Richards, 2004). Thus while food has always been a significant element in community to global cultures, new forms of communication and mobility offer opportunities for extended food expressions and experiences (Lee, et al. this issue). Considering the possibilities to design for positive, social and engaging experiences, points to the synergistic potential of cross-disciplinary endeavours between HCI and other domains of scholarship such as humanities and arts.

Yet, one of the greatest difficulties in arguing for Human-Food Interaction as a significant research area in HCI is that the technology we envisage as future food technology often seems to be just out of reach or in Bell and Dourish's (2006) words, in the "proximate future." Star Trek style food replicators with the ability to magically conjure food seem to offer a future where the problems of food shortages and malnutrition. For those who do not delight in the labours of the kitchen or the garden, the efforts of food production and preparation can be long forgotten. Such technologies may present exciting technical possibilities, and the first steps towards this Star Trek-esque food scenario are in the making (see Wei, et al. 2011b, Murer, et

al. 2013, Ranasinghe, et al. 2011) – though it would be short sighted to see these as the only means through which food and technology design can be mutually engaged. Human-food interaction requires much more attention to the people and the ways in which they engage with food than efficiencies and novelties new technologies may provide. This may seem like a limitation for a technology driven research agenda. However, the nuanced practices and experiences which surround food production, preparation, and consumption, point to the reality that food and technology are inextricably linked and thus require an understanding across various fields of research and scholarship. As evidenced by the growing number of research papers, including this special issue, and technologies being developed, the potential for Human-Computer Interaction and Interaction Design to impact on our food practices and experiences is extensive.

With this special issue, we draw attention to the growing and diverse field of HCI researchers exploring the interstices of food, technology and everyday practices. This special issue builds on the CHI workshop of the same name (Comber et al. 2012), where we brought together the community of researchers that take food as a point from which to understand people and design technology. The workshop aimed to ‘to attend to the practical and theoretical difficulties in designing for human-food interactions in everyday life’ identifying four thematic areas of food practices – health and wellbeing; sustainability; food experiences; and alternative food cultures. These practical and theoretical difficulties are evident in the papers that we present here, though the distinction between our four themes, premised by complexities of food practices, is a little less evident. Thus, in the papers that follow we explore how the social, technological, cultural and methodological intertwine in the field of Human-food interaction.

We start with work by Parker and Grinter, which explores healthy eating among African American populations in low-income households in the US. The paper discusses a framework in which particular communities and cultures are characterised across a number of key dimensions which express the orientation of a particular culture in the ways it values the collective over the individual and in the ways it values equality and sharing vs. competition and hierarchy. Further elaborating on the theme developed by Grimes and Grinter, **Orji and Mandryk** argue in their paper that persuasive interventions for healthy eating, in HCI and beyond, often draw on public health messages devised for individualistic cultures. The authors call for more culturally appropriate, and evidence based models of persuasion and public health in the design of persuasive technology. **Lee, Samdanis and Gkioussou** similarly acknowledge the role of culture in the production of food practices and look to understand the ever-changing practices of national cuisine in light of and in conjunction with new media practices. With a particular focus on Greek food blogs, Lee and colleagues propose that the advent of digital food cultures and human food interaction (HFI) give support to emerging forms of cultural hybridization in the appropriation and re-making of food cultures (and digital media) by individuals outside the institutions of haute cuisine. The growing significance of social media is further explored in the paper by **Gaspar, Gorjão, Seibt, Lima, Barnett, Moss and Wills**. The paper presents an analysis of Spanish use of social media during the 2011 EHEC/E. Coli bacteria outbreak in Europe and shows how such media channels increasingly function as important channels for the communication of health information, while simultaneously functioning as sources for misinformation. It

further highlights the need to consider possibilities and as importantly, limitations in relation to the method of enquiry that utilises so-called big data analysis. Finally, **Kerr, Tan and Chua** present a discussion of the methodological complexities of understanding and designing for food practices, particularly in diverse cultural contexts. Kerr and colleagues review an extensive discussion of applications and solutions that have been reported in – mostly HCI – literature, and highlight the potential gap in the design of technologies between perceived and actual needs. They introduce their user research method as one means to overcome this dilemma: Goal-directed Design.

The collection of cases presented in this special issue points to the methodological, disciplinary, and design complexities involved in balancing the technical with sociocultural to improve human-food interaction for today and tomorrow. These are challenging questions that require concerted efforts across a diverse group of stakeholders including researchers, practitioners, governments, industries, and communities within the given sociotechnical context that shape and are shaped by everyday food practices. This special issue seeks to draw attention to the questions and foster further discussions and research about human-food interaction.

Acknowledgements

We would like to first thank all the attendees at the CHI workshop, and the authors who expressed and followed their interest in participating in this special issue. We would further like to whole-heartedly thank our reviewers for their insightful comments on the papers: Dzmityr Aliakseyeu, Madeline Balaam, Pollie Barden, Mary Brennan, Alan Chamberlain, Rachel Clarke, Natalie Dixon, Stephan Dombrowski, Eva Ganglbauer, Mariann Hardey, Richard Harper, Eric Hekler, Annika Hupfeld, Maddy Janse, Joseph Kaye, Rilla Khaled, David Kirk, Predrag Klasnja, Tama Leaver, Conor Linehan, Jennifer Lofgren, Peter Lyle, Jon Mason, Bernt Meerbeek, Bettina Nissen, Marianna Obrist, Anne Preston, Yvonne Rogers, Johannes Schöning, Stefan Stieglitz, Lucia Terrenghi, Anja Thieme, Sally Wiggins, and John Vines.

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