

# Social Sustainability in Design Practices



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## Social Sustainability in Design Practices

### 1 Introduction

Recent developments in climate change science does not help to inspire great confidence in future developments: One study published last November even estimates that the magnitude of the increased warming of the earth will increase even after zero carbon emissions by as much as 25% more than previously estimated, due to various feedback effects as outlined in Figure 2 (legend quoted from Frölicher *et al.* 2013).

Furthermore, it is unlikely that the lofty goal of reaching a state of zero carbon emissions can be reached in a useful timeframe, as the environmental policy-making is only progressing slowly, as political scientists are quick to note (cf. Bernauer & Gampfer 2013: 439). They state that global environmental governance is suffering from a legitimacy-deficit, leading to a stalemate in global climate negotiations (ibid: 448).

Meanwhile, many researchers in the sustainable HCI community are working on their own approaches to resolve the problems caused by overconsumption in information technology. In the following, this paper will summarise the current state of the scientific work in sustainable HCI, before engaging in the critical discourse raised by the postmodern thinkers of the field.

#### 1.1. The Current Landscape in Sustainable Human-Computer Interaction

A great overview of the current landscape in sustainable HCI is provided by DiSalvo *et al.* (2010: 1975). In their fairly recent study, they analysed 25 programmatic and 58 journal and conference papers in order to find the underlying intellectual commitments made by the authors of these papers (ibid: 1976).

They identify five genres, or “*emergent clusters that draw on the same ideas*” and provide a short summary of these categories (ibid: 1977-1978): A majority of the literature, as much as 45%, are attributed to the genre of “*persuasive technology*”, where experimental success is defined in inducing behavioural change in the subjects. Researchers in this area often try to instrumentalise the power of

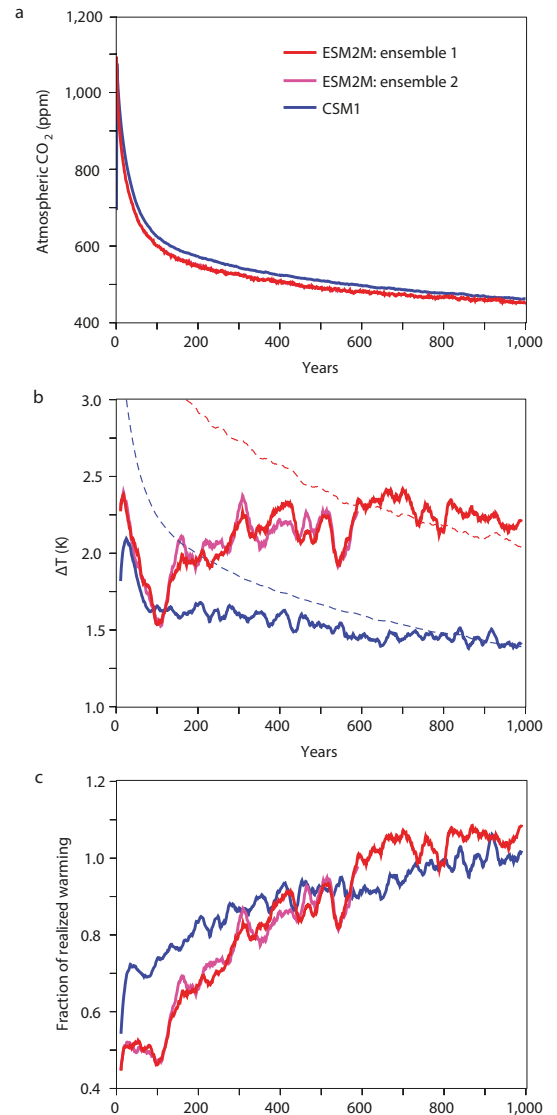


Figure 2.

“Idealized carbon dioxide emission scenarios and global mean temperature responses.

a–c, Time series of simulated global mean atmospheric CO<sub>2</sub> (a), surface temperature changes (b) and the ratio of actual and equilibrium temperature after instantaneous quadrupling of the pre-industrial atmospheric CO<sub>2</sub> concentration (c).

Times series in b,c have been smoothed with a 20-yr running mean and emphasize the differences between the transient simulations and the pre-industrial control simulations. Legend in a applies to all panels. Solid lines in b show the simulated temperature responses and dashed lines show the estimated equilibrium temperature responses.”

Frölicher *et al.* 2013: 41

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social networks and norms to influence behaviour, for instance as in the social website “*stepgreen.org*” created by Mankoff *et al.* (2010). The second most popular genre (25%) belongs to the category of “*ambient awareness*”, where calm computing and ambient displays are used to increase the user’s awareness of the consumption by visualizing the desirable behaviour and consumption. A prominent example for this genre is the Power-Aware cord designed by Gustafsson & Gyllenswärd, illustrated in Figure 3. The third genre, “*pervasive and participatory sensing*” can be identified of 22% of the literature. Studies in this genre use sensors to monitor and report on environmental conditions implying that action can and should be taken to change these conditions, as illustrated in Figure 4 depicting balloons measuring and displaying air quality factors. The fourth genre only contributes to 15% of the literature, and focusses on “*formative user studies*”, where scientists aim to understand the subjects’ attitudes to the environment and their behavioural impact. Here, it should be noted that the culture and country of origin can play a significant role, as demonstrated in the differences in mobile phone contracts across countries by Huang *et al.* (2009). The fifth and last genre accounts for 10% of the literature and concerns “*sustainable interaction design*”, a term coined by Blevis when he is using sustainability to reflect critically on the role and effects of the design process (2007).

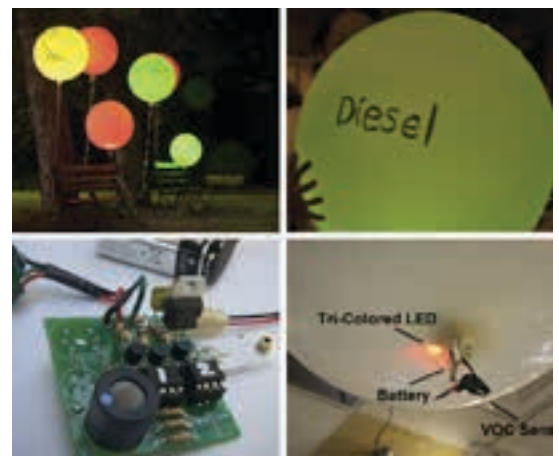
Overall genres together, as much as 70% of the analysed papers target individual consumers, as opposed to trying to address environmental behaviour within social groups. Furthermore, these users are often seen as “*the problem*” behaving in an unsustainable way, instead of solving the problems the users experience themselves. This leads to the proposal of mainly technological solutions and the wider political debate surrounding environmental sustainability is rarely addressed.

Therefore, the field of sustainable HCI can be characterised as being rather homogenous with a focus on technological design and lacking a critical reflection of social factors such as policy-making, governance, and the ethical concerns of coercing users to change their behaviour.



**Figure 3.**

The Power-Aware Cord Prototype  
Gustafsson & Gyllenswärd 2005: 1424



**Figure 4.**

Air quality balloons in public park (top left),  
diesel balloon inflated (top right), DIY die-  
sel kit fully assembled (bottom left), and  
a VOC balloon close-up (bottom right).

Kuznetsov *et al.* 2011: 237

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### 1.2. The Problems of Ecotopianism

With respects to such a characterisation of the field, Paul Dourish is an outlier and a proponent of a more comprehensive perspective of sustainable HCI, taking the three following considerations into account (2010: 1-2): First, he aims to go beyond the pure cost-benefit analysis to which sustainability is often reduced to. Second, he looks to address the socio-political consequences of the sustainability discourse. Third, he tries to broaden the field of sustainable HCI by considering a wider range of problems and solutions.

The first concern raised by Dourish is that a certain reductive conception of the human actor is used by a majority of scientists. He states, that both nature and markets are constructed as natural facts, when these are obviously socially determined. The role society plays in the conception of nature becomes apparent in the following example given by the Canadian scholar Andrew Walsh (2003): He notes that in his research in Madagascar, the indigenous population does not understand what the ecotourists perceive, when they visit the National Parks in the country, and that they are baffled by the lengths tourists go to take pictures of certain animals.

Walsh describes the following scene (2003: 85): *“Imagine yourself doing a mundane chore in front of your home. A truck pulls up to the side of the road, just a few metres away, and four passengers descend. The one among them who speaks your language explains to you that the other three are visitors interested in the animals that live around you. You point out such an animal crossing the road, sending these visitors in a photographing frenzy; one of them even lies down on the asphalt to get a better shot. Another shows interest in what you are doing and takes an incompetent turn at your chore; more pictures are taken. Before they leave, they give you a pen.”*

The animal in question was a chameleon.

While the woman in the description had problems understanding the tourists, Walsh found a Malagasy exchange student in Canada fondly taking pictures of squirrels. This goes to show, that what one person perceives as “*nature*” and affords an expensive journey in order to experience this “*nature*”, is of little significance for another person.

Meanwhile, markets are a social institution by definition, as they are spaces for structured interactions between human beings. This leads us to the original critique by Dourish. As soon as sustainability is framed as a personal and rational choice, a limited perspective is introduced and the designs created to address these issues are not contributing to the change of the bigger picture – for example political and regulatory change (2010: 4).

This leads seamlessly into the second concern, the social and political consequences of the sustainability discourse. Dourish states that the position of much of the environmental activism can be accommodated with the term “*ecotopianism*” (2010: 5). The problem herein lies within the adoption of an utopian perspective in the quest for sustainability. He cites four concerns with such an ecotopian perspective:

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For one, they postulate an alternative ecological future, that is stable and rests in a “*status quo*”, whereas social reality realistically is in a constant flux. Furthermore, such a future is essentially prescribing universal values on the individual human being – and as the example of the tourists in Madagascar has shown, this is not necessarily very realistic. For instance, it is easy to say that nature has to be preserved in order to protect our living conditions, but if your subsistence depends on a “*natural*” product, such as wood, then you may not be in a position to change your lifestyle. Furthermore, ecotopianism itself also champions technoscience, in particular when it uses sciences to analyse and understand the environment and believes in the transformative power of new technology. Furthermore, ecotopianism aims to create small self-supporting communities, but depends on international policy-making for their implementation.

Dourish notes, that similar to this perspective of ecologic activism, HCI also focuses on individual technologies and single users, instead of instigating change at a larger scale or in tying different scales together. For him, technologies in this area would expand the field and by designing tools for people and their political activism, the environmental agenda could be advances.

### 1.3. The Limitations of Persuasive Design

In a more recent review of the discipline of sustainable HCI, Brynjarsdóttir *et al.* still find a relatively dominant focus on environmental sustainability through persuasion in half of the papers they analyse (2012: 947-949). They observe that researchers in these papers ultimately make decisions on the desirable behaviour of the users and mostly address issues of energy consumption. Furthermore, these researchers focus on changing individual behaviour, often by the means of sensing and reporting information. All the while, little evidence for actual behavioural change can be observed. Therefore, Brynjarsdóttir *et al.* reiterate the earlier criticism of persuasive sustainability as limiting the field of sustainable HCI.

They post that persuasive sustainability is explicitly a modernist enterprise, where “*sustainability*” is framed with the terms of the more manageable problem of “*minimizing resource consumption*” (ibid: 950). Solutions in this limited problem space can more easily be designed, whereas solving environmental issues in general is a complex problem and it is more difficult to offer valid designs here. However, they argue that narrowing the vision can lead to problems, such as forests being optimized for productivity and expiring as a consequence. Concretely, they argue that political and social factors are not considered correctly, leading to the problems already identified by Dourish: A focus on individuals and not groups, a focus on rational agents that can be swayed by information whereas in the real world sustainability might be inhibited by completely different problems.

Again, Brynjarsdóttir *et al.* find sustainable HCI constrained by the approach taken in most studies and come to the conclusion that “*most persuasive sustainability research is not producing solutions*” (2012: 954). They contend that in order to produce solutions, sustainability has to be considered in the context of the encompassing sociocultural practices.

### 2 A Postmodern Vantage Point

The critiques of current sustainable HCI raised by Dourish and Brynjarsdóttir *et al.* draw heavily on postmodern discourses within the social sciences. Especially cultural anthropology has a long tradition of arguing in favour of human diversity. In fact, when the United Nations first published its declaration of the Universal Human Rights, the executive board of the American Anthropological Association (AAA) published a retort essentially rejecting the Human Rights because they were Eurocentric (1947: 539): “*How can the proposed Declaration be applicable to all human beings, and not be a statement of rights conceived only in terms of the values prevalent in the countries of Western Europe and America?*”

Dourish and Brynjarsdóttir *et al.* rightly argue that in order to understand the products of a discipline, in their case sustainable HCI, it is necessary to investigate the dominant discourses that circulate in the field. In the remainder of the following text, the intellectual origin employed by Dourish and Brynjarsdóttir *et al.* are outlined with the goal of furthering our comprehension of their critiques.

It should soon become apparent that both papers are based on the application of postmodern discourses to sustainable HCI. However, before these are detailed further, a small example may help to illustrate this. In the keywords proposed by Dourish in his paper, there is one that instantly catches the eye of a trained social scientist.

It is “*environmentality*”, clearly a homage to Michel Foucault’s “*governmentality*”, one of the major intellectual figures of postmodernity (cf. Agrawal 2005: 5). The connection is even more apparent in the keywords proposed by Brynjarsdóttir *et al.* – “*modernism*” clearly refers to the theories of modernity put forward by the social sciences.

#### 2.1. The Paradigm of Modernity

Arjun Appadurai, one of the postmodern theorists explicitly mentioned by Dourish writes that “*Whatever else the project of the Enlightenment may have created, it aspired to create persons who would, after the fact, have wished to have become modern.*” (1996: 1).

The foundation for the rationally thinking human being was laid out during the period of the enlightenment, most famously by Thomas Hobbes in his book “*The Leviathan*” (1988 [1651]: 63). While this work is mainly known for the theory of a sovereign state, where humankind unites under a social contract in order to escape the terrors of war, the mechanism for this process is based on a very specific notion of the human nature (cf. Hobbes 1651: 87-89). As DiSalvo *et al.* correctly mention, it is of utmost importance to understand the underlying intellectual commitments by these scientific approaches in order to foster future growth in the field (cf. DiSalvo *et al.* 2010: 1977, 1982). The following section will continue to outline the most relevant theses of human agency in the social science of modernity and create the qualifications for a critical analysis of the issues raised by Dourish and



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Brynjarsdóttir *et al.*

Hobbes defines the “*nature of man*” as their equality in body, intellect and wisdom. This leads to war because this equality causes competition between individuals with the outcome that a difference is created as measured by individual success (1988 [1651]: 63, 88). From difference, diffidence when the successful become fearful of those who might employ force to steal their success away. Furthermore, Hobbes argues that from competing with each other, people will seek out glory, to achieve a greater value than their peers.

Since war hinders the development of culture, industry and commerce, people forfeit their rights of self-governance and unite under a sovereign banner, constituting the social contract (*ibid*: 89).

Even today, the works of Hobbes remain relevant, as the notion of a human equality and competition is still reflected in the economic theory of rational choice that constitutes the basis of modernity and, as Brynjarsdóttir *et al.* aptly point out, are adopted by the HCI community.

Gary Becker who formulated the rational choice theory was even awarded the economic Nobel Prize in 1992 for extending the methods of economics into the field social sciences (Chibnik 2011: 2). One of the advantages the theory provided for social science was, that by focusing on a restricted number of key variables, hypotheses could be tested in controlled experiments, expanding the methodology of social sciences. While these methods have been successful at explaining larger trends, they imply little individual agency and human diversity and are unable to provide insights in the decision making process of individual humans where their personal context has to be considered as well (*ibid*: 14).

States that have been reengineered based on this notion of a free market and rational human agency, are generally considered to be neoliberal states (*cf.* Wacquant 2012: 68). This redefinition of the state’s function at the core of neoliberalism, brings together the two major theoretical discourses analysing the phenomenon (*ibid*: 70). On one side, there is the approach delineating the ‘governmentality’ originating in neoliberalism, finding a messy, flexible conglomeration of calculative strategies and technologies employed to govern people’s behaviour, fol-



**Figure 5.**

Graffiti in Boston  
Raphael Ochsenbein, 2013



**Figure 6.**

Graffiti in Lisbon  
Raphael Ochsenbein, 2013



**Figure 7.**

Graffiti in New York  
Raphael Ochsenbein, 2013

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lowing Foucault and a French school of thought (ibid: 69, 70). On the other side, the emphasis lies in the structuring, monolithic form of neoliberalism proliferating through the world and dominating as an ubiquitous ideology, described by such scholars as Ferguson for example (ibid: 69). Wacquant finds that neoliberalism includes both schools, *“but with a distinguishing institutional core consisting of an articulation of state, market and citizenship that harnesses the first to impose the stamp of the second onto the third.”* (2012: 71-72).

In the following, these two contrasting features of neoliberal states will be explained in more detail.

### 2.2. Modernity at Large

For Appadurai, modernity is literally *“at large”*, running rampant among the world and creating a unprecedented rift between the *“traditional”* past and the *“modern”* present (1996: 3). This rift is created by the development of both global mass media and migration, leading to the modern subjectivity.

Appadurai argues that the appearance of the electronic media change the wider field of mass media, as they open up a wider field *“for the construction of imagined selves and imagined worlds”*, or what he also defines as *“cultural”* when used to refer to the construction of group identities (ibid: 3, 11-16). Because of their ubiquitousness and their rapid pervasion of daily life, *“electronic media provide resources for self-imagining as an everyday social project”* (ibid: 4). He uses the example of becoming drawn to the American culture his early life in Bombay through the consumption of United States produced media ranging from books over college catalogues and the Information Service library to seeing movies to finally end up as an American scholar at the University of Chicago (ibid: 1).

Similarly, these media empower mass migration in a way that allows for migrants to create a distinct identity in the diaspora without having to assimilate with the local culture – for example, Turkish guest workers in Germany can watch Turkish films in their German flats (ibid: 4).

In combination, electronic mediation and mass migration counter theories that *“depend on the continued salience of the nation-state as the key arbiter of important social changes”*, slaying the monstrous leviathan postulated by Hobbes (cf. Appadurai 1996: 4).

With this, modernity is inseparably linked to globalisation. However, the consumption of media throughout the world is by no means a passive process, but often produces agency in the form of resistance, irony and selectivity (ibid: 7). Such resistance can appear in subcultures, such as Graffiti art, as illustrated in Figures 5-7. Appadurai’s theory of modernity has four distinguishing features (ibid: 9). Firstly, it is not a teleological theory stating that modernisation will *“universally yield rationality, punctuality, democracy, the free market, and a higher gross national product.”* Secondly, the theory is not based on a large-scale social project, but on the everyday cultural practices producing identities and knowledge. Thirdly, Appadurai does not make any predictions as to where modernisation will lead in terms

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of nationalism, violence, and social justice. And fourth, Appadurai focuses on a transnational state of the world and moves away from the salience of the nation-state.

Ferguson proposes to view the transnational character of both “*state*” and the opposed “*civil society*” emergent in a globalised world with an analytic category he calls a “*vertical topography of power*” in order to structure the local, national and global levels (2006: 90). Civil society itself is a term reimagined in the recent political realities and is currently mainly used to denote voluntary organisations and NGOs that seek to influence the state (ibid). Furthermore, the term has gained much traction and “*has become one of those things (like development, education, or the environment) that no reasonable person can be against.*” (ibid: 91).

However, Ferguson deconstructs “*civil society*” as a mere topography of state and governance at different levels. In his view, it is vital to go beyond seeing civil society as an opposition to the state, and to analysing how governance is implemented at the “*top*” and the “*bottom*” (ibid: 99). At the top, Ferguson observes transnational organisations, such as the IMF, cooperating with states and can implement policies in African nations, leading to a new form of “*internationalized imperialism*” (ibid: 100). On the other hand, at bottom level, civil societies are made up of international organisations like church groups that are eroding the power of African states through structural adjustment, for example by providing schooling (ibid: 101). In these cases, Ferguson argues, that we are not dealing with political entities that are opposed to the state, but rather with a single transnational “*apparatus of governmentality*”.

### 2.3. Governmentality

The term “*governmentality*” is a neologism used by Michel Foucault to denote the emergent forms of government that were disconnected from a theological rationality and originated in the rationality of enlightenment (1991: 87). Foucault writes that the essential issue in the establishment of an “*art of government*” was the introduction of economy into political practice (ibid: 92). Furthermore, it is a move away from a government of territories to the government of men and their relations to other things like wealth, resources, means of subsistence, et cetera (ibid: 93). While territory and property is still part of the governance, it is only part of it, just as for instance death is another part of what is to be governed.

For Foucault, this marks a turning point away from sovereignty as the goal of government to a new focus on the perfection and intensification of the process of governance (ibid: 95). This increases the scope of government from being contained in laws to a range of “*multiform tactics*” (ibid.). Therefore, Foucault defines “*governmentality*” with the three following features (1991: 102-103):

1. “*The ensemble formed by the institutions, procedures, analyses and reflections, the calculations and tactics that allow the exercise of this very specific albeit complex form of power, which has as its target population, as its principal form of knowledge political economy, and as its essential technical means apparatuses of security.*”

2. *“The tendency which, over a long period and throughout the West, has steadily led towards the pre-eminence over all other forms (sovereignty, discipline, etc.) of this type of power which may be termed government, resulting, on the one hand, in the formation of a whole series of specific governmental apparatuses, and, on the other, in the development of a whole complex of savoirs.”*
3. *“The process, or rather the result of the process, through which the state of justice of the Middle Ages, transformed into the administrative state during the fifteenth and sixteenth centuries, gradually becomes ‘governmentalized’.”*

Governmentality, as defined in the above, deconstructs the state as a sovereign unity, and conceptualizes the state as a composite reality consisting of a range of tactics of government – essentially limiting the state’s power: The competences and meanings of statehood have to be continually renegotiated on the basis of the applicable tactics of governmentality (ibid: 103).

For Foucault, the principal instrument developed in the governmentalization of the state, is the police, and the disciplinary apparatus invoked by the police (ibid: 104). Wacquant goes as far as stating that the *“growth and glorification of the penal wing of the state are an integral component”* of the neoliberal state (2012: 74). However, recognizing the existence of the *police* does not explain how *policy* is created and implemented.

Bourdieu uses the notion of a *“discourse”* to delineate how policy is shaped in practice (1989: 22): A discourse performs an act of cognition, defining a thing as what it is objectively. A discourse also prescribes how people have to act and records how people have acted in the past, for instance in official police records. Therefore, a discourse imprints a specific vision on the public. However, Bourdieu also notes that there is always a struggle for the production and legitimation of discourses. How much influence any entity can exert on any given discourse amounts to the symbolic power the entity possesses in that context (ibid.). In this case, states are often the holders of much symbolic power – but not the sole owner.

### 3 Conclusion

In the following conclusion, the main endeavour will be to answer the question of how the postmodern thesis can further our understanding of sustainable Human-Computer Interaction. In the beginning, the three HCI papers that were summarized proposed each one specific criticism of the field.

Essentially, DiSalvo *et al.* posited that the designs created by a majority of the researchers were not user-centric in their goals, and mainly aspired to resolve sustainability issues by technological means instead of reflecting the social factors influencing sustainable behaviour.

For Dourish, sustainable HCI is also limited by designing for the wrong scale, trying to impact individual users instead of searching for solutions assisting other levels, such as the *“civil society”*.

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Finally, Brynjarsdóttir *et al.* assert that the disciplinary focus on persuasive design is not producing worthwhile results and limits the field.

While the postmodern framework is not directly providing a solution for the first critique raised by DiSalvo *et al.*, the paradigms of modernity and governmentality are exceptionally strong in explaining why the HCI community has focussed on one specific approach. The reason lies within the pre-existing discourse in computer science to solve problems by developing technological solutions. Additionally, a “modern” world generally defines success in economic categories, where tangible factors are given priority over “irrational” discourses. This preponderance for the liberal values of the modern West explains, why western scientists produce results that adhere to these values. However, it is important to note that this relative dominance of products from western schools of thoughts automatically result in users applying them without critical reflection: Appadurai clearly writes that people usually re-interpret any media and technology they receive and certainly possess their own agency in a global discourse. He even ponders a future, where the neoliberal values become dominated by other worldviews (1996: 23):

*“In the short run, as we can see already, it is likely to be a world of increased incivility and violence. In the longer run, free of the constraints of the nation form, we may find that cultural freedom and sustainable justice in the world do not presuppose the uniform and general existence of the nation-state. This unsettling possibility could be the most exciting dividend of living in modernity at large.”*

The second critique by Dourish is more directly addressed by Ferguson’s observations about civil society in Africa. He certainly identifies “civil society” as an area, where technological intervention can span different social action and succeed in changing prevailing policies. However, he also notes that by doing so, one again embraces a certain mind-set, where the state’s sovereignty is contested by the “civil society”. That may not be an inherently bad thing in itself, but if one wishes to reflect on the effects of technology on society, then it certainly pays to be mindful of the worldview one supports through the technology. It would be naïve to believe, that designing for the civil society is in any way less ecotopian, than designing for rational human actors is.

As for the failure of persuasive design criticized by Brynjarsdóttir *et al.*, it would seem that an analysis of the technologies of governance and hegemony could yield new approaches to design that is in fact effective in governing user behaviour. Here, I absolutely agree with the authors that it is important to see humans as living in a complex social nexus and subject in order to inspire novel design approaches to further sustainability. Furthermore, I believe that the scientific output of social sciences can be an advantageous starting point for such an endeavour.

## Bibliography

**Agrawal, A. (2005).** *“Environmentality: technologies of government and the making of subjects”* (p. 325). Durham, NC: Duke University Press.

**The Executive Board, American Anthropological Association. (1947).** *“Statement on human rights”*. *American Anthropologist*, 539-543.

**Appadurai, A. (Ed.). (1996).** *“Modernity at large: cultural dimensions of globalization”* (Vol. 1). U of Minnesota Press.

**Bernauer, T., & Gampfer, R. (2013).** *“Effects of civil society involvement on popular legitimacy of global environmental governance”*. *Global Environmental Change*.

**Blevis, E. (2007).** *“Sustainable interaction design: invention & disposal, renewal & reuse”*. In Proceedings of the SIGCHI conference on Human factors in computing systems (pp. 503-512). ACM.

**Bourdieu, P. (1989).** *“Social space and symbolic power”*. *Sociological theory*, 7(1), 14-25.

**Braidotti, R. (2005).** *„A critical cartography of feminist post-postmodernism“*. *Australian Feminist Studies*, 20(47), 169-180.

**Chibnik, Michael (2011).** *“Anthropology, economics, and choice”*. Austin: Univ. of Texas Press.

**DiSalvo, C., Sengers, P., & Brynjarsdóttir, H. (2010).** *“Mapping the landscape of sustainable HCI”*. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (pp. 1975-1984). ACM.

**Dourish, P. (2010).** *“HCI and environmental sustainability: the politics of design and the design of politics”*. In Proceedings of the 8th ACM Conference on Designing Interactive Systems (pp. 1-10). ACM.

**Ferguson, J. (2002).** *“Global disconnect: Abjection and the aftermath of modernism”*. *The anthropology of globalization: a reader*, 136-153.

**Ferguson, J. (2006).** *“Global shadows: Africa in the neoliberal world order”*. Duke University Press.

**Frölicher, T. L., Winton, M., & Sarmiento, J. L. (2013).** *“Continued global warming after CO2 emissions stoppage”*. *Nature Climate Change*.

**Foucault, M., Burchell, G., Gordon, C., & Miller, P. (Eds.). (1991).** *“The Foucault effect: Studies in governmentality”*. University of Chicago Press.

**Gustavsson, Anton; Gyllensward, Magnus (2005).** *“The Power-Aware Cord: Energy Awareness through Ambient Information Display”*. Interactive Institute.

**Huang, E. M., Yatani, K., Truong, K. N., Kientz, J. A., & Patel, S. N. (2009).** *Understanding Mobile Phone Situated Sustainability*. *IEEE Pervasive Computing*, 8(1), 0046.



## Bibliography

**Kuznetsov, S., Davis, G. N., Paulos, E., Gross, M. D., & Cheung, J. C. (2011).** *“Red balloon, green balloon, sensors in the sky”*. In Proceedings of the 13th international conference on Ubiquitous computing (pp. 237-246). ACM.

**Mankoff, J., Fussell, S. R., Dillahunt, T., Glaves, R., Grevet, C., Johnson, M., ... & Setlock, L. D. (2010).** *“StepGreen.org: Increasing Energy Saving Behaviors via Social Networks”*. In ICWSM.

**Walsh, A. (2012).** *“Made in Madagascar: Sapphires, Ecotourism, and the Global Bazaar”*. University of Toronto Press.

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