

# Deviant and Guilt-Ridden: Computing Within Psychological Limits

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## ABSTRACT

In this position paper we discuss a set of problems particular to computing within limits that draws on psychological and sociological barriers. The enormity of the predicaments we are facing, global climate change and resource scarcity, together with the social, cultural and national settings in which we are facing these predicaments, are seriously hampering our possibility to address them. We argue that without confronting the underlying psychology that perpetuates our current state of un-sustainability, there is little computing can hope to achieve. Furthermore, we also argue that these psychological limits to computing do not only concern the users of our systems, often portrayed as the people in need of behavioral change, but also ourselves, as researchers within computing. In this paper we start exploring what these psychological limits could be, what ideas computing for sustainability has tried but should now retire, and start discussing a way forward.

## Author Keywords

Sustainability, psychological barriers, values

## ACM Classification Keywords

H.5.m. Information Interfaces and Presentation (e.g. HCI): Miscellaneous

## INTRODUCTION

To borrow a well-worn, rather trite adage, the first step in solving any manner of problem is admitting you have a problem. Clearly this saying has a certain procedural logic to it — ‘Step 1: define problem’ — but it conceals the psychological complexity of what such an admission entails. In practice, one has to first of all be able to identify the problem as problematic with respect to a combination of personal values and goals, an internal sense of morality and ethics, and a consideration of cultural norms and the degree to which one feels obligated to conform. On top of this, there are considerations to be made about the relative benefits of a potential solution i.e. problems are rarely *intrinsically* problematic, but rather

are defined as problematic in comparison with an alternative ‘better’ state. So in admitting the existence of a problem, one is implicitly conceding the superiority of change. And finally, to some degree admission of a problem is futile, or at least butts up against our powerful impulse for self-preservation, if there is no way of solving the problem; so admission also contains a glimmer of hope, a recognition that there is, or may be, a way of solving the problem.

It is no wonder, therefore, that sustainability is such a difficult challenge for us to face, let alone solve. To begin with, the effects of un-sustainability are not easily perceptible. They creep up on us, and in their slow approach, disguise themselves as ‘natural’, normal, unchangeable. In terms of climate change, for example, we can observe time lapse photographs of glaciers and coral reefs, track the extinction of species, or witness the increasing extremity of weather events, but all of these lack the immediacy of feedback one often needs to pinpoint a problem. And even if it seems understandable we had failed to anticipate the greenhouse effect, we probably should have been able to anticipate that a society dependent on fossil fuels was subject to collapse when resources eventually ran dry; and yet in the early days there was no threat of running low on oil, and the benefits such resource use brought were impressive enough to blind society from the obvious long-term limitations. Even as we face peak oil, the effects of resource shortage are not so easily perceived, much less what it entails for our future. All of these connections need to be made in an aggregate way over time, through data correlations and standard deviations; through simulations and projections. We require science to mediate our un-sustainable reality.

And that is just to get to the stage of understanding *what un-sustainability is*. There is a great deal of psychological work still to come before one can truly admit that it is a problem. For example, how do we weigh up the moral implications of un-sustainability? And while we may understand that it is not ideal, in trying to determine the benefits of a sustainable ‘solution’, one must consider the desirability of a world in which we have made the necessary changes such a solution would entail. To quote Exxon CEO Rex Tillerson in a stunningly nonsensical but psychologically apt excerpt, ‘What good is it to save the planet if humanity suffers’ [8]? And for those who might not concede the extinction of humanity as preferable to a resource constrained future for our species, there is still the difficulty in perceiving hope in humanity’s ability to cooperate toward solving this wicked problem. It is certainly

LIMITS’15, June 15-16, 2015, Irvine, California, USA.

deflating to the spirit to recognize the power wielded by those who seem content to drive humanity off a cliff. Do individuals have any real power to affect climate change or collapse? Unless we can conceive of some realistic impact our actions can have, who is to say we are not better off ignoring our problems, or at least leaving them for others to deal with?

So far, computing has attempted to circumvent the very need for people to admit to the problem of un-sustainability by appealing to their modernist impulse to behave in optimally efficient and economical ways. Perhaps we can be forgiven for trying to find a shortcut, especially when we're up against a ticking clock; but unfortunately, without addressing the underlying psychology that perpetuates our current state of un-sustainability, there is little that computing can hope to achieve. By avoiding confronting the human psyche (a strange tactic for HCI in particular, a community largely comprised of researchers with a background in psychology), we have relegated ourselves to (slightly) improving ICT efficiency, developing behavior change apps and clever interventions to automate out people's intransigent consumer inefficiencies, and trying to instill in people a desire to retain their obsolete devices. If we as a community are going to have impact, we are going to have to take the more difficult path. Not only are we going to have to identify interventions and approaches that can affect these various psychological barriers, but we as researchers are going to have to overcome our own psychological barriers toward becoming much more radical in our ambitions. The sections to follow address both of these aspects in turn.

## **INTERLUDE 1: CONFESSIONS OF A GUILT-RIDDEN CLOSET ACTIVIST**

*Elina:* On some level, I have always been conscious of environmental issues, having been brought up with a close connection to both nature and animals. But I must confess that this consciousness has been on a rational level; all the numbers add up, all the facts were there. As a result, I did recycle my waste, but the rest of it was so far from my everyday life, there were not much I felt could do. I clenched my fist in my pocket and looked the other way. One transformational event later, sitting with a vulnerable tiny baby in my arms, listening to one of the most down-to-earth sensible people I know talking about peak oil and the collapse of society as we know it, and I am changed. Now I'm laying awake at night, privately fretting my time away, guilt-ridden by my part in the climate crisis, slowly transforming my life into something that is as far from business-as-usual as possible. Every action, every decision is fraught with considerations most would find troublesome if not downright weird, and sometimes I am paralyzed of all the bad options that I have to choose from. Sustainability has become my guiding light in both private and working life, and I am grateful for the opportunity to actually do research on the subject. But, my gratefulness is concealed within myself, my knowledge of all the bad options are not outwardly stated and all the consideration I do is hidden. It feels like I am a small island, within a sea of ignorance, and I am struggling to align my life with those around me, while at the same time trying to make it sustainable, without becoming

the weird one, the deviant. My neighbors might guess that my family is environmentally conscious, but they have no idea how far my views of the future go, or how I actually judge their behavior in the light of the climate change crisis. My extended family find our lack of car annoying, but still think it is a monetary matter and not our struggle to become more independent from fossil fuels. All the occasions when I have started to discuss peak oil and climate change, I have felt that I undermine my relationship with friends and family, as if stating our point of view (which is far from criticizing theirs) raises a defense system within the people I talk to, and I am met with resistance. By just turning the spotlight to my worries I uncover their own fragility in a world that they painstakingly are trying to uphold as secure and unchangeable. But, if I can't talk to the people around me about my change, how could I possibly then research and promote their change? If I do not dare come out of the closet as an environmentalist, how could I ever believe that others will?

## **BACKGROUND**

At first glance, one might think that the challenge of getting people to act on climate change or handle the issue of a resource constrained future stems from a lack of information or a simple matter of denial. These then suggest simple solutions: both can be addressed through technological innovations that make people more aware (like persuasive technologies), or through more sophisticated information campaigns and education. If only it were that simple.

As Norgaard [11] shows in her study of a village in Norway, the denial of these overwhelming issues is far less simple than it appears, in part because it does not result from an individual's psyche alone. Norgaard spent one year in the village, becoming a part of their community, observing and interviewing the residents around issues of climate change. Already in 2001, during her stay, the climate had changed to such a degree that it directly affected the village through late snowfall and less snow, damaging the main source of income through winter tourism. The proof of a changing climate was directly in front of the villagers, yet they avoided talking about it. In her study she uncovers a complex weave of everyday action within a cultural setting that socially constructs denial. For example, what is clear is that the respondents in Norgaard's study do have pre-requisite knowledge about climate change, but use different cultural tools in order to manage the uncomfortable emotions that surface in connection with this issue, and hence actively (and collectively) distance themselves from information on climate change. This is particularly evident with feelings of helplessness and fear, which create additional psychological discomfort because they contradict the Norwegian emotional norm of being optimistic and being in control. Norgaard [11] shows that her respondents manage these contradictions in emotions by, for example, using *selective attention*, through avoiding negative information or focusing on the past and not the future. Another example is guilt. Due to their oil resources and their comparatively high standards of living, Norwegians are aware of their contribution to the global problem; and yet, for the individual, it is difficult to know what one can do in terms of tangible

actions, particularly when many feel that their individual actions are unlikely to change anything or that potential actions would harm their relationship with others. Norwegians actively manage their guilt by emphasizing their national identity as a country that values nature, and making favorable comparisons with countries that are relatively worse in handling carbon emissions.

Acknowledging that denial is socially organized implies that any measure to work with change needs to address different sets of emotional palettes, and more importantly different cultural settings. While the feelings might be universal, the toolkits used to manage these feelings are embedded in a different cultural context and within different national identities. Furthermore, several of the coping mechanisms participants demonstrated in Norgaard's [11] study show that regardless of the availability of information, people are more than capable of shutting out climate change information that makes them uncomfortable, evading deeper discussions about these issues, and refraining from thinking about the future. Climate change thus becomes something Giddens [4] calls a "back-of-the-mind" issue. For meaningful change to occur, it needs to be promoted to a "front-of-the-mind" issue [4], central to any political agenda, through different political devices. However, the issue is broader than politics, and needs to become a "front-of-the-mind" issue in everyday life in order for us to untangle inaction and work with change.

While climate change imposes limits to computing — in the sense that we need to radically lower emissions of greenhouse gases — the narrative of peak oil and resource scarcity inflict even more fundamental limits to computing. Without materials and energy computing is nothing. Greer [5] describes a particular set of psychological limits to our possibility to act in the face of peak oil. First of all he presents the myth of progress as an (in the western world at least) all-encompassing civil religion, which obscures, and makes it hard for us to envision a future that is not better, bigger or more abundant. Furthermore, Greer discusses the need for "the deviant" to oppose this overriding cultural identity construction, and it seems that the followers of the myth of progress have found their main opposition in environmentalists, and in later years, peak oil exponents. In Greer's words, these groups "...function has become the standard deviant role of our time — that is, to oppose the heroic march of progress, and fail" [5]. Consequently, all discussions on limits, be it on society, economy or for that matter computing, will be in the light of the myth of progress meeting resistance, partly because of the deviant role and partly because of the cognitive dissonance that follows when trying to incorporate scarcity with the abundance of progress. But more alarmingly, Greer [5] also describes how the deviants, in their struggle to have their voices heard, focus on the imminent doom of society as we know it to convey their message, a form of (almost) apocalyptic narrative that unfortunately just becomes even more easy to ignore. It is a classic Catch-22: "The environmental apocalypse, in turn, is precisely what will happen if the world does not listen to warnings of imminent doom — and the growing fixation on a prophetic role of this kind is a subtle but effective way of encouraging environmen-

tal activists to express their warnings of imminent doom in such a way that, in fact, the world will not listen" [5, p. 99].

## INTERLUDE 2: A RELUCTANT ACADEMIC DEVIANT

*Bran:* In the early days of formulating my research interests for my PhD research, I concluded that above all it was important to me that my research made some positive contribution to sustainability, an issue that I had come to care strongly about in my personal life. Naïvely I thought, 'Wouldn't it be great if there was computing research on this subject?' Lo and behold, when I explored the digital archives, there was a great deal of computing research that fit the bill — at least in the sense that researchers were using the terms 'sustainability' or 'environment' and attempting to create ICT that was somehow deemed 'better' for both. In my enthusiasm, I read a large number of these publications in a short amount of time, and soon grew weary of references to this nebulous 'environment', and even more so to the never defined 'sustainability'. What was anyone talking about? I wouldn't say I *dislike* the environment; but I also don't actively enjoy spending time outdoors, so I wouldn't claim to have a sincere affection for nature (if that's what was meant by 'the environment'). For me, protecting the environment is one critical component of a multifaceted sustainability which includes social justice and personal wellbeing; and our environmental destruction is a manifestation of a confluence of major forces including: a narrative void for the post-modern era into which steps contemporary capitalism, the imperative for continual consumption this requires, the erosion of socialist safety nets and the ensuing fear of failure that this model instills in people (preyed on by savvy advertisers who use this to sell us more stuff), global and national power imbalances that promote exploitation and disenfranchise the everyday citizen... the list goes on and on. And if environmental destruction was a symptom of these bigger problems, it seemed worrying that there were no attempts to understand, let alone address, the *cause* of the problem(s).

The more I read about sustainability, the more complex the problem became, and the less relevant the computing solutions seemed as a result. To find some saving grace in the efforts of well-meaning researchers, I attempted to quantify in purely practical terms how much of an impact current computing interventions were having with respect to reducing carbon emissions. But turning to the book *How Bad Are Bananas: The carbon footprint of everything* [2] for some initial numbers to help with my analysis, I found that a) my own footprint was shocking, b) there were very few carbon intensive practices I could reasonably do without, and c) the kinds of things that computing was telling people to do to lower their emissions were amongst the easiest to adopt and lowest impact in terms of climate change. At the same time, I was growing increasingly aware of the very real carbon impacts of the technologies we develop (e.g. embodied carbon, the energy required to power them, the waste produced when we upgrade machines or abandon our new gadget), even those ostensibly attempting to reduce carbon emissions. When researchers enthusiastically reported the energy saved through their interventions, these figures regarding the initial and long term carbon losses from the ICT itself were externalized. By

my back-of-the-envelope calculations, few (if any) interventions could be said to achieve a net carbon reduction. It was at this point I radicalized, realizing that unless we in computing began to take a more sociologically and psychologically informed approach to the sustainability challenge, we were simply fooling ourselves into thinking we were making an impact.

I believe that when we see something wrong in the world, it is our responsibility to do something about it. But how do I, an early career researcher, influence the computing agenda without provoking anger and other coping mechanisms discussed in this paper? This seems to suggest being an activist within the community; but how does one avoid the ‘hot-head’ label often given to activists and build a career as a respected academic? Much like those that struggle to find meaningful steps to take to make a difference, do I really have any power to affect my community? Or will I, like other deviants, be doomed to fail?

### **IDEAS WE CAN RETIRE**

The first thing to consider in addressing some of these complex psychological components related to climate change and peak oil is, ‘Are we in computing currently doing work that is exacerbating unhelpful coping mechanisms?’ Clearly, if the answer to that is ‘yes’, then we ought to seriously consider abandoning these approaches. And it would appear there are several that we might sensibly retire.

#### **Low cost guilt assuagement technologies**

It is often assumed that if people understood how big a problem we are facing, they would be paralyzed by the enormity of it. This, however, is not a reasonable justification for settling for behavior changes that cannot make an impact on the scale that is required. The behavior changes that are most commonly advocated as a route to achieving reductions in resource consumption and carbon emissions — e.g. remembering to switch off machines when not in use, upgrade to more efficient lightbulbs, etc — are grossly inadequate measures to combat climate change, even if adopted by every person on the planet [10]. Promoting such behavior changes, either through public discourse or through the kinds of computing interventions we develop, fosters de-motivating cognitive dissonance: the scale of the problem (‘the biggest threat to humanity of all time’) does not correspond to the scale of the change required to solve it [3], hence making the problem unintelligible. This is further problematic for computing’s sustainability goals in the sense that these minimal change options offer people the opportunity, at very little cost, to assuage their guilt, hence undercutting a powerful motivator to take more significant actions in the future. As a first step, computing could contribute significantly toward helping people grasp the necessity of deeper change by ceasing all technological development that attempts to engineer incremental behavior changes.

#### **Blaming consumers**

The unfortunate consequence of focusing our computing efforts on consumer behaviors (e.g. unplugging devices, home

heating reduction, etc) is that these interventions subtly reinforce a narrative in which the consumer is to blame. It is likely that in the long term, the guilt reaction this provokes more than negates any potential energy savings by cultivating the perfect environment for ‘disavowal’ [14] (a.k.a. ‘stealth anxiety’ [12]) to take hold. Disavowal is characterized by the deflection of anxiety through systematic distortion of proportionality. It occurs when we use omnipotent thinking (e.g. engaging in the quick fixes computing supplies users) to minimize our conscious anxiety, which the unconscious brain nonetheless recognizes to be insufficient. This fuels mounting anxiety that requires continual effort to suppress, usually through the entrenchment of disproportionate thinking about the effectiveness of our quick fixes. If the consequence of our current sustainability strategy in computing is to make it harder for people to understand the true nature of the sustainability problem, then we need an altogether different strategy.

#### **Reinforcing self-enhancement values**

As explored in depth previously [6], computing interventions for sustainability to date have almost without exception emphasized a set of values related to personal self-enhancement. This is done, specifically, through the design of technologies that offer some kind of personal reward (e.g. reductions on energy bills, social recognition from friends, greater marketplace competitiveness) as leverage for incentivizing behavior change. The implicit assumption is that people are selfish — that they will prioritize personal gain (social, financial) over collective wellbeing and survival. This would be a worrying state of affairs, given that our willingness to take action to address the sustainability problem hinges in part on valuing the human species and the planet. Never mind the fact that empirical evidence actually demonstrates the opposite, that people almost always prioritize collectivist (self-transcendent) values over self-enhancement values [1]; the salient point for the computing community is that self-enhancement values are *negatively correlated with positive actions for sustainability*. Hence, technologies built upon this assumption create a self-fulfilling prophecy: through use of these technologies, people do become more selfish and less inclined to want to act for the benefit of the environment and others (particularly when it comes at some perceived personal cost). There is certainly enough reinforcement of self-enhancement values in our society in the form of constant exposure to advertisements. If computing wants to have a positive impact for sustainability, it cannot do this by playing into this cultural narrative. The good news is that technology is itself a powerful narrative force in Western culture, and if we consciously decide to appeal to and reinforce self-transcendence values, we may just be able to bring out the best in people (cf. [7]).

#### **Exclusively appealing to rationality**

There is a tendency, particularly amongst a group of practitioners who are familiar with data and graphs as a routine part of their work, to try to develop tools that communicate data as a central tactic for sustainable computing. There is an abundance of eco-feedback tools and educational tools that aim to do just this — a seemingly sensible tactic for mitigating cognitive barriers associated with sustainability. And,

indeed, this is a common strategy for progressive politics in general: ‘Appeal to people’s rationality, and if you have the facts on your side, you’re sure to win.’ Unfortunately, thanks to well-funded and active disinformation campaigns, the very notion of facts (in particular those related to climate change) are under attack and are less persuasive than one might think. But more to the point, the impetus behind sustainability is not purely, or even primarily, rational; it is *moral*. Appealing to facts undermines this moral impetus and castrates the argument for sustainability (cf. [9]). In particular, how can people weigh up the moral implications of un-sustainability if we in computing insist it is a practical rather than moral issue? The lesson here is that computing must abandon future attempts to persuade people through fact alone, and instead must embrace other modes of persuasion which focus on helping people recognize the immorality of sustainability inaction. Arguably, this means becoming overtly *political*, beginning with how we frame what we are attempting to do in sustainable computing and why. We can try to rationalize our efforts on the grounds that sustainability makes economic sense, and that it is simply silly to waste resources. But this is not what motivates us; and it is not what will inspire others. As a community, we have to stand up for sustainability on moral grounds.

#### THE END OF THE WORLD AS WE KNOW IT

We cannot any longer live in denial of climate change and resource scarcity, and we cannot any longer live in denial of our responsibility to act and support change towards a more sustainable and resilient society. But we must acknowledge that this journey will be painful, guilt-ridden and fraught with emotions; it will be computing within psychological limits. Consequently, this is a struggle that, as we have attempted to show in this paper, will occur at least two levels. First of all, we must acknowledge that we as researchers are also vulnerable to denial and other coping mechanisms. We may look to our own history in sustainable computing as evidence of a psychological inability to admit to the scale and complexity of sustainability. The first years of attempting to incrementally reduce energy consumption through complex technological means would seem to indicate that we, too, suffer from disavowal. The years following this, when we have persisted in pursuing this strategy despite the lack of empirical evidence of overall reductions in greenhouse gas emissions resulting from ICT or any lasting evidence of behavior change is a symptom of this disavowal.

It is certainly possible, as well, that this disavowal springs from a form of ‘survival anxiety’ [14] — the fear, in this case, that in a future sustainable world, computers and all of us who make our livings in this field, will be redundant. The thought has surely crossed our minds that in a resource constrained future, the person who can thatch a roof is in far greater demand than the person who can program. Desperate to stay relevant, therefore, we cling to notions of ourselves as vital in the ongoing efforts to engineer ‘Resource Man’ [13], the human we envisage as optimally adapted to a resource constrained future. What seems clear is that computing *will not* continue along the trajectory that it has been progressing along since its inception. Fundamental changes will need to be made to

our goals, and to what we think we are doing to achieve them. This is not to say that there is no need for our skills now; but these skills cannot be blindly applied to the development of new gadgets that we will not be able to power — or at least should not be wasting resources powering — in the future.

Secondly, we must acknowledge the psychological barriers with all the users we are addressing with our computing. Computing within limits has an important role in defining what a future within limits could be; but to be successful we will need to learn from, and perhaps become involved in, fundamental research into how to communicate this reality in a way that is understandable without threatening people with apocalyptic rhetoric. We also have a role in helping people come to grips with the enormity of the problems we are facing, but doing so without them getting stuck in apathy and negative emotions. And all the while, we must work towards developing technology that does not make the problem worse, and instead leads to a more resilient society. Furthermore, while working with these barriers, we must also acknowledge (and somehow not be daunted by) the depth of impact we must achieve. All of these barriers are deeply embedded in social norms and cultural identity, making them hard to change. As tempting as it is to ignore them, or design around them, it is difficult to imagine how we are going to make a meaningful contribution without carefully attending to their implications for computing. The good news is that the computing community is noted for its ingenuity, and for its diverse mix of researchers hailing from a variety of disciplinary backgrounds. If we can work together to get over our own psychological barriers to get to the point that we are ready to wholeheartedly embrace this challenge, there is a chance we will succeed.

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