

The Past is a Different Place: they Do Things Differently There

Harper, R.; Randall, D.; Smyth, N.; Evans,
C.; Heledd, L. & Moore, R.

June, 2008

MSR-TR 2008 -89

Microsoft Research
Microsoft Corporation
One Microsoft Way
Redmond, WA 98052

The Past is a Different Place: They Do Things Differently There

Harper, R.
Microsoft Research
JJ Thomson Av
Cambridge, UK
Tel+44 (0)1223 479824
r.harper@microsoft.com

Randall, D.
Manchester Metropolitan University
Dep't of Sociology
Geoffrey Manton Building, M16 5LL
Tel (+44) 161 247 3037
d.randall@mmu.ac.uk

**Smyth, N.; Evans, C.; Heledd,
L. & Moore, R.**
BBC Research & Innovation,
BBC Wales,
London & Cardiff, UK
First.surname@bbc.ac.uk

ABSTRACT

This paper reports the trial of a wearable data capture device, SenseCam, as a resource for digital narratives and uses data from the trial to reflect on the models of the 'mind' that underscore HCI. More particularly, over a period of one week, 5 participants and 2 researchers used SenseCams to capture digital traces of their experiences, and used the same to create 'story telling' materials for presentation at a workshop at the end of the trial. The study found that all users delighted in the devices, but found that the traces that SenseCams produced were not analogues to their own memory. Instead, SenseCam data presented a picture of daily lives which was at once different to the one recollected by participants and yet brought a sense of wonder, depth and felt-life that was strangely enriching; furthermore, SenseCam data enabled participants to create artistic and evocative stories about prosaic activities that would not normally merit being recounted; and finally, SenseCam data could be used to tell parables about 'life' and hence about the characters in those parables. The paper will comment on the implications these findings have for digital narrative technologies, on concepts of memory prosthesis devices, the sociology of memory and for the concept of mind that underscores HCI.

Categories and Subject Descriptors

H5.m. Information interfaces and presentation (e.g., HCI):
Miscellaneous.

General Terms

Design, Human Factors, Theory.

Keywords

Memory; memory capture; memory prosthesis; sociology; psychology; analytic philosophy; digital narratives; storytelling; wearable data capture; SenseCam.

1. INTRODUCTION

The word 'mind' is a curious one. Some people insist in

thinking it's a word for a physical object: a thing inside some one's head. Others, more philosophically inclined, prefer treating the word as a concept, or rather as a word used in a set of related conceptual frameworks, only some of which have to do with empirical matters and containers. These people believe usages of the word have virtually nothing to do with a 'space' where a 'mind' might be found. They think the word is used to explain and label how intentions are manifest in actions. In their view, mindfulness is shown when someone tenderly touches another person who has just been hurt by some painful news, for example; or when someone refers, eruditely, to the arguments used in a book he or she has read which appear relevant, in that person's view, to an ongoing discussion.

Crudely speaking, the former view, the idea that the mind is a container, is the one that most cognitive scientists hold, the latter, the one held by those trained in analytic philosophy since the time of Wittgenstein. Though the difference between these two positions might seem obvious, the salience of these differences in points of view for HCI, for the design of computer systems—and indeed for discussion at conferences like DIS—much less so. "Why does it matter whether the mind is found in the head or in the behavior of individuals?" one can hear a skeptic complain, "After all", he or she might go on, "it's all in the mind".

We think it does matter. It matters in the following way. It seems to us that technology and the conceptual frameworks that determine the function and meaning of that technology go hand in hand: one defining the other. Whatever the balance in any particular instance, it seems to us therefore true to say that if one alters the conceptual framework, then where the technology might go will alter too. This in turn will alter the perceived role or function of the technology and hence the conceptual frameworks will evolve.

Let's take a prosaic and uncontentious example to explain what we mean. The conceptual framework that surrounds cameras and what they can do—or are perceived as being able to do—has been shifting in recent years. This has been driven in large part by changes in the technology of cameras and related devices. In particular, the merging of cameras with mobile phones has shifted what it means to be a photographer just as it has altered the value placed on captured images. Whereas once photographers were experts of sorts, their presence used to celebrate special events, and the images they captured displayed in honored locations (mantelpieces, bedside cabinets etc), so now everyone is a photographer, every event is photographed and there is no knowing what will be displayed. The trajectory here is one that suggests that the relationship between images

PLEASE LEAVE THIS
BOX BLANK – IT WILL
BE USED FOR
COPYRIGHT
INFORMATION.

and special events is dissolving, as is too the relationship between the image and its honorific display.

The point here is that what it means to capture an image and, relatedly, what it means to display it, is bound up with conceptual frameworks which are changing; and these changes are themselves bound up with changing technology; one change leads to another, almost indefinitely one might say. Which comes first, in this instance, is perhaps a moot point, though the scope and depth of research into this trajectory is, now, one might add, immense [4,11].

We use this prosaic, everyday example because it illustrates how conceptual frameworks and technological shifts can alter a perceived trajectory of some new device or set of devices and doings related to them in new and exciting ways.

This is what leads us back to our remarks about the curious nature of the word, ‘mind’. Over the past decade or so, the massive reduction in the cost of digital memory and data capturing devices has led some researchers to invent what they call human memory aids or memory prostheses. Most of these researchers are taking the view that ‘mind’ is a label for an empirical place, a container of stuff, in this case the stuff of memory [exemplar of this view is 3]. In their conceptual framework, the word memory as applied to computer systems can also be applied to the ‘human variant’ of the computer, the biological mind. These researchers recognise, of course, that the functioning of each type of ‘memory machine’ may be different, the one using binary code and silicon, the other chemical traces and flesh. But nevertheless, the conceptual framework treats them as alike, essentially as data processing devices. This has all sorts of implications for the design, development and expected role of the devices that ensue.

Microsoft Research’s SenseCam is one such device designed with this conceptual framework as its guiding principle. It consists of a camera, data storage chip and various other sensors, combined with a battery, all embedded in a lightweight case about the size of a corporate ID badge, which can automatically capture and store about 3000 images [See Fig 1]. Currently, various researchers are investigating the utility of SenseCams for this conception; i.e. as some kind of device for the capture of human memories or their analogues. These researchers are building their enquiries around the idea that the mind is a place which houses a repository of ‘stuff’, in this case memories; and, though SenseCams may not be capturing the same stuff, what it does capture, namely images of place, can be used as tools, links, pointers toward, indexes if you will, that enable the (human) memory in question to be accessed after the event [5;10].



Fig 1: SenseCam V2.3

Most—indeed all—of these papers do not say much about the philosophical auspices of their inquiries, treating their use of the concept of mind as rather inconsequential. One might even say that they treat these auspices as something that can be taken for granted. Philosophically, these researchers are relying on the framing concept of Qualia as the ‘thing inside the head’,

the thing which holds the stuff that the body collects and mechanically stores via some kind of cognitive trace.

This view is fairly commonplace in cognitive science and in psychological studies of memory more generally, where the work of people like Loftus is treated as definitive [12]. In her view, the mind is an ‘information processing machine’, and memory a similar mechanical process, albeit subject to various internal and external constraints affecting its efficacy. She argues that the verisimilitude of memories is subject to such things as the importance of the event in question, the context in which it is recalled, and the social pressures to reconstitute it. These factors can be statistically modeled, she goes on to argue [See also 8; 15].

However complacent cognitive science might be about such research, this is not the only set of framing concepts that have merit. Though this is not argued frequently, the view from analytic philosophy (most especially Wittgenstein [18] if not Quine [1]), is that memory is best thought of as a label for different types of action, types of action that display pertinent knowledge of and reference to, the past as place of relevance to the present [13]. Accordingly, memory is essentially an apparatus of culture, whereby having memory equates to being socially competent (i.e., able to act in meaningful and appropriate ways). Memory is thus also normative and hence cannot be understood except with reference to culture. Statistical analysis is therefore subordinate to investigative techniques appropriate for cultural inquiry, in all its forms, such as conceptual analysis and ethnography [16].

This view can provide a different framework and hence a different trajectory for the use and development for devices that support, enable, enrich or help document human action, like SenseCam. In other words, if one swaps the idea of memory as something-in-the-head for the idea that memory-is-a-resource-for-action then what devices like SenseCam can do, how they might be used, and hence how they might be developed, can shift.

It was just this possibility that we report on in this paper. More particularly, we report on the use of SenseCams by a set of seven users who were asked to use SenseCams not to capture digital analogues for their memory, but as devices that would provide resources for action: in this case to tell historical stories about their lives. We expected these ‘tellings’ would be vehicles to convey memory, insofar as memory is an action.

The findings from the study were surprising. For one thing, we found that the past is not brought to bear on the present in ways that is, as it were, straightforward. SenseCam data in particular were a source of what one might call the problematising of what the past might be. For another, we found that memory-as-an-action implicated much more than can be labeled as ‘mere matters of evidence’. Concerns such as the character of the persons recounting the past turned out to be important too. This led us to think that the study affirmed something about the philosophical auspices that had driven our take on the role of memory prosthesis – namely a Wittgensteinian one—as against those that had been the originating progenitor of SenseCams: namely a cognitive view of the mind as a container.

More especially, and as we shall explain at fuller length in the paper, the ‘narrative(s)’ produced by our subjects (by reference to SenseCam data traces) were not ones that reflect the experience of living as typically thought about, reflected upon or remembered by our user group. Instead, these narratives evoke traces of action and aspects of things that are discontinuous with ordinary experience. This does not mean

they contradict or correct ‘lived memory’. It is rather that what is captured, what is seen and what is evoked by SenseCam devices and then used in ‘narratives of the past’ is, as it were, distinct from what was experienced. We will suggest that this is a benefit, at least for our users (and we will assert, for other potential users for the same reasons). For these very differences created new values, new resources for narrative and self-understanding. These have demonstrably appealing values to our users.

Further the ways in which these traces of the past were marshaled in the storytelling was bound up with the ways in which narratives are typically told, or to put it in Austinian terms ordinarily ‘performed’ [1]. By this we mean that telling a story has certain properties that make it not merely an empirical account. Stories don’t just need a beginning and an end but they need to entertain too; above all, stories about oneself need to convey a sense of personality or character [8]. They need to say who one is. And this is not something that can be captured by simply describing one’s empirical experiences, even if one does ornament them with a start and a finish. This was made clear to us in the stories told by our subjects. They were not merely empirical accounts of some sequence of events; they were stories fabricated with certain goals in mind. In this case, these goals included such things as laments for the anguish of parenting, dismay at the prosaic elements of daily life and delight in the ability to view the world differently with devices like SenseCam.

This leads on to a third point that the trial made clear. The co-joining of the features of story telling and the material used in that storytelling showed that the relationship between the things known and recollected, the things seen by Sencams but not recollected, and the things shown that surprise and the things that confirm recollection, are diverse and complex. The past-as-a-thing-remembered and the past-as-a-thing-presented are not separated by degree or empirical measure; they are separated by the purposes that structure the telling of the recollection. It is these purposes that provide much of the source of that complexity and diversity. Further, these complexities are bound, also in complex ways, to such things as an individual’s intentions as regards their future, their judgements of their success or otherwise in the past, and their expectations and hopes for what might have been and what yet might still be. Beyond this, it showed that they were bound up too with an individual’s own assessment and display of their own insightfulness and ‘depth’, even their adroitness at living. Our subjects made it apparent that these purposes were, for them, measures of character. In sum, their stories indicated that character is not simply a function of where a body is in time and space: character transcends these coordinates.

Now, this might seem to be running ahead of the argument; it is not intended to be so. We are seeking, in this introduction, to simply frame the evidence we are about to present. This is necessary because what we will present might end up seeming a long way from HCI. One can imagine again the surly researcher complaining that they cannot see the link between these philosophical delicacies and computing. But the links are there, as these remarks hopefully suggest.

It is the purpose of this paper to give flesh to these claims. It will be organized as follows.

Having described the study, it will present the findings, breaking those into sections around the type of experience evoked and the allusions to character thus made, both in the symbolic currency of the stories and in the discussion that the stories provoked with other participants (and needless to say

ourselves). This will be followed by further discussion of the implications for the design of future iterations of SenseCam type devices. The paper will then elaborate what these findings mean for memory prosthesis and for the design of digital narrative technology. It will conclude with remarks on how HCI might conceive of the past as a category of the mind whatever the design goal or technology in question might be.

2. THE STUDY

The study was undertaken as part of a three year, DTI-EPSRC and commercially funded project, called PARTICIPATE. This primarily involves the BBC, BT, Microsoft Research and the Universities of Nottingham and Bath. Part of the project entails investigating forms of data capture that allow ordinary users to ‘participate’ in new ‘ubiquitous’ computing experiences. SenseCams obviously fit under these auspices.

With this in mind, during Easter, 2007, the BBC arranged for five participants in South Wales to be given the use of Microsoft SenseCams for one week. A sixth was booked in but was sick at the time. Two BBC researchers participated too.

Two of the participants were middle aged ladies, both with young children; one was a male university lecturer of later middle age; a fourth, a young man, recently down from university; the fifth a male video producer in his thirties. Both BBC participants were in their early twenties, one of each sex. None of the participants had ever seen or even heard of SenseCams before, nor had experienced ‘wearable’ computing. Two had been involved in visual narrative research in a prior BBC project.

Having been introduced to each other and us, each participant was given a SenseCam and laptop to run the associated application, and then given a minimal brief on how the devices worked. To help the participants focus their endeavours, they were asked to perform simple tasks during the week. These were to (a) caption photographs which they chose from all those available; (b) to select key images with which to tell a simple story; (c) to try to capture something of the flavour of local elections due to take place that week; (d) to keep a log of their activities. The tasks were left vague, however, so as to maximise the degree of freedom participants felt they had. Having done this, the participants were then given some guidance as to what digital narratives might consist of, but were assured that in this instance the narratives they produced, whatever their quality, were not for broadcast. Instead the trial was solely to explore the utility of SenseCams as digital narrative technologies.

At the end of the trial, participants were invited to a review meeting where a free discussion of their experiences took place. Each participant was invited to present some results in a form which they found suitable and, if they so desired, to make samples of SenseCam images and associated materials (such as notes, edited Media-player or I-Movie films), available at the review meeting and ultimately to the research team. The following findings derive from these materials.

2.1 Findings

Narratives can of course take many forms and indeed can be motivated by many desires: to broadcast one’s identity, for example; to celebrate lives that might be otherwise ignored; and so on. But underneath all these purposes there is a sense in which a narrative will be empirical if it is anything at all. Hence, one’s experience, one’s bodily movement through space, one’s moment-by-moment thoughts, all this and more may be thought of as the raw stuff of which narrative will be made, presumably,

whatever their purposes. It seems perfectly reasonable to assume, therefore, that various sorts of digital devices can be brought to bear on the task of capturing this ‘stuff’ and making it available for the assembly of such things as digital narratives. From the first moment of the feedback session, it became clear that this is not such a straightforward proposition as it seems.

SenseCam ‘data’ is not, it was remarked, an analogue of experience. It is in various ways discontinuous yet empirically bound to it. This sounds contradictory, but as shall become clear, there is a subtle but important set of possible relationships between the remembered experience before examination of SenseCam data and experience as recollected thereafter. These relationships have to do with such things as the difference between the stuff that ought to be remembered and that which was not; between the stuff which is never remembered because it lacks merit and that which is another’s view and so could not be remembered; and between the ways stuff of the past can be made more interesting, even more aesthetic and redeeming, through using the traces of the past that SenseCam provided to ‘mix up’ that past. These properties are bound up too with the nature of story telling or, rather, the ways in which individuals chose to assemble and present their stories. The stories in this case were sometimes merely anecdotes about single images, for example; sometimes they were more thought-out and reflective, entailing comments not only on the visual experience of life but also on the prosaic aspects of the doings in question; and sometimes, as we remarked above, providing opportunities for laments about some of those same doings.

This intermingling of the empirical, the strange and the wondrous, with the ways that stories are told, the morals of those stories and the measures of character that these allowed, became manifest as we listened to our participants in the feedback and discussion session at the end of the trial. Each subject talked in turn and each offered their own digital narrative(s). As they did so, and as these tellings provoked talk and reflections, so the intermingling of fact and fiction, of character and identity was undertaken. Accordingly, we present the main dimensions of these ‘tellings’ as they came out of the feedback session, below, before bringing together an analysis at the end relating to the more design theoretic and philosophical issues mentioned above.

2.1.1 Strangeness

The first thematic was then the one we have already foreshadowed: participants frequently expressed surprise at how their lives were, to a degree, rendered ‘strange’ by SenseCam images.

At the minimal, this included ‘noticings’ of previously unremarked features:

N: I took it on holiday and 80% of the photos were of my boyfriend ... but what I loved about it was the way it caught his mannerisms and behaviour ... the way he’d be looking out the window or watching something else... it’s capturing the way they behave and the mannerisms ...

Sometimes, participants remarked on the way in which things they habitually took for granted suddenly looked rather different:

M: It does give a ... a couple of things I do quite a lot ... one of them was my bike ... I liked that, I don’t know why ... just sort of, it was a bit like being in a silent movie ... you could see over the handlebars ... it made me look at things that I’d taken for granted in a different way ... (See Fig 2)



Figure 2: a SenseCam image from a bike

Part of the strangeness was also achieved because the SenseCams have fish eye lens cameras. This type of lens had been fitted since the original inventor thought this would capture more of the scene, and hence would be closer to that experienced (though she recognised it might make the images odd, to a degree). As it happens, the oddness made them quite unlike that experienced:

N: The fish eye lens makes everything look different but it’s quite cute, it’s kind of more interesting...

2.1.2 The Prosaic in Life

A second theme, also alluded to, had to do with how the images reviewed made participants see the mundane in new ways, ranging from noticing for the first time what the world looks like from between a pair of bicycle handlebars, through to the foregrounding of concerns, as in the above example, to the surprise evoked at seeing candid images of a child reacting to being ‘caught’ in some trivial way:

S: I actually caught her [the daughter] on camera eating a dog biscuit and giving another one to the dog ... the guilt on her face ... I never ever could have got that if I was trying to take pictures ...

In various ways, then, the SenseCams brought the mundane to life, whether it was by simply seeing things another way, foregrounding what had previously been background issues, or capturing things (like a boyfriend’s mannerisms) that would otherwise remain neglected. But SenseCams did more than this: they drew attention to those aspects of our subject’s lives that ordinarily deserved so little attention that they would be neglected, not remembered and hence assigned to oblivion.

2.1.3 Reflection

Seeing events in this way also provided opportunities for reflection. More than one participant talked about their surprise on discovering certain features of their lives that hitherto they had seemed to neglect. In particular SenseCam images provoked discoveries, if you will, of certain mundane things that had not been noticed before:

T: I noticed how much I was in the car ... how much you go shopping ... how much of your day is taken up by washing up ... you know ... you see quite a lot of the insides of my house ...

A: I think people do ... from a pressure point of view .. you look at newspapers and it’s all about lifestyle ... all the family you should be having that’s why I like this ... it actually goes into the life you’re leading ... the boring bits where you’re not achieving status ... they turn out quite interesting ... it focuses on the things we don’t [normally] reflect on ... you make a slightly different judgement ... it can be really reaffirming, to look back on a really nice day and say, oh, it was ok ...

These and other comments are striking for the way in which the participants chose to talk about the ordinary and humdrum features of their lives. SenseCam images were used to justify or

excuse celebration of these humdrum moments, or to make the subjects humble about something, or to laugh at themselves.

SenseCam images were even suggestive, sometimes, for a need to change:

M: No, what I would do is only put it on ... it's brought home to me that I need to change a few things ... it makes you rethink your life a little bit ... wear it for a week and you realise what you're doing with your life ... like a therapy...

2.1.4 The Painful

There were a few negative features to this. There were some comments to the effect that:

V: ...it made me look angry and aggressive ... it made me paranoid ... you'd imagine it would be an accurate record but some things didn't get picked up, or were brushed over, while others seemed interminable ...

Reflectiveness and doubt about how one chooses to conduct one's life-choices in this case between doing things that seem humdrum or interesting or over how one presents oneself and hence might be perceived—are indicative of how what memory might be and how recollections of what the past entailed, are clearly not restricted to matters of the strictly empirical. The participants did not use SenseCam data to assert 'I did this' or 'I did that'. They used this data as keys to unlock something much greater and more profound: assessment of their own values.

These assessments were sometimes quite cruel, casting a severe measure on themselves. Nevertheless what was also made clear was that this philosophising (as it were), gruesome and unpleasant though it might appear, was of especial value to the participants. These reflections on the past, though not all positive, were something that these participants agreed SenseCams helped induce. In this regard, this memory prosthesis turned out to be a spiritual tool.

2.1.5 Candor and Spontaneity

These remarks might seem rather pretentious, especially given our remit in HCI, though it should be clear that we are doing nothing except explanation. Yet we should not neglect noting that throughout the feedback session, part of the joy that the SenseCams provided was not in allowing the participants to reflect in these abstract ways alone, it was also in providing them with a device that could bring a candid view on what had been, irrespective of whether measures and assessment and reinterpretation were thereafter merited. Indeed, the overwhelming feeling was that the 'candid' quality of SenseCam images was to be celebrated.



Figure 3: A candid view of a workshop

A very good example of this is shown in Fig 3. One of our participants conducts children's workshops on a professional basis. She spoke very positively about the candid and un-looked for results she got from SenseCam, suggesting that there is simply no other way of getting results of this kind.

2.1.6 The Life of Others

One's neglected moments, surprising views of oneself were only part of the value of SenseCams. A further dimension of the experience evoked by SenseCam images was a heightened sense of others. At its most simple this meant seeing those 'others':

V: All the people you focus on normally are people who are present in your life, and the strangers ... you exclude them ... this brings the strangers back ...

Some participants asked partners, workmates and others to wear the camera. Others wished they had. Hence:

M: I would like to have an 'almost spontaneous' response ... I ran in to someone who had been away in New Zealand and I thought wouldn't it have been fantastic if I'd had 'SenseCam' with me [so I could capture the moment] ... I could have shown my boyfriend 'cos he knows them too ...

V: Oh yeah ... you realise how much of each others' lives you're missing.

M: I'd be interested in seeing other people's days .. I actually gave it to my housemate to see what he does at work ... the answer was, 'not much' ..'

Accessing the lives of others was not the only way that SenseCams provided new opportunities. Animate and inanimate objects alike provided vehicles for exploring different views on existence.

V: I put it on a kite ... we were in the park ... I wanted to know what it looks like when you fly ... I'd love to know what that's like ... so I put it on a kite with some gaffer tape ... it was great..

I: Yeah, I wanted to put it on my dog ... see what the world looks like from his level ...

2.1.7 History

These concerns related to the lives of the participants, albeit sometimes seen from the views of others. But the lives' of others separated in time was also raised. Notably, more than one participant spontaneously raised the issue of 'looking back' beyond one's own existence. As one said,

T: It would be interesting to look back six months from now ...

Another took an even longer term view and suggested,

V: ...it would be nice if you could look at the life of other people who lived in the same house as you, but 60 years before ... that would be interesting ...

Such discussions were brief, though, since SenseCam data obviously did not provide any evidence of this kind, though the prospect of some kind of curatorial role here, both for users and new technology, can easily be imagined.

2.1.8 Creativity

Some uses can only be described as creative. Creativity here refers to the way that people both imagined uses to which the device could be put, and actually did put it to some quite unanticipated uses. This was especially driven by a concern with the novel aesthetics of SenseCam images, such as related to the distorted perspective the fish eye lens produced.

In one instance, a participant selected some images of a group of friends ten-pin bowling which were, in their mind, meaningless but ‘artistic’:

M: Oh yeah, the bowling ones [images of a group of friends ten pin bowling] ... oh yeah, they were really interested to see them ...[See Fig 3]

Q: Have any of your friends asked to[see them]?

M: Oh yeah .. especially the arty ones ... I was just thinking, this one ...

N: oh, that’s lovely ... Doesn’t it make you ... changes your, um

M: Yeah, I captioned this, ‘great bowls of fire’ ... I love those kind of abstract images ... (See Fig 4)



Figure 4: an image from a bowling alley

This suggests that, for our participants, one of the ways the past could be made interesting was through making it entirely unfamiliar, divorced if you like from the experience-as-experienced. Yet, part of the magic here would appear to be related to how this difference was made visible and more tractable by somehow being anchored in the recollection of the event itself. The delightful difference and artistic value of a ‘creative view’ was measured in terms of how far that view was from what it was thought and experienced to be.

2.1.9 Reassessing Oneself in the Past

If we have seen how SenseCam images allowed artistic interpretation, candor, spontaneity and encouraged reflection on the humdrum, they also provided opportunities to transform the meaning of an experience.

In the following, one participant talks about how a ‘bad day’ she had had with her daughter had been utterly transformed when she retrieved an image of that moment with her SenseCam (See Fig 4). On retrieving it she found that she was able to think about that moment differently, and to see it for ‘what it was’ Gazing at the image lead her into realising that the day in question was not as it seemed at the time.

Before saying anything about what that realization was, the significance of the change produced was enough for her to caption the moment, as per one of the tasks she was asked to do for the trial. As we shall see, her captioning had a poetic quality, one which moved all of the people in this discussion (See Caption 1).

As she explained,

S: ... cos, I’d had like the worst day ever ... I just found it ..., she’d been driving me absolutely mad ... and we were in the playground and there was no-one there ... and she was ... she won’t eat properly .. she’s so small ...

Q: And what you’ve written [in the caption] is that documenting [image of daughter next to a giraffe painted on the wall]...

S: Yeah, yeah, it was like the conversation we had ... it was like, ‘but Mum, when ... when am I going to be bigger ...



Fig 4: The daughter beside the Giraffe

Once she had seen the image, though, the Mother realized that her disconsolance at being a parent of such a child was nothing more than a moment of low spirits. Another day, or more exactly, a re-looking at the day made her fate seem less consequential and bleak.

The caption was as follows:

MUM, WHEN WILL I BE BIGGER?

But mum when will I be bigger?

...When you eat all your meals

But mum what do I need to eat to get bigger?

...you need to eat your breakfast, lunch and dinner

But I don't like all my food. Do giraffes eat all their food?

...they do

Do they like beans, chips and chocolate cake

...no darling they like leaves and shoots

But I like chocolate cake... will chocolate cake make me bigger?

....only if you eat your meals too

If I eat all my meals will I be as big as a giraffe?

....you'll be bigger

But mum, how big am I?

...you're 90 centimetres

But mum, will I be as big as a giraffe next year?

...but Phoebe you don't want to be as big as a giraffe.

I do I want big long legs and a long neck.

...no you don't you are beautiful as you are.

But mum when will I be bigger?

The points that one should take from this instance are important and so is worth ensuring some clarity here. What we see here is not merely that the empirical facts of bodily location in space were made strange by SenseCam images. Here the evidence suggests that the SenseCam images—or rather one—provided a momentum for the participant to reflect on what they had thought at the moment in question and for them to change what the meaning of that moment ‘really was’. In particular, for this participant, the moment in question had entailed her looking at her daughter whilst bearing in mind the agony that that daughter had induced in the period before that moment. As she reflected on that anguish she also gazed at her daughter with a lament that her hopes for the future –one better than the past—might falter.

In recognizing that experience-in-the-moment has this transcendental quality, the participant was avowing to us the commonly recognised fact that experience is never constrained by time and space but is always, in varying degrees and ways, suffused with knowledge of the past and explorations of and hopes for the future. One can put this another way: her account, poignant as it was, conveyed a truth of human experience: no time or place is ever without a past or future, but equally no moment in time is ever understood without travels into that same past and future.

But in addition to this, the participant's narrative also showed how the past-and-the-future-as-seen-and-thought-about-and-viewed-as-a-prism-for-the-present was also an indicator, a sketch if you will, of who the participant was or 'is'. Their character, their personality; in brief, their identity was being drawn in the way they told the story of what it was for them to be who they were, thinking what they thought then and there.

There is one further point one should take from this example. This sketching was also an opportunity to convey how she changed herself insofar as she came to see that her experiences were not as it seemed then but were, 'in fact', a low moment in her spirits. In this new view, what had happened then, when looked at in hindsight, wasn't so bad. Indeed a poem of sorts could be written to celebrate it. The lesson then is that though time and space and mindful movement through those dimensions do frame thought, what can be understood as being the meaning of any thoughts in any time and place can be transformed afterwards. What happened at one time can come to be understood as something else in a future time. In this sense, the past-as-experienced, the thing that memory prostheses seek to capture, is something that is not inviolate or objective; it is something that can be transformed in to something else by an act in the future. The significance of this for the premise of memory prosthesis as simply a data capturing enterprise hardly needs expounding.

2.1.10 Dissolving the linear

So, the past had many features and many ways of being experienced and being re-experienced *post hoc*. We have seen for example that there could be a tension between empirical facts and the artistic rendering of the same, another as between the past as understood then and as 'corrected' in the future.

Another dimension that came out of the study had to do with how SenseCam images brought into doubt the value of the past as a linear object worth recollecting with that linearity as a set property. Our participants found that, with SenseCam images of the past, or at least SenseCam traces of it, the past could be as it were juggled up.

Indeed, this was viewed as a real value to participants. When they presented in the feedback session, all juxtaposed, changed, organised images in ways that frequently challenged the idea that their experience 'flowed'. In one case, a participant designed a film (taking six hours to complete it) which was shown to everyone else present. Only afterwards did the participant admit:

V: 'It's not the way my week went ... I divided it up ... put things together so they would be interesting ...'

That the past here was juggled up does not attest to the possibility that the past is revisable in the ways that the past was revised in the mother-daughter example. That change was in the meaning of particular events, not in their sequence. The ability to juggle up the past had to do with how the past is not necessarily an interesting place in its linear form.

Our participants treated the past as a place one visited, sometimes serendipitously and sometimes purposefully and sometimes with a view to telling others, as in this case the other participants in the trial, interesting things about that past. The film that this participant showed was designed to entertain, to be a narrative of sorts with a story like structure; one that somehow enhanced the other participants' experience of it. In this case, it included elements of the mundane and the artistic, the surprising and moments that deserved reconsidering. That this movie entranced the participants was certain; all looked with intensity at the I-Movie and clapped at its conclusion. We did too.

2.1.11 Reconceiving the Author - Subject

If strangeness, the neglected and the aesthetic were part of the values that use of SenseCam gave vitality to, and if, further, the ability to juggle-up the narrative of life to create evocative stories was also a bonus, then it is not entirely surprising that, with a capture device that can work automatically, people should be less prone to editorialising before or during the event. Our subjects treated SenseCams as a producer of raw material; it is no surprise therefore that the values SenseCams provided to them was in large part because they did not 'steer' or give planned voice to 'stuff' that was collected. That this stuff nevertheless sometimes had a style, a meaning was part of the joy and the wonder of it.

There was a key social property of SenseCams that lay behind this, though, which several of the participants commented on. This had to do with how the devices transformed the role and the function of the author and the subject. Whereas photography (both classical and ephemeral, as mentioned at the outset) requires someone to take a picture and someone to be the subject of a picture, because SenseCams are automatic, it no longer mattered who is who. This released some participants from the burden of making this distinction itself.

A: You know with this I don't worry about what the pictures look like I am not involved, I mean I know I am I chose to wear it for the trial but you know I didn't feel as if I was taking pictures I didn't ask anyone to stand still and look right-I mean I did sometimes but not always and the thing about it is I feel much more free...

This in turn, so some participants remarked, made the events in question more 'natural' and less 'infected' (as one put it), by the presence of photography.

This has a paradoxical consequence, of course. When participants first started wearing SenseCams they had worried that they were making the world as a whole a subject. In some instances they had been especially worried about this because they had been in places where imaging was prohibited, such as in playgrounds. There, the very concept of author-subject was the salient along which concern arose. By the end of the week, however, at least some of the participants were delighting in the dissolution of this nexus. They were no longer the author. 'It' was.

2.2 Analysis

There were, needless to say, other dimensions of experience that came out from our trial. Space precludes discussion of them all. We have focused on what we think are the most provocative, though, and in particular on the following interrelated concerns.

First of all we have focused on the relationship between things-as-remembered-by-the-subjects-in-ordinary-ways and things-as-presented-by-the-SenseCams which are, too, in curious ways,

things-that-might-have-been-remembered-but-not-intentionally. There were, further, just to confuse, sometimes things-that-were-beyond-the-possibility-of-being-recalled-by-the-user-but-which-when-presented-to-the-user-somehow-provoked-a-recollection. Here we are thinking of the weird images, views from peculiar places, the faces that were there but not seen, and so on.

This awkward language alludes to the difficulty of exploring and commenting upon what the SenseCam trial drew attention to: namely, the complex relationship between human memory as a cultural act and digital traces of action as a technical accomplishment. We have seen that SenseCam data makes lived-experience, in various ways and in varying degrees, *strange* to the persons who had the relevant experiences in question. Strangeness here is not a negative thing, as we saw. Strangeness brings values of various kinds. The crux, it seems to us, is that in creating different experiences to the ones imagined or recollected, SenseCams brought to bear ways of seeing that were not obviously the subjects' own, but which were nevertheless empirical, though in complex ways. These diverse ways had cultural value, value insofar as they brought the mundane to life; revived the meaning of the forgotten and provided novel measures of 'what it means to be'.

Second of all, we have emphasised the relationship between the empirical as a matter for story telling about the past, and the implications of that story telling for the delineation of the personality or character of the ones telling the story. All of the arguments in the bulk of the paper, the allusion to how character is a composite of the empirically experienced and the imagined, the forgotten and the recollected, the planful and the indifferent, indicate to us that the past, whatever it might be, cannot be adequately conceived of as an empirical category. We learn from the study that the past is a place to sure, but how it is evoked and what is evoked is always bound to separate questions as to *why* it is evoked. And why here doesn't simply mean because of how these participants might have been asked to recount the past. It is related to what kind of person is portrayed in the telling—a fundamentally cultural measure if ever there was one.

Let us put it this way. It seems to us that the ultimate lesson that came from our study is that memory should never be separated from other aspects of the 'mind' as an encompassing conceptual category or set of categories. Here we are thinking about such matters as how someone judges their competence as a parent, for example, and all that means in terms of struggles they have with that burden, its joys, the hopes it brings and the fears it induces. We are thinking too of how people measure their lives in terms of how prosaic it might appear; how it is full of work they care little for and hence typically forget, as if their existence consisted, in part though not all, of vapour.

We are alluding, in brief, to the fact that the past is experienced in essentially human terms: mindfully. And mindfully means both in terms of keeping a track of what happened, i.e. with reference to the burden of keeping store of things and events, as the mind-as-container metaphor implies, and in terms of what one might choose either intentionally or neglectfully to forget. We are thinking of mindfully in the sense also that the past is a place where one behaves in certain ways and for which one can be held to account for in the present. And account here has many values: in terms of whether one's life is prosaic, whether one neglects others in that life or things in it or whether one ought to re-evaluate what happens in that life. One is not just held to account for what one did, but also for what one thinks about that behaviour now, in the present.

There is a sum to all these arguments, all these roundabout discussions. It is that this SenseCam trial makes clear that the mind, as a conceptual category, turns out to be a cipher for what it means to be human.

3. CONCLUSION

It is no wonder therefore that we think these findings have considerable implications for what one understands as the mind, for memory as a faculty of the mind and hence for how the past is seen and understood, and how data gathering devices can capture, if that is the right word, traces of that past. And, following on from this, we think this also leads to a different design agenda for data-capturing devices.

The findings have an especial relevance, in particular, to that research which seeks to build computer devices on the assumption that human recollection is merely an empirical object. In this view, what is captured with these devices—i.e. the data that is the collectable past—is not in doubt, it is whether the 'data' is captured that is, and once captured whether it can be recalled. In this view, what matters is the scope of the data, its adequacy, its degree of fit to what is known (somehow to the scientists in question) to be historical verisimilitude, i.e., the past as it 'really occurred'. Our study shows that this might be a wrong way of thinking about the issues at hand. Our reading of the evidence leads us to argue that whatever one's feeling about the concept of mind as a container, or the idea of Qualia and related claims about cognitive processes, much of which we have been pointing out can be thought of as deeply contentious, what is clear from this research is that the past is not a place one merely recalls, as if it memory were a data retrieval task. The past is better thought of as a place *one ventures into*. That this is so, we would like to now remark, has numerous implications not just for the philosophical auspice of research on data capturing devices but on the design and evolution of the devices and services that might ensue.

3.1 Design

That this is so might become clearer as we explain that this venturing can be seen as having two aspects. First, it has to do with how devices like SenseCam actively create, as it were, a slightly different past from the one experienced. It is this which entices a user to venture in to it. This obviously suggests a line of development where verisimilitude to cognitive experience (if that were possible which we doubt) is precisely *not* the design goal.

Putting it another way might help foster a design imagination here. SenseCams are illustrative not of devices that merely capture, as if data of (the) human past is simply 'data'. Rather SenseCams illustrate, intentionally or not, that how devices capture, the unique way they capture, has particular value. It is these particularities themselves that gives their users' delight. A fish eye lens creates one way of exploring the past, for example, just as a passive capture technique creates another. Each design choice creates a particular vision on what the past was, can be seen as, and ventured into. The crucial value of these ways of looking is not their empirical adequacy or otherwise; it's how they evoke new, yet somehow empirical slants that make the past different yet still plausible.

Further designs that capture and construe visual, auditory, tactile, or indeed other 'human-like' data traces ought to be developed so as to create opportunities to explore and discover how users can find new delights. Delight might not be the only word that ends up being appropriate, of course, since new designs might create data traces that evoke sadness and lament,

even metaphysical doubts. As we have seen, the past is a place pregnant with differences of view.

This leads on to the second strand of design motivation. These empirical traces, whatever they might be, are also tools used to judge character. Judgment is possible in the ways that renderings in question provide vehicles for the display and the assessment of why things were done, why things are forgotten and why some things are remembered. This means that one ought to design different ways of rendering 'data' so that how the past in question was judged at the time is somehow made visible.

Thus, one might capture and render some of the things that are typically and normally judged as not being relevant so as to force the revisiting of those judgments about relevance in the future. As it happens SenseCams already do this, but not because its designers made this a design value. But one might design future SenseCams precisely with the goal of capturing the things 'people choose to forget' when what is meant is precisely that these things are ordinarily neglected. As we saw, the amount of time people give to various doings does not necessarily equate to the judgments of value that those same people accord those doings in their daily routines and recollections. Future data capturing devices might allow users to reassess their ordinary selves.

Moreover, the design imagination should not confine itself to private accounting. It ought to consider, too, how the artfulness entailed in telling stories about that past might be augmented. One should not forget that stories, even empirical ones, are artful undertakings, and the ability of the story teller to be artful is in turn a measure of character. When one tells a story one is naturally judged as interesting, boring, thoughtful or dull. Stories have many purposes but can also be used in many ways by teller and listener alike. Therefore, one might design tools that let people assemble their stories in new ways.

If Web 2.0 means anything here, one might say that future 'memory devices' might allow users to mash-up their pasts in novel ways. One might go further, and say that such tools may become so valuable, or rather the visions of the past they allow to be constructed might become so valuable, that money might be invoked here, with people constructing stories of the past for sale. After all, one might say that this was what happened when an earlier 'technology for telling' was invented in the eighteenth century—namely the novel.

Values might not be only solipsistic either; one might imagine designing digital trace devices so as to capture, for example, multiple 'human-views' on an event. This might highlight, when these traces are integrated, differences in recollection and view; it might allow the creation of new, 'multi-person' narratives. These too might be monetisable.

Clearly, further design possibilities can be imagined; it is that faculty rather than any idea of the mind as a container with limits and processes that is at issue. We do not wish to stretch the tolerance of the reader by indicating any more imagined territories that might be explored. Hopefully, this paper has provided enough empirical evidence to encourage them to do so for themselves.

3.2 Disciplinary perspectives and the past

Wherever their imaginations take them, the point of this paper has been to show that one should not think of devices like SenseCam as good or bad analogues for human memory, as successful or failing memory prostheses. They are devices that, in their design, *makes the past in particular ways*. Hence, they

should be designed with sensitivity as to how they allow 'users' to render the past. What we have seen is that these renderings can offer delight, surprise, foreignness and strangeness in equal measure. We have seen too, how these renderings can shift even what it means to be an 'author' (a photographer) of one's own life, as well as who or what is the character of the person using these devices.

In these respects, we think this small trial ought to make us think differently about memory as an object of interest to HCI. This interest has been, up to now, pretty much solely driven by various forms of psychological cognitivism. The evidence here suggests that we ought to move toward a different view, one that is more cultural (and thus one might say sociological and anthropological). In so doing, it might lead us nearer to the view of memory expounded by the speech act theorists and their progenitors, the ordinary language philosophers, most especially Wittgenstein [18].

But even if we do, we also think that the findings ought to make us skeptical of those views of memory which might seem more plausible because they emphasise some of its cultural components: we are thinking most especially of those sociological studies that hold that memory is a 'social construction', a kind of 'act' [for an overview, see 7; 14]. For though the findings do suggest that the memory is a place one ventures to and thus one 'acts out', the findings also suggest that devices like SenseCam make the past a broader, richer, less socially tidy place than one might imagine.

We say this because even a cursory reading of the sociology of memory literature will draw attention to how this literature emphasises the political and intentional arrangement of recollection. This derives in large part from the work of Durkheim, especially his *Elementary Forms of Religious Life* of the early nineteenth hundreds. Though this is to oversimplify his account, his view was that some events are selected to honour (by Cenotaphs for example) while others are forgotten (and hence are not documented). This has value for Society, so Durkheim and those influenced by him argue. Following on from this, personal narratives of the past are designed, so these same thinkers claim, to give special credit to some events and persons.

Yet our study shows the experience-as-felt and incongruent perspectives that SenseCam brings to the past, to 'what has been', reminds us that whatever one's disciplinary view or technological tool, the past is always a bigger place than one would imagine or sometimes want it to be. What one does routinely, forgetfully, with forethought or with neglect, through habit and indifference, with boredom or with wonder, is not always tractable to social mores that dictate what ought to be and what ought to be neglected. The past is an empirical place, to be sure, but just how and in what ways is up for us to decide in the present in the present.

What we find with devices like SenseCam is that, although they might not act as memory prostheses, they most emphatically don't miss the mark in offering memory-related experiences that appeal to users. As we say, these experiences are at once close to those of the user and yet distinct from those experiences; they offer too new delights and wonder. But above all, they offer ways of provoking changes in those experiences, reconsiderations and redefinition of what the past may have been. As we have seen in this small study, voyages into the past can be sensitive experiences, not because of what is ordinarily forgotten. It is because what one finds there, what one did or might not have done, is not always what one might have hoped for or expected at the time and, indeed, it is often something

that one might want to change, if only it were possible in the present. Sometimes, of course, the past can be remade, as we saw. But this is not something that can be guaranteed or provided on demand, even with the most state-of-the-art devices. As H. E. Bates noted long ago, the past is indeed a different place, but not because they *do* do things differently there; it is because all too often *we* wish we *had* done things differently when *we* were there.

4. ACKNOWLEDGMENTS

Our thanks to all participants and to a number of people who worked hard to make the technology work, notably J.Scott and G.Smyth. S.Hodges must be commended for engineering and L.Williams for inventing the SenseCams in the first place.

5. REFERENCES

- [1] Arrington, R. & Glock, H. (1996) *Wittgenstein and Quine*, Routledge, London.
- [2] Austin, J.L. *How to do Things with Words*, J.O. Urmson, (ed) (1962), Claridon Press, Oxford.
- [3] Bell, G. (2001) 'A personal digital store,' *Comms of the ACM*, 44(1), 86-91.
- [4] Brown, B. Green, N. & Harper, R. (Eds) (2001) *Wireless World: Interdisciplinary perspectives on the mobile age*, Springer Verlag, Hiedleberg and Godalming.
- [5] Berry, E., Kapur, N., Williams, L., Hodges, S., Watson, P., Smyth, G., Srinivasan, J., Smith, R., Wilson, B. & Wood, K. (2006), 'The use of a wearable camera, SenseCam, as a pictorial diary to improve autobiographical memory in a patient with limbic encephalitis,' *Neuropsychological Rehabilitation*.
- [6] Button, G. Coulter, J. Lee, J. & Sharrock, W., (2005) *Computers, Minds and Conduct*, Polity Press, Cambridge.
- [7] Connerton, P. (1989), *How Societies Remember*, CUP, Cambridge.
- [8] Ebbinghaus, H. (1985) *Memory: A Contribution to Experimental Psychology*, Dover, New York.
- [9] Grice, P. (1989) *Studies in the Way of Words*, Harvard University Press, Cambridge, Mass.
- [10] Hodges, S., Williams, L., Berry, E., Izadi, S., Srinivasan, J., Butler, A., Smyth, G., Kapur, N., and Wood, K. (2006) 'SenseCam: A retrospective memory aid' *Proc. Ubicomp 2006*.
- [11] Höflich, J. & Hartmann, M. (Eds) (2006) *Mobile Communication in Everyday Life: An Ethnographic View*, Frank & Timme, Berlin.
- [12] Loftus, E.F. (1980) *Memory*, Addison-Wesley, Reading, Mass.
- [13] Malcolm, N. (1977) *Memory and Mind*, Cornell University, Cornell.
- [14] Misztal, B.A. (2003) *Theories of Social Remembering*, Open University Press, Maidenhead.
- [15] Neisser, U. & Hyman, E. (2000) *Memory Observed: Remembering in natural Contexts* (2nd ed), Worth, New York.
- [16] Winch, P. (1958) *The Idea of a Social Science and its Relation to Philosophy*, Routledge & Kegan Paul, London
- [17] Wittgenstein, L. (1952) *Philosophical Investigations*, Blackwell, Oxford.