

Ph.D. Proposal

Wearable Computers: Accounting for the Users' experience

Aspects from Invisible Computing –

Assignment 2

1. Introduction – Aims and Significance

This Ph.D. aims to investigate ways of understanding how wearable devices effect their users' experience of the domains in which they are being used. The aim is to understand how the wearable changes the users' interaction with their environment and to better elicit user requirements for future devices. Wearable computing reconfigures the relationship between the human body as social semiotic ¹ and the machine. This form of technology involves devices that are worn on the body of the User, usually for prolonged periods of time. The aim is often to augment or supplement the subjective experience of the wearer by providing them with additional sensory input or contextual information about the environment. Given this aim, research in the area of wearable computing requires means of investigating how users' perceive these changes to their experience.

In order to investigate the users' experience the present study seeks to investigate the users' construal of this experience in language. It thus adopts discourse analysis of this speech as a method of analysing this construal. Discourse Analysis is an interdisciplinary area of enquiry which focuses on the analysis of texts. These texts may be of different kinds such as written, spoken,

¹ Social semiotics is the study of meaning-making practices which are situated in cultural and social contexts. For an introduction see Deely, J., B. Williams, et al. (1986). Frontiers in Semiotics. Bloomington, Indiana UP.

written to be spoken and spoken to be written! It typically looks at aspects of the text above the clause or sentence level and approaches them in their social contexts rather than as isolated aspects of grammar. Systemic Functional Linguistics provides discourse analysis with a systematic way of relating the interpretations of texts to the linguistic data. The following figure locates SFL within the proposed research framework for this study:

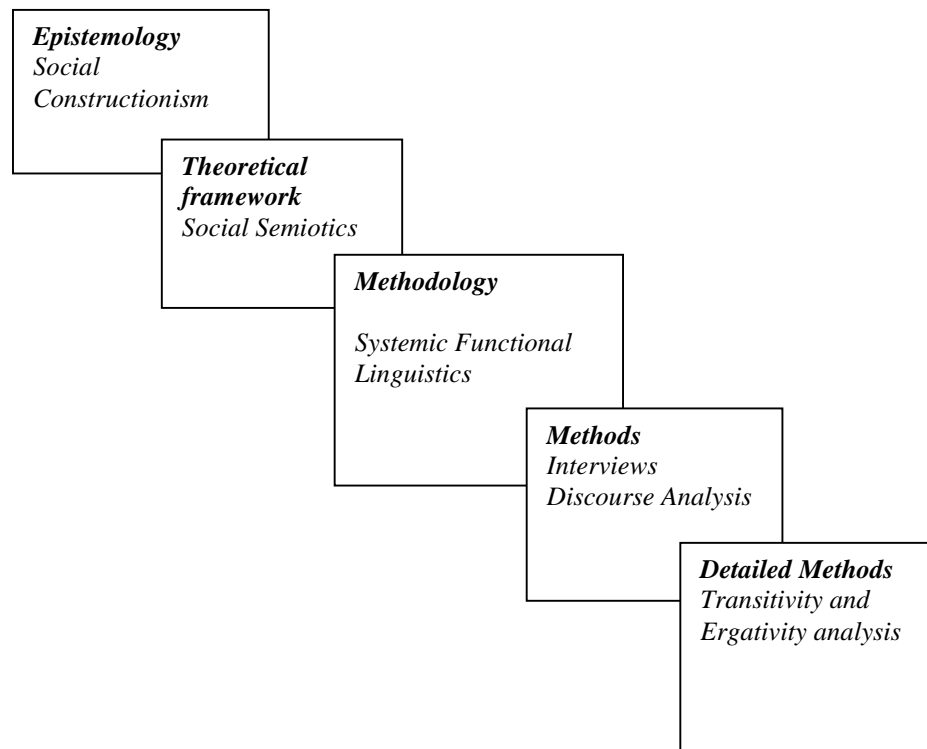


Figure 1 Proposed Research Framework

2. Introducing Systemic Functional Linguistics (SFL)

...it is functional and semantic rather than formal and syntactic in orientation, takes the text rather than the sentence as its object, and defines its scope by reference to usage rather than grammaticality (Asher and Simpson 1994)

Systemic Functional Linguistics (SFL) is a theory interested in describing language in terms of its semantic function in the social and cultural contexts within which it is put to use by speakers. In this way it differs from the formal, syntactic approach of traditional grammars. Halliday (1978), a major figure in the development of SFL, describes language as a social semiotic. Butt (2000) provides a clear outline of what this means:

To say language is *social* implies that a community of speakers share knowledge about systems of sound and writing, about lexicogrammar, about meanings and about situations. To say that language is *semiotic* implies it is a system of signs which convey meaning about that culture, just as other sign systems such as dress and architecture are shared by a cultural group and constitute that culture. (Butt 2000:10)

Thus, the social semiotic perspective suggests that the relationship between language and meaning is not arbitrary. Due to this, SFL asks questions about how language is used by speakers and writers to make meanings in functional contexts and how is it organised to achieve this. It approaches instances of such meaning-making as 'texts', that is, as units which have semantic significance.

Egins (1994:23) suggests that SFL is distinct amongst linguistic theories as “it seeks to develop both a theory about social process AND an analytical methodology which permits the detailed and systematic description of language patterns”. This chapter investigates both of these aspects of SFL. Systematic description is possible in SFL as it is a *systemic* theory, that is a theory arising out of the linguistic school known as Systemics. This means that SFL figures meaning as the selection of alternatives from a system network of possible choices. The nature of these choice is described in the following section. The reader is directed to Halliday’s (1994) *An introduction to functional grammar* as a first step into SFL.

Language as a stratified resource

SFL models language as a stratified resource as the following table, Table 1, summarises. The first column of this table divides meaning into content, that

| | | |
|------------|----------------|----------------------|
| | Folk names | Technical Terms |
| Content | meanings | semantics |
| | wordings | lexicogrammar |
| Expression | Sounds/letters | Phonology/graphology |

Table 1 The three strata of language (Egins 1994:21)

is, what it is about, and expression, that is, how it is articulated. The third column identifies how SFL divided content and expression into the three strata of semantics, lexicogrammar and phonology. The second column gives

equivalent folk concepts for each of these strata. (Halliday and Matthiessen 1999: 4). Each stratum realises the one below. For example semantics are realised through lexicogrammar, that is, meanings are realised through words. What this means is that a speaker or writer makes choices about the meaning that they wish to convey in a particular context and use the lexicogrammatical resources of language to construct this meaning.

2.1. Making different kinds of meaning: Introducing the Metafunctions

SFL suggests that language makes different kinds of meaning concurrently. The content plane of language, seen in Table 1, involves different kinds of meaning. Halliday and Matthiessen (1999) group these meanings into three metafunctions: ideational, interpersonal and textual. We use these metafunctions to construe different aspects of our experience. The ideational comprises our construal of the “experiential world” through language; the interpersonal “our construction of social relationships”; and the textual, the semiotic enactment of discourse. In thinking about language in this way, it is important to note that Halliday’s concept of ‘system’ is very different to the Structuralist perspective outlined in the previous chapter. While language is figured as a tri-stratal system, such systemisation is not semantically arbitrary, as in traditional grammars, but is based on meaning:

It makes no sense to ask whether the metafunctions are grammatical or semantic: the only possible answer would be “yes”. (Halliday and Matthiessen 1999)

This kind of functional-semantic approach is particularly useful to the present case study as it provides a practical method for analysing the meaning-making of participants from the structure of their language. The present study focuses on the ideational, and to a lesser extent, interpersonal metafunctions.

Halliday (1994) suggests the centrality of the clause in construing experience, claiming that “it embodies a general principle for modelling experience – namely, the principle that reality is made up of PROCESSES” (Halliday 1994: 106). The transitivity system is the system in which Process type is chosen by the speaker and is located within the ideational metafunction. According to Halliday, a Process has three components:

- (i) the process itself
- (ii) participants in the process
- (iii) circumstances associated with the process

Transitivity analysis decomposes discourse into these processes, participants and circumstances. It is a system allowing choice in the way these components

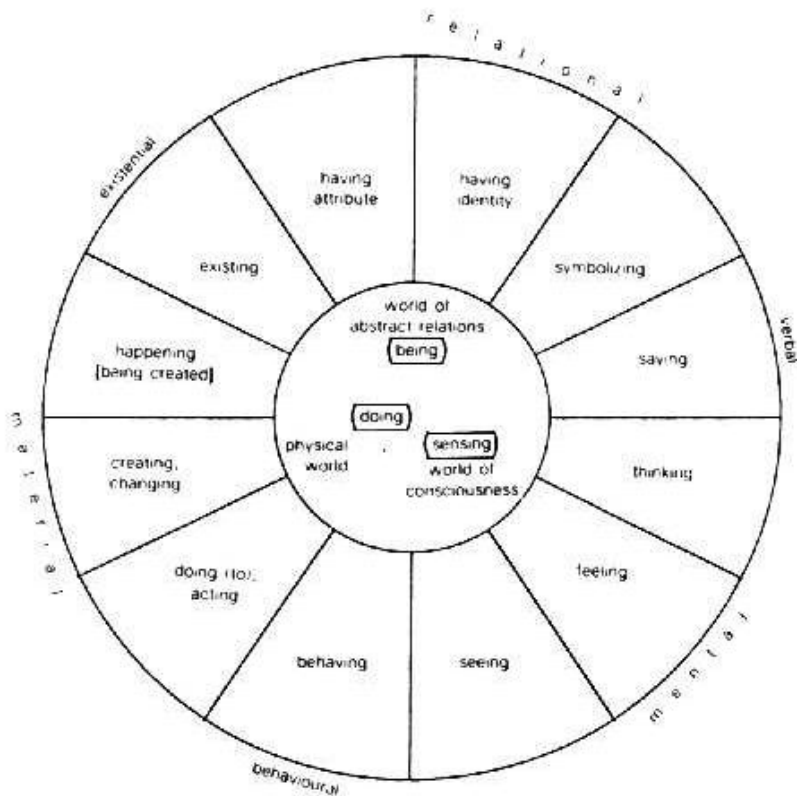


Figure 2 Process types in English. Source: Halliday (1994:108)

are configured. Halliday’s conception of transitivity is oriented towards semantics in contrast to traditional grammar’s interest in whether a verb takes an object. His tripartite interpretation of processes is perhaps the base level of an ontology of experience. As such it is, as Halliday indicates, “a resource for thinking with”:

In construing experience this way, the grammar is providing a resource for thinking with. A strict taxonomy of separate process types would impose too much discontinuity, while a bipolar continuum would be precisely too much polarized. What the grammar offers is, rather, a flexible semantic space, continuous and elastic, which can be contorted and expanded without losing its topological order. (Halliday and Matthiessen 1999: 516)

Within this semantic space processes are categorised in terms of their meaning. For example 'eat' is classified differently to 'think' as the former refers to a process of physical action while the latter a process of mental experience. Halliday conceives of six types of process Material, Relational, Mental, Verbal, Behavioural and Existential. These are depicted in Figure 2.

3. Research Plan

3.1. Data Collection

3.1.1. Semi-structured Interviews

Semi-structured individual interviews will be conducted with the users. The goal of these interviews was to encourage the participants to talk freely about their experience of using the wearable device. They are only directed to the extent that the participants' responses were taken as the basis for each subsequent question. This was part of an attempt to minimise the impact of the interviewer's speech upon the participants' responses while ensuring that the interviews involved relevant issues. An example of the style of questioning is "Tell me about your experience of the wearable device". This form was adopted to discourage participants adopting the process type used in the question itself. However, despite this measure it is acknowledged that the influence of the researcher is an unavoidable confounding variable in case study research. All interviews will be recorded and transcribed for later analysis.

3.1.2. Data Analysis

The transcribed interviews with users will be subject to three types of Systemic Functional analysis: Transitivity analysis, Ergativity analysis and Interpersonal analysis. The present section outlines the methods which constitute these analyses.

1.1.1. Data Type Declarations

XML Data Type Declarations (DTD) will be developed to facilitate XML tagging of the transcribed interviews in terms of their Transitivity and Ergativity analysis, the details of which are provided in the following section. An XML editor will be used by the researcher to apply the XML tags to the interview texts in an efficient manner. In addition, a python program, *ClauseStats* (Whitelaw 2002), will be used to identify which processes, participants and circumstances occurred in clauses containing particular lexical items and the frequency of such occurrence. This will enable the researcher to draw conclusions about phenomena such as the extent to which particular concepts were associated with particular process types or are construed within particular participant roles. The following sections detail the kinds of analysis in which will be undertaken.

1.1.2. Details of the Transitivity Analysis

The transitivity system construes the world of experience into a manageable set of process types (Halliday 1994: 106)

Transitivity is the system by which speakers select a process type. Analysis of transitivity is undertaken at the level of the clause. The following tables give examples of such analysis on fragments of discourse from the participants in this study. Examples are presented in tables and also marked-up in XML

Material Processes (processes of doing)

Material Processes are processes of doing, that is, of concrete actions in which an entity does something. The participant role of the entity doing the action is called the Actor, while the participant role of the entity at which the action is directed is called the Goal. Material Processes in their simplest form thus are typically structured: Actor + Material Process + Goal. Table 3 gives an example of Transitivity analysis for a clause involving a Material Process.

| | | |
|-------------|-------------------|------------------|
| They | design | wearable devices |
| Participant | Process | Participant |
| Actor | Process: Material | Goal |

Table 2 Transitivity Analysis for "They design wearable devices."

This Transitivity analysis may be marked-up in XML as follows:

```
<clause>
  <actor> They </actor>
  <material_process> design</material_process>
  <goal> wearable devices </goal>
</clause>
```

Figure 3 XML markup of a clause containing a Material Process

Mental Processes (processes of sensing)

Mental Processes are processes of sensing, that is, processes in which an entity perceives something. Halliday further divides them into processes of cognition, affection or perception. The participant role of the entity which does the perceiving is called the Sensor. The thing which is being perceived is called the Phenomenon. A simple structure for a clause involving this kind of process is Sensor + Mental Process + Phenomenon. The following table, Table 4, gives an example of such a clause:

| | | |
|-------------|----------------------------|-------------|
| I | like | wearables |
| Participant | Process | Participant |
| Sensor | Process: Mental: Affection | Phenomenon |

Table 3 Transitivity Analysis for "I like computers."

The analysis in Table 4 has the following XML mark -up:

```
<clause>
  <senser>I </senser>
  <mental_process>like </mental_process>
  <phenomenon> wearables
  </phenomenon>
</clause>
```

Figure 4 XML markup of a clause containing a Mental Process

Behavioural Processes

Halliday suggests that Behavioural Processes, that is, processes in which a conscious entity performs an action, are in-between Material and Mental Processes. This is because they involve an aspect of psychological and

physiological action performed by the entity with consciousness. The participant roles in this kind of process are a Behaver who performs the behaviour and the Behaviour itself though the majority of clauses only have one participant. Table 5 details Transitivity analysis for a clause involving a Behavioural Process and is followed by the corresponding XML markup:

| | | |
|-------------|----------------|--------------|
| The users | listen to | the designer |
| Participant | Process | Participant |
| Behaver | Verbal Process | Phenomenon |

Table 4 Transitivity Analysis for “The users listen to the designer”

```

<clause>
  <behave>The users</behave>
  <behavioural_process> listen to
  </behavioural_process>
  <phenomenon> the designer </phenomenon>
</clause>

```

Figure 5 XML markup of a clause containing a behavioural process

Verbal Processes

Verbal processes are processes of saying. The participant roles for this kind of process are of the Sayer who performs the verbal action, the Receiver to whom this verbal action is directed and the Verbiage, the message at the centre of this verbal action. Table 5 gives an example of Transitivity analysis of clause involving a verbal process of the form Sayer + Verbal Process + Receiver + Verbiage.

| | | | |
|-------------|----------------|---------------|-------------|
| The users | ask | the designers | questions |
| Participant | Process | Participant | Participant |
| Sayer | Verbal Process | Receiver | Verbiage |

Table 5 Transitivity analysis for “The users ask the Facilitators questions”

This has the following XML markup:

```

<clause>
  <sayer>The users </sayer>
  <verbal_process> ask </verbal_process>
  <receiver> the designers </receiver>
  <verbiage> questions </verbiage>
</clause>

```

Figure 6 XML markup for a clause involving a Verbal Process

Relational Processes (processes of being)

Relational Processes are processes of being, that is, of processes in which entities are assigned relations to other entities in terms of attributes or identity. Relational Processes may be Attributive or Identifying. Attributive Relational Processes assign an attribute to an entity, while Identifying Relational Processes define the entity. Examples of these types of Relational Processes are provided in Table 6. The reader is also directed to Eggins (1994:254-266) for a useful explanation of the nature of Relational Processes.

| type \ mode | (i) attributive | (ii) identifying |
|--------------------|------------------------------|--------------------------------------|
| (1) intensive | The wearable is heavy | The user is the subject of the study |
| (2) circumstantial | The meeting is on Friday | Tomorrow is the delivery day |
| (3) possessive | The wearable has two aspects | The concept is the designer's |

Table 6 "The principle types of relational processes". Adapted from (Halliday 1994: 119)

The participant roles in a *Attributive Relational Process* are that of *Carrier* and *Value*. The *Carrier* is the entity to which a quality is assigned, namely the *Attribute*. For a *Identifying Relational Process*, the participant roles are the *Token* and *Value*. A *Token* is an entity which is being defined and a *Value* is that which is giving the *Token* this definition. Figure 15 gives the XML markup for an *Attributive Relational Process*.

```
<clause>
  <token> The wearable </value>
  <relational_process>is </relational_process>
  <value>a computer</value>
</clause>
```

Figure 7 XML markup for a clause involving an *Attributive Relational Process*

Existential Processes

Existential Processes are processes in which an entity is stated as existing. The major participant role in this type of process is of the *Existent*, that is, of the entity which exists. Table 7 gives *Transitivity* analysis for a clause involving an *Existential Process*, followed by the corresponding XML markup in Figure 8.

| | | |
|-------------|---------------------|---------------------------------|
| There | are | two different types of wearable |
| Participant | Process | Participant |
| | Existential Process | Existent |

Table 7 Transitivity analysis for “There are two different types of Knowledge wearable”

```

<clause>
  <other>There </other>
  <existential_process>are </existential_process>
  <existent>two different types of wearable
  management</existent>
</clause>

```

Figure 8 XML markup for a clause involving an Existential Process

Transitivity analysis of a substantial corpus

The application of SFL analysis to large corpora is rare due to the time required to do the analysis. Figure 9 indicates the frequency of selection of process types for a corpora of 2072 clauses to which Mattheissen (1998:15) applied transitivity analysis. Mattheissen suggests that this may be viewed as a “profile of the frequency of instantiation of the system options – or looked at from the system-end of the cline of instantiation, this is a probability profile”. The probabilities of process type may be viewed generally as involving “processes of expansion unfolding as happening or as being (‘material’, ‘relational’) – 0.75; and processes of projection (‘mental’, ‘verbal’) – 0.2”

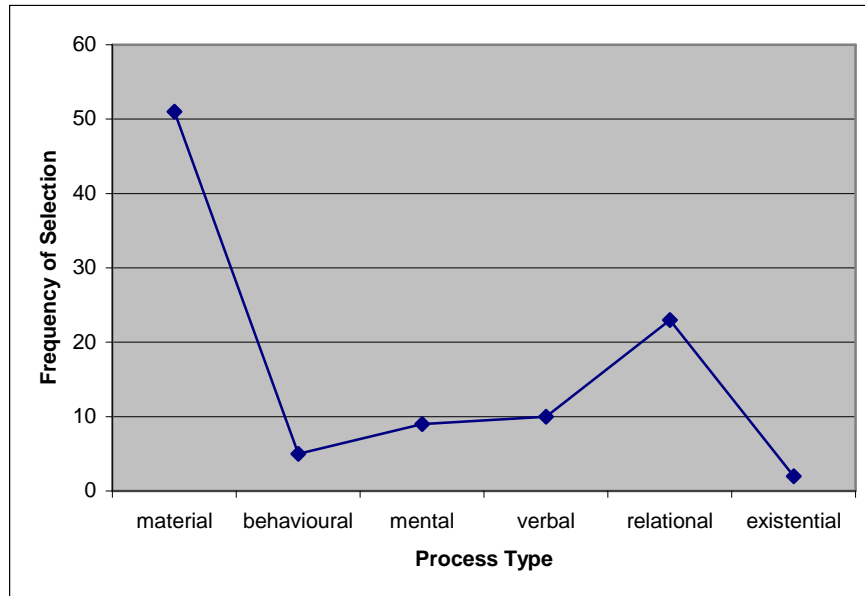


Figure 9 Frequency of instantiation of Process Type (Mattheissen 1998:49)

(Mattheissen 1998:49). These probabilities will be referred to in the analysis of results in the following chapter as they give an indication of degrees of variation of the transitivity of participant’s discourse on particular topics from the transitivity of speakers talking about the cross-section of topics in the corpus.

3.1.1. Ergativity Analysis: Looking at agency in the clause

Ergativity is also located within the Experiential metafunction and offers an additional way of looking at the clause. Ergativity deals with the concept of agency: determining whether a process happens without aid or it caused to happen by something. Viewing the clause in this way, suggests additional participant roles to those outlined in the previous section on Transitivity. These roles give further information on the causality of the process. Halliday (1994) suggest that two participant roles, Medium and Agent, are central to such causality. The Medium is the key element which is most closely associated

with the process in the clause, even though it is not the ‘doer’ or the ‘causer’. Halliday (1994:163) defines the Medium as the element “through which the process is actualized, and without which there would be no process at all”. The Agent, on the other hand is the participant which is the external cause of the process, should one exist. For example, in a Material Process such as seen in Table 9 the Agent is the Actor. Clauses may thus be divided into two kinds: those with external Agents, known as Effective clauses and those without such Agents, known as Middle clauses. Table 9 and Table 10 provide examples of Ergativity analysis of these two types of clauses. Figure 17 and Figure 18 show the corresponding XML markup:

| | | |
|-------|---------|-----------|
| They | design | wearables |
| Agent | Process | Medium |

Table 8: Ergativity analysis of an Effective Clause

```

<clause>
  <agent>they </agent>
  <process>do </process>
  <medium>other types of development</medium>
</clause>

```

Figure 10 XML markup for Ergativity analysis of an Effective clause

| | | |
|-----------|---------|--|
| The study | ended | |
| Medium | Process | |

Table 9: Ergativity analysis of a Middle Clause

```

<clause>
  <agent>The study</agent>
  <process>ended</process>
</clause>

```

Figure 11 XML markup for Ergativity analysis of a Middle clause

4. Related work – literature review

This literature review seeks to cast research into wearable computers in terms of post-Structuralist theorising on the technologised body. In so doing it investigates the ways in which Wearable Computing attempts to reorient the user's experience of the world. Such experience is the focus of this Ph.D. which attempts to use linguistic analysis to uncover its nature. These include the production of devices which seek to enhance reality as it is perceived by the User, who will herein be referred to as the 'Wearer'. Such devices seek to augment the Wearer's experience of a domain by responding to information which they collect about the Wearer and their context.

4.1. Cyber-Flesh: the Wearer as a technologised body

There has been substantial research in the humanities and social sciences into the concept of the 'technologised body', that is, a body whose experience of the world is altered by technology. Kroker introduces the idea of 'dedicated flesh', deconstructing the distinction between the user's body and the computer network. He conceives of the 'interfaced body' as part of a wireless network. In binding the human body to the interface, the brain itself becomes a participant in the virtual network and the body ' cyber-flesh' .

Why be nostalgic? The old body type was always OK, but the wired body with its micro-flesh, multi-media channeled ports, cybernetic fingers, and bubbling neuro-brain finely interfaced to the "standard operating system" of the Internet is infinitely better. Not really the wired body of sci-fi with its mutant designer look, or body flesh with its ghostly reminders of nineteenth-century philosophy, but the hyper-texted body as both: a wired nervous system embedded in living (dedicated) flesh. (Kroker and Weinstein 1994)

While Kroker's analysis of a future political economy of virtual reality which considers issues of digitised subjectivity conflates political theory, academic discourse and science fiction may appear abstract to the realm of wearable computing design, it offers an interesting perspective on the potential of this technology to create a new 'physicality'. A Wearer of a device is at once engaging in a new kind of experience and altering the way in which they approach such 'experience' of the world. In this sense the technology reconstrues the Wearer's field of perception. This will be particularly apparent in Section 2 which deals with wearable devices which seek to 'augment reality'.

Haraway (1991) suggests that technology has the capacity to reconstruct subjectivity and problematise the distinction between the internal and external, conflating experience and rendering what in this paper is the Wearer, a cyborg:

No longer structured by the polarity of public and private, the cyborg defines a technological world based partly on a revolution of social relations in the oikos, the household. Nature and culture are reworked; the one can no longer be the resource for appropriation or incorporation by the other. The relationships for forming wholes from parts, including those of polarity and hierarchical domination, are at issue in the cyborg world. (Haraway 1991)

The reworking of nature is seen in the way technologies such as wearable devices may reshape the way in which the body is socially visible and the extent to which bodily function is operationalised as it interfaces with the machine. While researchers assert the necessity of developing devices which are customised to suit the context in which they will operate (Dorsey and Siewiorek 2002.), the possibility that these devices will in future direct the avenues of human experience and perception is an interesting issue.

4.2. Augmented Reality

Wearable devices often seek to 'augment' reality through spatialized 3D graphics and audio cues (Billingshurst, Bowskill et al. 1998; Reitmayr and Schmalstieg 2001), frequently with a view to enhancing distributed collaboration (Billingshurst, Weghorst et al. 1997; Mulligan and Daniilidis 2000). The capacity of wearable computers to

renegotiate our perceptual relation with the environment is an interesting semiotic issue. In order to illustrate this it is necessary to introduce Peirce's triadic theory of signification, that is the process by which a subject makes meaning. Peirce conceives a triadic relation of signification which hinges upon mediating processes that emphasise the relational and perspectival aspect of representation. A sign, in this context, is 'grounded' by its interpretation:

A sign, or representament, is something which stands to somebody for something in some respect or capacity. It addresses somebody, that is, creates in the mind of that person an equivalent sign, or perhaps a more developed sign. That sign which it creates I call the interpretant of the first sign. (Peirce, Burks et al. 1931).

Thus, Peirce develops the notion of a 'grounded Interpretant', that is of perception which is culturally and socially constructed. The focus on such grounding of triadic semiosis may form the basis of an argument against knowledge management initiatives which ignore the mediation of meaning through culture. At the organisational level, Peirce's interpretant may be figured as organisational culture:

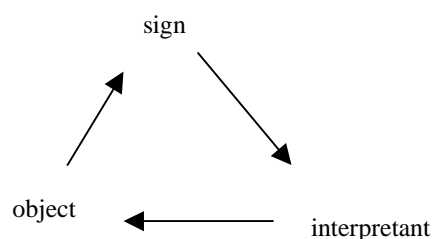


Figure 1: A triadic conception of semiosis

The 'grounding' of semiosis is akin to (Suchman 1987) conception of 'situatedness' as it relocates context from the periphery to the center of meaning-making. The presence of

the wearable computer ‘extends’ this process of signification, adding another layer to Peirce’s triad.

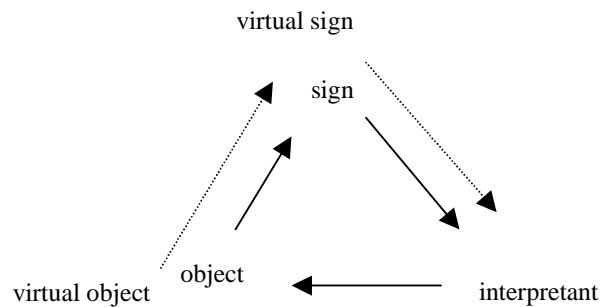


Figure 2 : ‘Wearable’ semiosis

The virtual object and virtual sign which the wearable computer superimposes upon the physical object has an interesting relationship to the subject’s interpretant. Viewing the computer as part of the subject’s perceptual apparatus as an extension of it figures the virtual sign as internally produced and closer to the role of the interpretant itself.

Sparacino (2002) develops a wearable computer designed to operate in museum exhibitions to ‘enhance’ the Wearer’s experience and ‘perception’ of exhibits through a personalised audiovisual narrative. The aim is to provide an ‘experience’ which is personalised based upon the Wearer’s path through the museum and the length of their ‘stops’ in front of exhibits. The wearable architecture consists of a “custom-designed long-range infrared location-identification sensor”, a lightweight CPU in a shoulder pack and a private-eye display consisting of a “commercial monocular, VGA-resolution, color, clip-on screen” attached to headphones. This is summarised in the following figure:

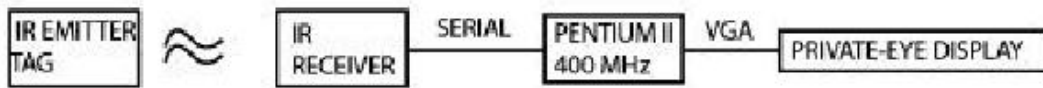


Figure 12 Museum wearable components (Sparacino 2002)

The user's brain 'assembles' the image which is perceived naturally by one eye with another which is projected by the artificial 'private-eye display' and seen only by the other eye. The resulting experience is one of seamless 'augmented reality' as suggested in Figure X. In this way, the device alters subjective perceptual experience as it integrates with natural visual functioning.

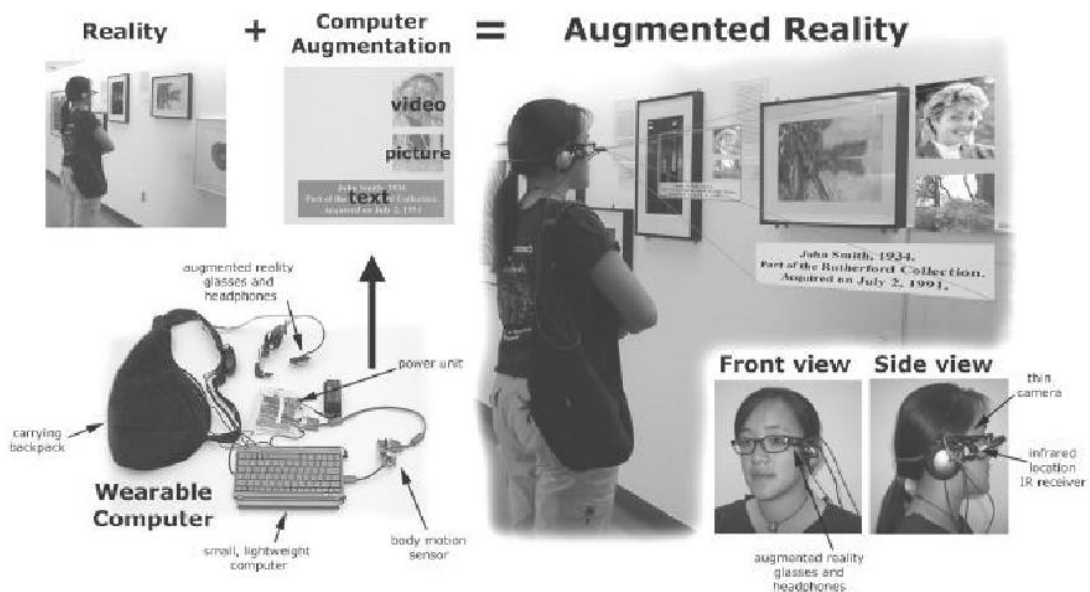


Figure 13 Concept of 'augmented reality' (Sparacino 2002)

The ontological focus of devices such as the Museum Wearable is on the Wearer's perception. The extent to which the machine involves itself in such perception is part of the focus of Kroker's notion of 'dedicated flesh' discussed in section X.

4.3. An emotional interface: affect perceiving devices

Healey et al. and Picard and Healey (1997) present the concept of an "affective wearable", that is a system worn on the body capable of gathering input about the affective patterns of the wearer. These systems may be distinguished from mere portable computers by the closeness and extent of physical contact of the device with the body. Understanding human affective response is a major area of research in psychology and medicine and currently available technology such as heart rate monitors plays an important part in facilitating this research.

Devices which allow the 'host' to 'perceive' through the mediation of an interface data about their affective state offer an interesting extension of human perceptual function. Making this data explicit will also impact on the interpersonal as devices communicate with each other about their host's state or other humans view the interface displaying that state. Making what is considered internal and intuitable rather than visible external opens up important questions on how such experience should be construed:

If you are willing to transmit your mood to your spouse at the end of the day, how should this information be presented? As synthesised facial expression, modulated vocal announcement, or, encoded in something more subtle, such as a note announcing the arrival of fresh flowers at the local store which is on your way home? (Picard and Healey 1997: 6)

Picard and Healey (1997) cite the importance of considering privacy issues in the transmission of affective information. In addition, the way this technology has the potential to problematise the relation between the internal and external; between emotion and perception should be considered

Healey applies the affective wearables introduced above to the domain of personalised music. The system which Healey developed is an “Affective DJ” which uses a modified palm pilot which can accept input from an electromyogram to measure ‘changes in the user’s skin conductance on the palm of the hand’ to draw conclusions about the user’s affective state. The study utilises an algorithm based on this galvanic skin response which presupposes a significant relationship between the physiological signal and the subject’s mood. Preliminary testing claims to have found a significant correlation between this algorithm and the ‘perceived excitement of the song’. The aim is to match the song played to the user’s current mood.

Collecting information about the user through their affective response is an interesting development in implicit data collection for user modelling. The reluctance of users to contribute explicit information unless it is directly related to their goals is a fundamental problem for personalised systems (Carroll and Rosson 1987). Implicit data collection techniques have thus far focused on user activities such as mouse-clicking. Healey’s

focus on the ‘naturalness of preferences and affective responses’ raises the question of the device reorientating the user’s affective behaviour due to physical constraints such as annoying electrodes or the extent to which its presence impedes upon the fluidity of social interaction.

4.4. Renegotiating Space: Merging the physical and virtual context

Sparacino, Davenport et al. (2000) suggest that wearable computing “provides a means to transform the architecture and the space surrounding us into a memory device and storytelling agent”. They introduce the concept of an ‘information landscape’ which acts as a cognitive map to process, manage and understand textual and visual information. Their impetus comes from work in cognitive psychology on spatial orientation. They cite a variety of mnemonic techniques ‘based on associating information to a location in space’ which have been used since antiquity. Drawing upon these techniques, they construct an ‘internet memory city’ called Wearable City.

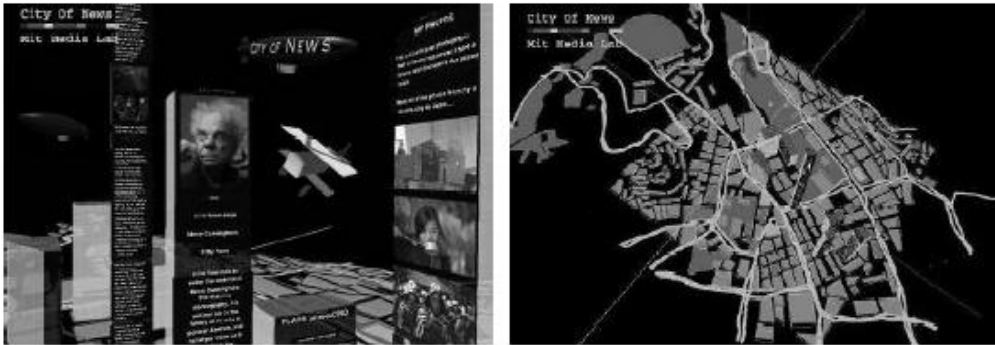


Figure 14 Projection of information onto landscape (Sparacino, Davenport et al. 2000)

Within the city, text and graphics from webpages are mapped onto webpages while the user browses, as Figure 3 suggests. The districts of the city represent “the different conceptual areas” by which the internet search engines divide sites. The system is wearable and consists of a “jacket which has an embedded CPU, a sensing system for location identification, high-resolution color display head, mounted display glasses, and a touch sensitive threaded keypad as input” which is sewn into a sleeve of the jacket.

In addition to architectural mnemonics, the study suggests the importance of narratives in individual’s experience of the world. They thus introduce the concept of ‘narrative architecture’ in which the Wearer’s traversal of the architectural environment is conceived as a narration of experience:

Architecture and narrative are certainly not disjoint, and the history of architecture offers innumerable examples of places which embed and narrate a story through their spatial layout and décor...we can see a path through space as generator of a flexible and interactive story, as an Ariana’s thread in the logos of architecture. (Sparacino, Davenport et al. 2000: 6)

Sparacino, Davenport et al. (2000) suggest that they are able transform a space into a 'living memory theatre' in which the Wearer experiences the exhibition as a movie or interactive documentary:

Our work hypothesis for our second application is that by wearing a small computer able to articulate a visual and auditory narrative in its private eye display, we can accomplish architecture's dream to transform itself into narrative. (Sparacino, Davenport et al. 2000: 7)

Their technique seeks for transforming architecture "into narrative" to 'situate' cinematic experience within a virtual landscape using 'perceptive media modelling'. The wearable cinema runs on the wearable CPU in real-time rather than a desktop computer. Real-time computer vision is used as input for location finding via colour histograms and shape analysis. The set-up is shown in the following figure:



Figure 15 Wearable Cinema setup:backpack, two CPUs, camera and lightweight color SVGA glasstron display (Sparacino, Davenport et al. 2000)

This is attempt to reshape the Wearer's conception of space into a composite, multinarratorial experience.

5. Schedule

A high-level schedule for the project is presented overleaf:

6. Conclusion

This Ph.D. proposal has outlined how SFL may be used to investigate the user's experience of the wearable device and how the device changes their interaction with their environment. It has also suggested that this kind of discourse analysis may be useful in eliciting user requirements. In so doing, we have outlined methods for discourse analysis such as Transitivity and Ergativity analysis which will be applied to the users' discourse on their experience of using the wearable device. The aim is to understand the areas in which this experience is reconfigured by the presence of the wearable device. We hope to use this analysis technique to better elicit the users' requirements in order to achieve wearable devices which provide the users' with the kind of experiences they desire in the various domains in which they use wearable computers.

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