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CATEGORISING EMOTIONAL EXPERIENCES WITH PORTABLE INTERACTIVE DEVICES

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ABSTRACT

This paper reports on a six month longitudinal study exploring people's emotional experience with two categories of portable interactive devices (PIDs); media and health related PIDs. The focus is on emotions and how PIDs mediate these experiences in everyday contexts. Previous findings presented by the authors (Gomez, Popovic, Blackler, 2009; 2010) revealed that people's emotional experiences with PIDs over time are influenced by whether interactions were at a personal or social level. This paper presents four categories of activities identified and their relationship to emotional experiences with PIDs that have been developed through further analysis of the data. It concludes with a discussion of the findings and their implications to the field of Design on the design of future PIDs.

Keywords: Design emotion, emotional experiences, emotion and portable interactive devices

INTRODUCTION

There is little doubt that emotions play a central role in human experience. Emotions filter thoughts, behaviours, attention and various other aspects of everyday experience; especially during interaction with products. Portable interactive devices (PIDs) are especially interesting because they are carried and interacted with in diverse contexts, alone or with other people, and in private or public setting. As such people's relationship with PIDs, and their emotional experiences, can be unique and distinctive in ways that other products cannot.

This paper discusses a longitudinal study conducted exploring the emotional experience of two product

categories including media/entertainment PIDs (MP3 players and PDAs with mobile telephone functionality) and medical/health PIDs (blood-glucose monitor, pedometer and heart-rate monitor). The authors have previously published papers outlining the the impact of the social level on the overall emotional experience (Gomez, Popovic, Blackler, 2009; 2010). It was identified that negative and positive social experiences have different impacts on the emotional experience between media products and medical products. This paper discusses further findings and outlines four categories of activities and their relationship to the emotional experience perceived by participants.

BACKGROUND

Picard and Wexelblat (2002) maintain that designers who do not take into account emotional aspect of human experiences will inevitably develop artefacts and systems that are incomplete and bound to ignore basic human needs and desires. Thus, when considering interactions between people and artefacts the starting point should not be; *how can this device make the life of the person more enjoyable?* but rather; *what type of experiences make people happy in everyday life?* closely followed by; *how can the device facilitate or enhance these experiences through everyday use?* As a result, the fundamental step in making new technology usable, practical and ultimately enjoyable involves understanding people and their experiences with artefacts in everyday situations; and designing the artefacts around that critical understanding (Merholz, Wilkens, Schauer & Verba, 2008).

The position taken in this research reflects the experience design approach (Budd, Taylor, Wakkary & Evernden, 2005; Schifferstein & Hekkert, 2008)

and the work of Dourish (2001) where the concern is not purely the physical interface of the products or its usability aspects but rather the ways in which they are experienced in everyday contexts. As such, the research centers on exploring emotional interactions with PIDs in real life contexts. This includes focusing on the emotional aspects of interaction, situating experiences within real life contexts and observing these evolving emotional experiences over time. It aims to enable designers to better understand how to support and enhance the evolving emotional experience between people and PIDs.

MEDIA/ENTERTAINMENT DEVICES

Media and entertainment PIDs allow people to interact with entertainment, news, information and a whole subset of personal and business communications in ways never before possible (Cairncross, 1997; Hamill and Lasen, 2005; Jones & Marsden 2006). These devices open up novel means of communication that impact personal and social relationships (Wiberg, 2005). For instance, during early years of mobile telephone research, statistics showed that very advanced technology such as WAP (wireless application protocol), video calling and mobile payment schemes failed while the use of very basic applications such as voice calling and text-based messaging thrived. Why would these very advanced, supposedly appropriate and useful, applications fail while the basic ones succeed? Essentially the answer lies in the fact that the latter “meet basic human desires in simple, direct ways” (Jones & Marsden, 2006 p5). From this perspective it is critical to understand how artefacts, especially media/entertainment PIDs, are to be designed to fulfill and meet these basic needs.

To date there has been research conducted relating to emotions with media/entertainment PIDs, particularly focused on mobile telephones (Vincent, 2006; Arvola, 2004; Ito, Okabe & Matsuda, 2005; Ling, 2004; Palen, Salzman & Youngs, 2001; Plants, 2001). Stelmaszewska, Blanford and Fields (2005) studied peoples’ experiences and emotions when using technology; including PDAs, mobile telephones and MP3 players. Although interesting aspects in relation to the social dimension of interaction were

reported, the research did not appear to have methodologically recorded or documented the longitudinal aspect of interaction. With regard to mobile music players Heye and Lamont (2010) discuss the use of music as a means to control, associate and/or prolong emotional moods in listeners while travelling. Although this study focused on emotional aspects of using MP3 players the longitudinal aspect of interacting with these devices over time did not appear to be explored. Likewise, Geisler and Golden (2003) reported on results from structured interviews conducted with PDA users but neither the emotional reaction nor the longitudinal aspects of use were specifically observed. Kallinen (2004) also explored PDA interaction; however the focus was on the emotional response to music while interacting with PDAs and did not appear to deal with the longitudinal aspect or use in everyday life. So while there is evidence of research on the emotional aspect of interaction with media/entertainment PIDs as discussed above there appears to be limited research specifically focusing on a longitudinal study of emotional experiences of everyday interactions with these types of devices.

MEDICAL/HEALTH DEVICES

Emotions have a significant role to play in how people feel about themselves and about their health (Mayne, 2001). Thus, devices that assist in the health process should be designed to support the recovery and quality of life of people as they are implicated in influencing the way they relate to their own health and general wellbeing. Further, with these devices being portable, health issues are no longer confined to private contexts as they can now be used anywhere, anytime and bring what has previously been a private experience into the public realm.

Currently, there exists a multitude of PIDs to assist with personal health including heart rate monitors, pedometers, blood-glucose monitors among others. The proliferation of these types of devices is set to continue with various health-care companies investing in portable health device technologies (Dean, 2009; Dolan, 2009; Hattangady, 2009; Wong, n.d.). Frog Design, a leading design company based in the United States, published an article in collaboration with health-care providers, consumers,

governments, and technology companies illustrating a vision of the future for health care that included a significant application and use of portable devices for personal and social use (Kilian and Pantuso, 2009).

Research in this area has focused on developing infrastructure and associated systems for wireless telemedicine (Dean, 2009; Lymberis & Dittmar, 2007; Varshney, 2007; Park & Jayaraman, 2003). These reports have mainly been produced to make the case for a shift in resources and research to support this potential future. Recently a special section in IEEE Transactions on Information Technology in Biomedicine was devoted to affective and pervasive computing for healthcare (Vasilakos & Lisetti, 2010). Although the research is interesting and highlights the importance of emotions for health PIDs it does not specifically explore emotional aspects of interacting with these types of products over time. Pentland (2004) reports on the opportunities of future wearable and portable health devices but does not refer to the emotional effects these devices might have on potential users during interaction and what that might mean for the design of the devices. Likewise, Reiner (2008) conducted a study of a portable respiratory assistance device over a 3 week period with participants but focused mainly on the effectiveness of the device for treatment of particular anxiety disorders. Although there was an examination on emotional aspects of using the device this had more to do with patient response to the treatments rather than how they felt regarding their use of the product and how it fit into their daily lives. Perhaps the work conducted by Shah (2005) best relates to the approach taken in this study. Shah conducted an experiment to explore how pleasurable user interactions and situated computing can increase patient compliance with physician recommendations, as well as aid patients in making better health-related decisions.

Although pleasurable aspects of interaction were mentioned as a focus of the research it is not clear how this was studied. The research in this area suggest that on the one hand there is a link between people's emotions and their health and on the other a growing momentum for the advancement of

portable health devices from the medical industry, there appears to be little research available looking at the emotional experience of interaction with health related PIDs over time.

THEORETICAL FRAMEWORK

To contextualise interactions between people and PIDs, Activity Theory has been used as a theoretical framework. Nardi (1996) has described Activity Theory not as a theory as such but rather as a powerful tool to clarify and describe the way people interact with artefacts in the world. From this perspective understanding how people perceive and act in real life contexts is crucial and forms the basis for understanding how they perceive the world around them (Kuutti, 1996). In this way, artefacts become the means to an end, not the end itself, and are appropriately viewed as mediators for human experience. Three central features of Activity Theory that relate to this research include the focus on; (1) activities through time; (2) activities within context and (3) considering people not merely as agents in a system but rather as having motives, intentions and emotions.

Activities are composed of three levels with *activities* sitting at the highest level, composed of *actions*, composed of *operations* at the lowest level (1996). This model explains a complex interaction dynamic in a simplified manner. For instance, to make a call with a mobile telephone a number is dialed (*operations*), a conversation ensues (*actions*) and a message is communicated (*activity*). The model also takes into account the dynamic nature of activities. To continue the previous example, if in the attempt to make a call the mobile telephone does not function, the *activity* changes to finding out what the problem is, while the *action* may involve looking for error messages or checking for a signal, and *operation/s* include pressing buttons and so forth. This highlights the fact that activities are neither static nor one-dimensional. Activities exist on multiple levels simultaneously consisting of a global (or macro) level and a local (or micro) level (Gomez, Popovic, Bucolo, 2004). In relation to this study the global-level is composed of the overall emotional experiences perceived by the participants during each month and at the end of the study, while

the local-level is composed of the multitude of experiences recorded throughout that time. This concept has certain implications and advantages for this study. It has been discussed earlier (Gomez, et.al., 2009; 2010) and will be outlined briefly.

EMOTIONS WITH PORTABLE INTERACTIVE DEVICES: A LONGITUDINAL STUDY

Two experiments were conducted exploring the emotional experience of interacting with media/entertainment PIDs and medical/health PIDs during everyday use over the first six months of use. The discussion regarding the experimental method, approach, aims and objectives have been outlined previously (Gomez, et.al., 2009, 2010).

Nevertheless, this paper reports on the latest set of findings that have identified categories and relationships of use between participants and the PIDs providing insights into the ways people interact with PIDs in daily life and how they in-turn impact the evolving emotional experience. Results from the investigation provide data to better understand how to appropriately design PIDs to support positive (and avoid negative) emotional experiences in everyday situations.

The primary aim of the research was to observe what types of factors influence the emotional interaction with these types of PIDs. The objectives included: observing the fluctuating relationships with PIDs over the course of time (six months); determining the critical factors influencing the overall emotional experience; and outlining how these factors influence the overall emotional experience in a positive or negative way.

DATA COLLECTION AND TECHNIQUES

The experiments centered on recording experiences with PIDs in everyday life over the course of the initial six months of use. There were various complications with participant recruitment and retention throughout the study. In retrospect the authors believe this is due to the six-month timeframe, which placed a significant time obligation on potential participants. For the media/entertainment PID experiment nine participants were involved in the study; six used MP3s while three used PDAs (with mobile telephone functionality). For the medical/health PID experiment six participants completed the study (out of an initial group of eight); three used pedometers, two used heart-rate monitors and one utilised a blood-glucose testing device. Only users with no more than two months experience with the devices were recruited; thus attempting to capture the initial stages of interaction and how it evolved over the six months of use.

A triangulation approach consisting of diaries, interviews and co-discovery techniques was used to help make the research and results more reliable and valid (Denzin and Lincoln, 2003; Robson, 2002) and increase the theoretical generalisations emerging from the study (Flick, 2006). The experiment was divided into the following four stages: (1) initial interview, (2) participant diaries, (3) intermittent consultations and (4) co-discovery (Figure 1). All audio and textual data emerging from the study were analysed using Atlas.ti software.

INITIAL INTERVIEW

The initial interview (15-20 minutes) centered on gaining knowledge about the participant's

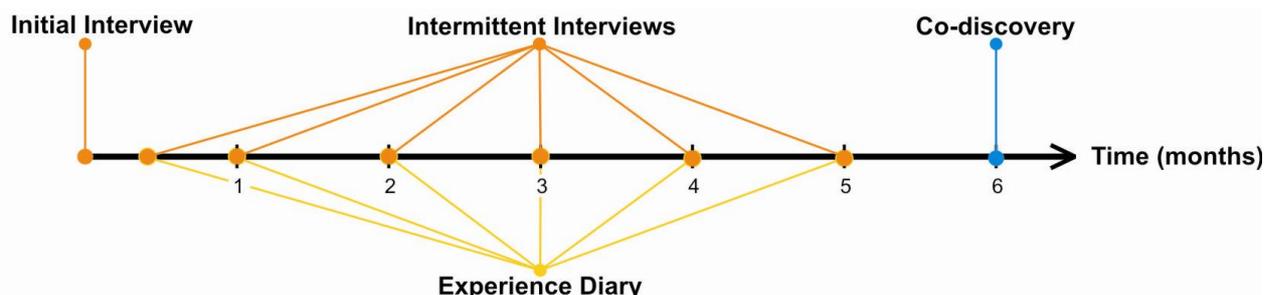


Figure 1. Timeline showing the various techniques used in the longitudinal study including interviews (initial and intermittent), experience diaries and co-discovery.

expectations of the product, initial emotions toward the product, the expectation of benefits it might provide, and any possible challenges expected.

EXPERIENCE DIARIES

Experience diaries were used by participants to record relevant interactions with the products over six months. Participants were asked to fill out the diary once a week. The structure of the diary provided for up to three experiences per week primarily highlighting the emotional experiences with the product during interactions. The diaries included the following questions: context of interaction (location/time/date); activity performed (purpose of use); who was present during interactions (alone/with other people); and an indication of emotional experiences (perceived emotional reaction to experience). The participants recorded their emotional reaction using the Emotional Chart (Gomez et.al., 2004) and has been effectively used as a self-reporting tool in other studies investigating design and emotions (Desmet, 2002; Fagerberg, Stahl & Hook, 2004).

INTERMITTENT INTERVIEWS

Between five and six semi-structured intermittent consultations (15-20 minutes) were conducted with participants over the six-month period. The interviews were recorded through audio and note taking. Between two and three consultations were performed in the first month, followed by one a month for the remaining five months. The purpose was twofold; regularly check any problems with the diary, and record more detailed information about the experiences. Participants were asked questions on the number of times they had used the product since the previous interview, feelings towards the product, positive experiences of using the product, negative experiences of using the product, and the positive or negative impact of the surrounding context (environmental or social).

CO-DISCOVERY

The final part of the study involved a co-discovery session between two and/or three participants. This part of the study focused on how their expectations in the beginning changed as their experiences with the products evolved over the six month period.

ANALYSIS

The data was analysed using a content analysis technique (Bauer & Gaskell 2000). To assist in contextualising the findings the data sets were split into two categories; local-level experiences and global-level experiences. Firstly, data relating to specific activities within the overall six month timeframe were categorised as local-level experiences. For example, using the MP3 player to listen to a song on a train or checking the heart-rate monitor to determine heart rate would be a local-level experience. During the interviews participants may be asked how they felt about the product over the previous month. Their responses would be characterised as global-level experiences. These global-level experiences were composed of many local-level interactions throughout. Table 1 shows the relationship between data gathering techniques and how data was categorised. This study primarily focuses on the analysis of the local-level interactions from initial interviews, experience diaries and intermittent interviews.

Data collection and Methods	Global-level experiences	Local-level experiences
Initial Interview	✓	✓
Experience Diary		✓
Intermittent Interview	✓	✓
Co-discovery	✓	

Table 1. The breakdown of data collected for global-level experiences and local-level experiences

CODING SCHEMES

Since one of the objectives was to determine aspects of interaction that influenced the emotional experience it was relevant to define the types of interactions that people were involved in. Thus a coding scheme was developed with three broad themes; *Context*, *Emotional Perception* and *Activities*. Tables 2 and 3 outline the *Activities* categories and sub-categories for media/entertainment PIDs and medical/health PIDs respectively.

Local-level data from the interviews were the primary source to develop the sub-categories for *Activities*. These could only be developed during the coding process, as participant activities could not be

Theme	Category	Sub-Categories
Activities	Feature	Interface
		Headphones
		Sound Quality
		Portability
		Technology
		Aesthetics
		Memory capacity
	Functional	Music / Songs
		Podcasts / Sound files
		Calendar
		Contacting people
		GPS
		Calculator
		Pictures / camera
		TV
		Games
		Generic work function
		Transporting product
	Mediation	Relaxation
		Escape
		Distraction
		Companionship
		Product becomes part of background use
Conscious awareness of product		
Association of particular cultural group		
Auxiliary	Mobile phone (cell) reception	
	Battery	
	Loosing product	
	Damaging product	

Table 2. Media / Entertainment PIDs Coding Scheme for Activities theme

predicted beforehand. For example, an excerpt from the interviews outlines how the *Calendar* sub-category for media/entertainment PID on Table 2 was defined.

It is convenient for me... I have something that I can make appointments on the go and if someone says let's meet tomorrow I know when I am available...

The participant identified the activity of inputting appointments into the PDA as a convenient function

of the product. Another example is an excerpt from a participant that identifies both the *Interface* and *Data storage* sub-categories for medical/health PIDs on Table 2:

So I can have a look at how I'm doing...just flick back and have a look. The watch itself has also got a couple of things built in... so I can go, just by looking at the watch I can go back about six to eight weeks um, on history [and] events.

Themes	Category	Sub-category 1
Activities	Feature	Comfort
		Data storage
		Aesthetics
		Portability
		Quality of mechanism / product
		Interface
		Technology
		Rattling
		Alarm
		Changing needle
		Changing strips
		Logging of data
		Strap
		Beeping
		Clip
	Resetting	
	Functional	Recording steps
		Taking blood sample
		Reading hear rate
		Tread function
		Reading VO2 max
		Timing
		Telling time
	Mediation	Monitoring personal fitness
		Product just another item to carry
		Motivator
		Consciousness of product
		Becomes part of background
		Forgotten about product
		Monitoring personal health
	Relying on product	
	Auxiliary	Loosing product
Brochure / manual		
Damaging product		
Maintenance		
Product broken		

Table 3. Medical / Health PIDs Coding Scheme for Activities theme

Here the participant identifies an aspect relating to the product's interface ...I can have a look at how I'm doing... Just flick back and have a look, as well as the data storage capabilities of the product itself ...I can go back about six to eight weeks...on history on events. All of the sub-categories for *Activities* were developed in this manner for both product categories.

ACTIVITIES CATEGORIES

The procedure above explains how initially the sub-categories of both product types were developed from the actual experiences performed by the participants during the course of the study. Once the sub-categories were outlined it was determined to group these into comprehensive categories that

encapsulated these activities. For example the sub-categories in Table 2 including *Interface*, *Headphones*, *Sound Quality*, *Portability*, *Technology*, *Aesthetics* and *Memory Capacity* all represented features relating to the product in question and as such the category *Feature* was developed to encapsulate these. The remaining categories including *Functions* (specific functions of the products), *Mediation* (an activity that permitted the participant to experience that was not purely simply functional) and *Auxiliary* (tertiary type of activity) were developed using the same process.

FINDINGS

Once the data were analysed some relevant findings regarding relationships between the different *Activity* categories and emotional experiences across both product types could be explored. Tables 4 and 5 show the overall numbers of positive and negative emotional experiences (and relative percentages) of the *Activities* categories across all participants for the media/entertainment and medical/health PID types respectively.

MAJOR CATEGORIES OF INTERACTION

Results outlined on Tables 4 and 5 illustrate some similarities and differences between the most often mentioned categories identified for both product types. Table 4 illustrates the main categories participants mentioned for media/entertainment PIDs were the *Feature* (42%) and *Functional* (40%) categories, accounting for 82% of all activities discussed. In contrast Table 5 indicates that emphasis is placed on *Feature* (58%) and *Mediation* (23%) activities for the medical/health related PIDs which together account for 81% of all activities discussed.

An interesting finding to note is that *Feature* appears as the highest mentioned category for both product types and accounts for 47% of all activities mentioned (across both categories combined).

FEATURE CATEGORY AND EMOTIONAL EXPERIENCES

An interesting finding derived from the data analysis is that although the *Feature* category is mentioned the most by all participants, the majority were characterised as negative in nature (Figure 2). For instance, looking at *Feature* related activities more closely in the media/entertainment category 63% of *Feature* activities were described as negative in nature. Likewise in the medical/health category 62% of *Feature* activities were described as negative in nature.

Category	Positive	Negative	Overall (pos + neg)	Percentage
Functional	101	68	169	40%
Feature	66	112	178	42%
Mediation	37	9	46	11%
Auxiliary	4	29	33	7%
Total	208	218	426	

Table 4. Overall results for Activities categories in the Media / Entertainment PIDs

Category	Positive	Negative	Overall (pos + neg)	Percentage
Functional	14	16	30	16%
Feature	42	69	111	58%
Mediation	35	8	43	23%
Auxiliary	-	6	6	3%
Total	91	99	190	

Table 5. Overall results for Activities categories in the Medical / Health PIDs

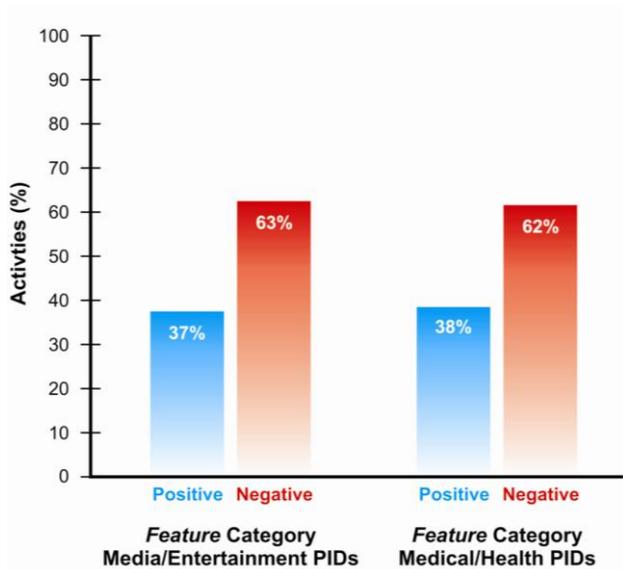


Figure 2. Overall percentage of Feature activities characterised positive and negative for Media/Entertainment (left) and Medical/Health PIDs (right)

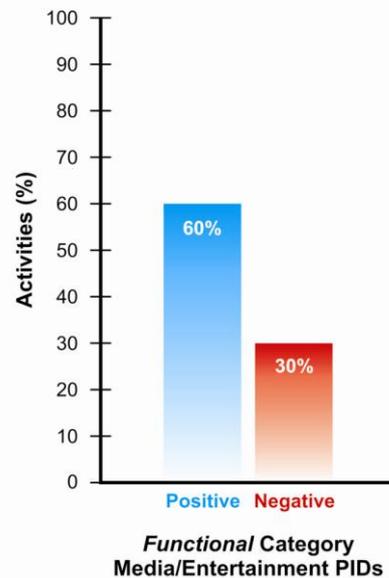


Figure 3. Overall percentage of Functional activities characterised positive and negative for Media/Entertainment PIDs

FUNCTIONAL / MEDIATION CATEGORIES AND EMOTIONAL EXPERIENCES

Looking more closely at the second highest categories for each product type, *Functional* and *Mediation* for media/entertainment and medical/health respectively, it can be noted that these were characterised as more positive in nature. For media/entertainment PIDs 60% of the experiences in the *Functional* category were characterised as positive in nature (Figure 3).

For medical/health PIDs the second highest category was the *Mediation* category with 81% of the experiences characterised as positive in nature (Figure 4).

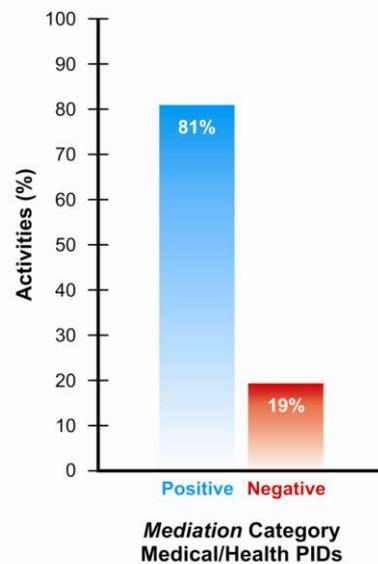


Figure 4. Overall percentage of Mediation activities characterised positive and negative for Medical/Health PIDs

MEDIATION CATEGORY AND EMOTIONAL EXPERIENCES

Another interesting result is the overwhelmingly positive characterisation of *Mediation* activities for both product types. As already established it appears that *Mediation* activities are significant for the medical/health PIDs, accounting for 23% of all experiences mentioned. Nevertheless, even though *Mediation* activities only account for 11% of all experiences mentioned for the media/entertainment PIDs, the proportion characterised as positive is the same as medical/health. As such for the

media/entertainment PIDs the percentage of *Mediation* activities characterised as positive is 80% while for the medical/health product types the percentage of positive experiences is 81%.

AUXILIARY CATEGORY AND EMOTIONAL EXPERIENCES

For all participants throughout the 6 months the least mentioned activities related to the *Auxiliary* category. These activities accounted for 7% and 3% of all experiences for the media/entertainment and medical/health PIDs respectively. It is worthwhile noting however that even though they were rarely mentioned, there was an overwhelmingly negative characterisation of experiences associated with this category such that for media/entertainment PIDs 88% of experiences were noted as negative while for the medical/health PIDs 100% experiences were noted as negative.

DISCUSSION AND IMPLICATIONS FOR DESIGN

The results presented here have identified interesting aspects regarding the relationship between activities and the associated emotional experiences reported by participants over the six-month study. Three main aspects are discussed and contextualised within PID design.

Firstly it was identified that the most mentioned category by participants was *Feature* for both media/entertainment and medical/health PIDs. Nevertheless, a considerable amount of these experiences were characterised as negative. This has implications for the design of media/entertainment product type as it would be important to consider that *Feature* related aspects play a significant role over a long period of time during the user-product relationship and are inclined to be perceived as negative in nature.

Secondly another relevant aspect is that the next most mentioned category differed for both product types. The *Functional* category was (fractionally) the second most mentioned by participants using the media/entertainment PIDs while for the medical/health it was the *Mediation* category. It was initially expected that *Mediation* related activities would be mentioned more often for the media/entertainment PIDs since it was predicted

that these types of devices were more inclined to be used to facilitate specific activities (both formal and informal in nature) and also open to more spontaneous experiences whereas medical/health products were more inclined to be used for more particular and restrictive purposes. However, the findings demonstrate this was not the case. Further, it is interesting to note that most *Functional* activities for media/entertainment PIDs and *Mediation* activities for medical/health PIDs were mainly characterised as positive in nature by participants. This suggests that for media/entertainment PIDs it is important to consider *Functional* related aspects as they represent a large portion of experiences and users potentially relate positively toward them over the course of interaction. Likewise, for medical/health PIDs it is important to consider that users focus on *Mediation* related activities during the course of interaction and that these types of activities may be inclined to be positive in nature.

Thirdly, although *Mediation* categories differed in quantity across both product types, when mentioned they were overwhelmingly discussed in a positive light. This finding is important as it might support the hypothesis that *Mediation* activities may not be mentioned as often as other categories but they still play a vital role in influencing and impacting the overall emotional experience perceived by participants during interactions over time. Further research needs to be conducted to explore this in depth.

CONCLUSION

The findings discussed regarding similarities and differences in the relationship between *Activity* categories and emotional experience are a significant contribution to the design field and the potential future design of PIDs, especially in regards to interactions with these devices in real life contexts. The findings are significant because they illustrate that over the initial six months of use with PIDs certain activities types are focused on more than others and these differ for the two PID types. These activity categories are characterised as either positive or negative in nature and have the potential to influence and impact on the overall experience

perceived by the participant over the course of interaction. Further analysis and correlation of results from the studies needs to be conducted but the findings discussed are certainly a step forward in understanding emotional experiences during interactions with PIDs.

The authors have previously published papers identifying the role that personal and social experiences play in the overall emotional experience (Gomez, et.al., 2009; 2010). This paper reported on further findings that identified four different activity categories including *Feature*, *Functional*, *Mediation* and *Auxiliary* activities. The activities within these categories were further linked to the emotional experience perceived by participants and relationships between these two aspects were outlined.

Results demonstrate that over the course of six months the most mentioned category for both product types was the *Feature* category. It was identified that participants significantly characterised the *Feature* activities as negative in nature. For media/entertainment PIDs the *Functional* category was the second most mentioned category while for the medical/health products it was the *Mediation* category. Both of these were classified as positive in nature. *Mediation* activities discussed for both product categories were characterised as positive in nature. *Auxiliary* category appeared to be least mentioned category with a notable bias towards negative characterisation of these activities for both product types.

Further analysis can now be performed on the data to identify additional relationships at all levels of interaction. It is predicted that some interesting trends about people's emotional experience with portable devices over time and in real life contexts will be revealed.

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References

- Arvola, M. (2004) *Shades of use - the dynamics of interaction design for sociable use*. Doctoral Dissertation, Sweden: Linköping University.
- Bauer, M. & Gaskell, G. (2000) *Qualitative researching with text, image and sound: a practical handbook*. London: SAGE.
- Budd, J. Taylor, R. Wakkary, R. & Evernden, D. (2005) *Industrial Design to Experience Design: Searching for New Common Ground*. Available http://www.sfu.ca/~rwakkary/papers/ICSID_final.pdf [Accessed 1st May, 2011]
- Cairncross, F. (1997) *The Death of Distance*. Boston: Harvard Business School Press.
- Dean, S (2009) *Current, future trends in medical electronics*. Available http://www.eetasia.com/STATIC/PDF/200908/EEOL_2009AUG04_EMS_TA_01.pdf?SOURCES=DOWNLOAD [Accessed 1st May, 2011]
- Denzin, N. K. & Lincoln, Y. S. (2003) *Strategies of qualitative inquiry*. USA: SAGE.
- Desmet, P. M. A. (2002) *Designing Emotions*. The Netherlands: TU Delft.
- Dolan, B (2009) *Google Health: The future of healthcare is mobile*. Available <http://mhealthinsight.com/2009/05/08/google-health-the-future-of-healthcare-is-mobile/> [Accessed 1st May, 2011]
- Dourish, P. (2001) *Where the action is: the foundations of embodied interaction*. Cambridge: MIT Press.
- Fagerberg, P. Stahl, A. & Hook, K. (2004). eMoto: Emotionally engaging interactions. *Personal and Ubiquitous Computing*, Vol.8, No.5, 377-381.
- Flick, U. (2006) *An introduction to qualitative research*. USA: SAGE.
- Geisler, C. & Golden, A. (2003) Mobile Technology at the Boundary of Work and Life: *National Communication Association, Human Communication and Technology Division* [online PDF]. Available <http://www.rpi.edu/~geislc/Manuscripts/Mobile.pdf> [Accessed 1st June, 2009]
- Gomez, Rafael E., Popovic, Vesna, & Blackler, Alethea L. (2010) Emotional experience with portable health devices. *Proceedings of The 7th International Conference on Design and Emotion*, Chicago, USA.
- Gomez, Rafael E., Popovic, Vesna, & Blackler, Alethea L. (2009) Emotional experience with portable interactive devices. *IASDR 2009 Proceedings*. Seoul, Korea.
- Gomez, Rafael E., Popovic, Vesna, & Bucolo, Sam (2004) Driving : the emotional experience and automotive design. *Proceedings of the Fourth International Conference on Design and Emotion*, July 12-14, Ankara, Turkey.
- Hamill, L. & Lasen, A. (2005) *Mobile World: Past, Present and Future*. USA: Springer.
- Hattangady, S (2009) *Wireless Medical Revolution*. Available <http://www.google.com.au/url?sa=t&source=web&cd=3&ved=0CDgQFjAC&url=http%3A%2F%2Femblazeworld.com%2FAttachments-Articles%2F2009-June%2520Emblaze%2520Consulting%2520-%2520Wireless%2520Medical%2520Device%2520Revolution.pdf&rc=j&q=wireless%20medical%20revolution&ei=KEvmTc7sMlqevQO-9dmaCw&usg=AFQjCNFWle6R0vwEc75obLgvGmAtKmeEjw&cad=rja> [Accessed 1st May, 2011]
- Heye, A. & Lamont, A. (2010) Mobbile listening in everyday life: The use of MP3 players while traveling. *Musicae Scientiae*, Vol. 14, No, 1, 95-120.

- Ito, M. Okabe, D. & Matsuda, M. (2005) *Personal, portable, pedestrian : mobile phones in Japanese life*. Cambridge: MIT Press.
- Jones, M. & Marsden, G. (2006) *Mobile Interaction Design*. England: John Wiley & Sons.
- Kallinen, K. (2004) The Effects of Background Music on Using a Pocket Computer in a Cafeteria: Immersion, Emotional Responses, and Social Richness of Medium. In: *CHI '04 Extended Abstracts on Human Factors in Computing Systems*, Vienna, Austria, 1227-1230.
- Kilian, J and Pantuso, B. (2009) *The Future of Health Care Is Social*. Available <http://www.fastcompany.com/future-of-health-care> [Accessed 1st May, 2011]
- Kuutti, K. (1996) A Framework for HCI Research. In: Nardi (Ed.) *Context and Consciousness : Activity Theory and Human-Computer Interaction*. Cambridge: MIT Press.
- Ling, R. (2004) *The mobile connection : the cell phone's impact on society*. San Francisco: Morgan Kaufmann.
- Lymberis, A & Dittmar, A (2007) Advanced wearable health systems and applications: Research and development efforts in the European Union. *IEEE Engineering in Medicine and Biology Magazine*, Vol. 26, 29-33.
- Mayne, T.J. (2001). Emotions and health. In: Mayne, T. & Bonanno, G. (Eds.), *Emotions: Current issues and future directions*. New York: Guilford
- Merholz, P. Wilkens, T. Schauer, B. & Verba, C. (2008) *Subject To Change: Creating Great Products & Services for an Uncertain World*. USA: O'Reilly.
- Nardi, B. A. (1996) *Context and Consciousness : Activity Theory and Human-Computer Interaction*. Cambridge: MIT Press.
- Palen, L. Salzman, M. & Youngs, E. (2001) Discovery and Integration of Mobile Communications in Everyday Life. *Personal and Ubiquitous Computing*, Vol. 5, 109-122.
- Park, S. & Jayaraman, S. (2003) Enhancing the quality of life through wearable technology. *IEEE Engineering in Medicine and Biology Magazine*. Vol. 22, No. 3, 41-48.
- Pentland, A. (2004), Healthwear: Medical Technology Becomes Wearable. *IEEE Computer*. Vol. 37, No. 5, 42-49
- Picard, R., & Wexelblat, A. (2002) Future Interfaces: Social and Emotional, *Proceedings of CHI '02 extended abstracts on Human factors in computing systems*. New York, USA.
- Reiner, R. (2008). Integrating a portable biofeedback device into clinical practice for patients with anxiety disorders: Results of a pilot study. *Applied Psychophysiology and Biofeedback*, Vol. 33, 55-61.
- Robson, C. (2002) *Real world research: a resource for social scientists and practitioner-researchers*. Blackwell Publishers.
- Schiffstein, H. N. J. & Hekkert, P. (2008) *Product Experience*. Amsterdam: Elsevier.
- Shah, S. (2005) *Diabeates: Synchronizing Diabetic Health Beat by Beat*. USA: Thesis submitted to the Parsons School of Design.
- Stelmaszewska, H. Blandford, A. & Fields, B. (2005) Emotion and technology: an empirical study. In: Peter, C. and Beale, R. and Crane, E. and Axelrod, L. & Blyth, G. (Eds.) *Emotion in HCI: Joint Proceedings of the 2005, 2006, and 2007 International Workshops*, September 5-9, Edinburgh, UK, 48-52.
- Varshney, U (2007) Pervasive Healthcare and Wireless Health Monitoring. *Mobile Networks and Applications*. Vol. 12, 113-127.
- Vasilakos, A. & Lissetti, C. (2010) Guest editorial. Special section on affective and pervasive computing for healthcare. *IEEE Transactions on Information Technology in Biomedicine*. Vol. 14, No. 2, 183-185.
- Vincent, J. (2006) Emotional attachment and mobile phones. *Knowledge Technology Policy*, Vol. 19. No 1, 39-44.
- Wiberg, M. (2005) *The interaction society : practice, theories and supportive technologies*. London: Information Science Publishing.
- Wong, J (n.d.) The future of wireless medical devices, available at http://www.google.com.au/url?sa=t&source=web&cd=1&ved=0CCQQFjAA&url=http%3A%2F%2Fwww.cambridgeconsultants.com%2Fdownloads%2Finterface%2F46%2Fmedical_devices.pdf&rct=j&q=The%20future%20of%20wireless%20medical%20devices&ei=0kzmTaiZiYe6vQPMrOz0Cg&usq=AFQjCNG7W3Vadcq1AhSsG9CC5kvq3qh3YQ&ad=rja [Accessed 1st May, 2011]