

## Tactile Experiences: User Interpretations and Meaning with Tablets

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### Abstract

*Although touch computing has become an everyday occurrence, there has been little research into the subjective meanings people may assign to touch-focused IT artifacts. Following an interpretive case study with tablets, we examine blogposts, aiming to document user interpretations of the tablet, and to investigate the role of touch and that of cognitive ergonomics towards the formulation of subjective meanings. Our findings illustrate that users focus their evaluations on the limited use of physical controls, the direct, without physical barriers, interaction and the new interaction modalities. These evaluations contribute to interpreting the tablet as a 'significant other', as well as having extraordinary abilities, or holding symbolic significance. Since designing for positive experiences entails grasping the relationship users develop with their IT artifacts, our study's results can enrich the literature of user experience, and inform design by offering insight into user interpretations and their tactile experiences.*

### 1. Introduction

Touch computing has transformed human-computer interaction, making it even more “embedded within our everyday experience, lying closer to our skin” [23]. Indeed, the sense of touch is our “only non-distal sense” [25] (i.e., active and passive touch) and, through it, we perceive our surroundings, the objects populating them and their material properties, thus developing feelings of pleasure or discomfort.

This form of computing has offered the opportunity “to design and develop new, unique, and richer design patterns and approaches”, building upon touch-focused devices and gesture-based interaction modalities [36]. At the same time, new device genres, as for example the tablet, have been popularized, revolutionizing the landscape of IT artifacts.

However, an important challenge remains; today's IT artifacts manage to satisfy most user requirements, and therefore, they are often differentiated by the user

experience they offer [28]. As such, designers are burdened with designing devices and interfaces for pleasurable or unique experiences. Yet, “experience is (...) beyond designers' complete control” [4] and its design entails that the designer is well aware of the various values and meanings, communicated through and identified in IT artifacts, as well as of the sociocultural and material context within which experience unfolds [2]. The massive popularization of touch-focused devices provides the opportunity to investigate these novel interactions and their impact on user experiences within real life scenarios.

In this paper, we argue for the investigation of user behavior post-adoption, aiming to delineate the subjective meanings users attach to touch-focused IT artifacts. Following the interpretive case study approach, our research gathers unsolicited user descriptions of tablet experiences, as documented in personal blogs, and identifies patterns of interpretations and meanings produced during and beyond interaction.

The paper begins by considering extant literature on the relationship users develop with the IT artifacts, and the processes through which they construct and attach meaning to their experience, thus setting the context of our study. Next, we detail our study and the overall research approach in depth. This is followed by a discussion of the study's findings and we conclude by highlighting our study's contributions and its limitations.

### 2. Background

The idea that IT artifacts may be more than mere tools is certainly not new. As all products, they too are equipped with symbolic features; as a result, their use is not based exclusively on their usefulness, but on the social meaning they hold [26], which has sparked a growing interest on the relation between user and product.

In what follows, we discuss extant literature on meaning making with IT artifacts, by investigating meaning's various expressions and important factors driving its formulation. Admittedly, meaning is multifaceted, dependent on the aesthetics of an IT

artifact, the context of the interaction, one's emotional state [e.g., 39] among other personal characteristics [10]; however, because we focus on touch, we examine specifically the role of cognitive ergonomics towards the formulation of meaning.

## 2.1 Subjective meanings and interpretation of IT artifacts

Inquiring into the interpretations and meanings an individual constructs during the interaction with an IT artifact can be highly complex. Kuutti underlines that artifacts hold culturally founded and shared meanings that are significant for their overall assessment [15]. In this vein, she discusses meaning containers (e.g., art objects), functional (e.g., computer utility programs) and those created and distributed beyond market mechanisms (e.g., YouTube clips).

Nevertheless, it is hard to consider software and devices as purely and strictly functional; previous studies have shown that these too may hold a subjective meaning for their owners. Going beyond the tool/toy dichotomy, computers may be means to think about other concepts, by being compelling, engaging and integrated into one's sense of self [30]. In other words, they may be relational artifacts, asking users to approach them as companions and "subjects in their own right" [32].

Meaning and its experience have been quite influential in the field of user adoption and experience. Thorbjørnsen et al. [27], for instance, argue that fashion trends and in-group norms may be as important as, e.g., ease of use or usefulness, and have shown that self-identity and social identity can be equally important drivers of IT adoption. Crilly et al. highlight the symbolic association and the social value of products and argue that on the one hand, products may be means of communicating one's sense of self externally, while on the other hand, may be used to communicate it internally, by highlighting what distinguishes a user from others or what makes a user part of a specific social group [6]. All the while, experience of meaning is an integral component of our interaction with products and through interpretation, memory retrieval and other cognitive processes, we identify metaphors and award objects with personality or expressive traits, and experience luxury and attachment, among others [7].

## 2.2 Human factors and meaning

An important driver of meaning making with IT artifacts is their overall design and the interaction they provide users with. Indeed, researchers have long argued for their importance, as aesthetics can even

function as an extension of the self, by allowing a given product to communicate specific statements about its user [29]. As such, researchers have explored the role of beauty [e.g., 9], and that of materials and their properties [e.g., 8] towards the formulation of user perceptions.

However, fewer studies explore the link between meaning and cognitive ergonomics. Hummels et al. [12] posit that users construct meaning through interaction, while recognizing action possibilities. They explored several design tools and techniques for supporting designers towards the investigation and reflection of gestures and tangible interactions, among other paradigms. Wensveen et al. [35] explored perceptual-motor skills, and the relationship between mood and interaction and found that indeed interaction patterns may communicate meaning and emotions. Schiphorst et al. [24], inspired by interactive artworks, focused on the interaction with multi-touch tabletop artworks, and investigated materiality and the semantics of caress, i.e., "the different meanings encoded in touch and gestures". Among their findings, the authors discuss that users tend to use gentler and longer gestures under strong affect.

Wobbrock et al. [37] researched various tabletop gestures and developed a taxonomy categorizing them into 'form', 'nature', 'binding' and 'flow'. Within the 'nature' category, they included those being visual depictions of objects, which users regarded as symbolic gestures or in which they recognized metaphors. More recently, Park and Han found that users give meaning to gesture elements, often by developing metaphors and associations. For example, when required to refresh the mobile web browser, drawing an imaginary circle on the touch screen was among users' top preferences, and the authors posit that this may reference Internet Explorer's refresh symbol. Also, the hand posture was found to express well the force of hand when dragging or toggling windows, similar to real-world movements [21].

To summarize, interaction modalities do influence user perceptions. They affect evaluations regarding the pragmatic- and hedonic-related qualities of an IT artifact and contribute towards meaning making and overall experiential appraisals. For the purposes of our study, we examine issues pertaining to the cognitive ergonomics, which refer to the interaction with the elements of an information system, i.e., the interaction modalities introduced through touch computing [14].

## 3. Research Approach

Within our study, we approach interaction with technology as subjective and consider meaning making as socially constructed. We thus follow the qualitative

paradigm, and specifically the interpretive tradition, using philosophical hermeneutics as the underlying philosophy guiding our research. This allows us to embrace the user's perspective and profit from a deeper understanding of the subjective meanings assigned to IT artifacts [19]. At the same time, it permits us to approach the empirical material's intended meaning without dismissing our own preconceptions, but rather use them as a reference point towards refining our understanding [5].

Aiming to examine meaning making with touch-focused IT artifacts, our research builds on an interpretive case study, using interaction with the tablet as the unit of analysis. We chose to focus on the tablet, and specifically on the iPad, as we consider it to be the exemplar of its genre. First, it has been argued that the tablet "failed to capture the public's imagination" [1]. However, this is no longer the case, as forecasts show that by 2015 shipments may even overtake the PC market [13]. Furthermore, while the tablet was indeed considered to be a niche market [20], it was only with the launch of the iPad that this genre became particularly popular among everyday users. Finally, contrary to its counterparts, the iPad offers a consistent user experience across its models, thus allowing us to have a coherent view of the documented user accounts.

### 3.1 Empirical material

The empirical material of our study builds upon blogposts, prepared and published by tablet users. Within these entries, the bloggers were offering detailed accounts of their everyday life and rich descriptions of their personal experience with the tablet.

Prior studies have shown that unsolicited, personal blogs, communicating individual opinions and narratives, can be used for documenting one's life and may express "deeply felt emotions" [17]. It has also been argued that blogs may be advantageous relative to other empirical material; approaching them as online diaries, they manage to "captur[e] situated action unadulterated by the scrutiny of a researcher", while the "tight union between everyday experience and [its] record" makes them less exposed to the retrospective reconstruction, often occurring during interviews [11]. Therefore, we consider them to be gateways to one's experience and approach them as means "for understanding social actors both as observers and informants of social life" [11].

### 3.2 Data collection and analysis

The pool of blogposts was generated through a web search between March 2011 and August 2012, using

'experience' AND 'iPad' AND 'blog' as the keywords. In order to ensure that our empirical material included solely unsolicited, personal blogposts, we excluded all technical reviews, blogs and websites that could be thought of being affiliated directly or indirectly with Apple Inc. This resulted in 79 blogposts, authored by 64 unique bloggers, communicating various perspectives, including both positive and negative experiences. Regarding demographics, approximately two thirds were authored from North America-based bloggers, while one-third from Europe-based bloggers.

We conducted our analysis using the NVivo software, based on a largely data-driven coding approach, following the grounded theory methodology [33]. However, the process was not theory-independent, as the coding scheme was informed by extant theories and studies on user experience, social studies, industrial design and so forth. The overall coding procedure entailed approaching the tablet as a comprehensive agency, consisting of the device itself, any additional technology enablers and accessories, the operating system, and the applications accompanying or having been downloaded to the device; in short, we adopted the approach proposed by Olsson et al. and examined the computing device and the ecosystem surrounding it as a "role prototype" [18]. This was dictated both by our empirical material and the concepts we wish to investigate. On the one hand, during the preliminary examination of our data, it became apparent that users' perceptions regarding the IT artifact and their experiential evaluations were deeply ingrained with valuations of the content as well. On the other hand, based on the literature review, it becomes evident that the various features and components of an IT artifact all work together toward constructing and influencing its use, and ultimately have an impact on user experience.

We begun our analysis pinpointing three specific elements within each user account: descriptions of the interaction and the overall experience, features of the IT artifact pertaining to experiential evaluations (i.e., references to cognitive ergonomics), and references to the IT artifact as a whole. Naturally, user accounts often involved several themes. This resulted in accounts being coded across multiple categories. At the same time, some concepts were unique or newly emergent. Therefore, themes that could not be coded within extant codes were placed into newly created ones.

Following open coding, we proceeded to selective coding, grouping themes together. This helped us towards developing the study's core categories. In essence, at this stage several open codes were grouped together into subcategories, being each other's variants, or dimensions and properties of the core

category [33]. This process resulted in identifying the core categories, i.e., user interpretations and subjective meanings, with regards to the three aforementioned elements, allowing us to scale up our analysis. Finally, we moved on to relating core categories to each other, i.e., interpretations of the tablet to those relating to cognitive ergonomics.

The coding procedure entailed several iterations and remained faithful to the hermeneutic circle methodology [5]. This allowed us to constantly re-evaluate and refine our interpretations (second-order constructions) within each case and across cases (i.e., first-order constructions) and against the literature, and eventually permitting us to identify reoccurring patterns. As far as coders are concerned, the first author conducted open coding, and core categories and relationships were consolidated via consultation among all three authors.

## 4. Findings and Discussion

In what follows, we describe the roles of the tablet that users identify in it and offer some details regarding users themselves, so as to set the context of the study.

Most of the bloggers hold upper level managerial positions. However, there are several cases of pastors or ministers, accountants, authors and user experience designers and developers, among others. Many of the bloggers are frequent commuters or need to travel often for work purposes, while they attend meetings on a regular basis. With regards to the tablet, all bloggers report their need for connectivity, speed and mobility.

Often, the tablet plays the role of a *productivity* tool. We see it becoming a business device, by allowing users to carry out light work and effortlessly attend meetings, and an extension of the office, particularly for mobile professionals: *"It's also a great work netbook. It's small and light enough to have in every meeting, and fits in smaller rucksacks. No more ugly corporate laptop bags. It's excellent for presentations (and not just as a novelty)"* (Roger, VP Marketing, B7<sup>1</sup>).

As the spatiotemporal component of experience changes [39], from the work to the home environment, we see the tablet fulfilling the role of a *home appliance*. Many have integrated it within their everyday routine, and substituted other devices with it for internet browsing or catching up with the news during leisure time: *"How many times do Hubby and I Google something or pull up Fandango on our iPhones*

*while sitting on the sofa in front of the TV? Um, too many to count. The iPad is a happy medium between running to your PC and Googling via the iPhone"* (Sarah, fashion blogger, B57). Moreover, all members of the family (e.g., children, parents) are using it, concurrently or successively, thus transforming it into a family device: *"It would be wrong not to admit that using these devices is just plain fun. Whether it's reading Winnie the Pooh to Haylee, playing "Memory Cards" with our family, or teaching Dana how to play solitaire, we've had a good time"* (Albert, minister, B8).

The tablet manages to channel users' social life, taking up the role of a *socializing medium*. For example, many report using it for communication purposes and describe it as their 'social lifeline' when on the go (Harry, HR professional, B16). All the while, it is more communal, strengthening the character of social activities, such as looking up photos and browsing the internet with others, dining out and so forth: *"I opened up the web page of the restaurant we wanted to order from and passed around the iPad for everyone to have a look at the menu. It was quite cool and a bit of an eye-opener for the skeptics. It worked a lot better than crowding around a screen or taking turns sitting at a computer for the places for which we didn't have a menu on hand."* (Dougie, User Experience designer, B55).

Finally, the tablet takes up the role of a *casual companion* by fulfilling travel, gaming and computing needs of the average user. While this role may appear as an aggregation of the previously discussed ones, it is quite different in its essence. This role entails the tablet's use for specific purposes, and within particular contexts; therefore, its assessment stems from an entirely different perspective, i.e., as something for in-between time: *"I don't get much time to play around on the iPad for fun. I'm either reading or writing or doing something with some stated purpose (researching for an interview or story, writing a blog post, etc.) But sometimes, I just need a break and I can turn to my iPad for that as well"* (Emory, Science Fiction writer, B46).

While we identified four different roles for the tablet, it should be noted that these are not mutually exclusive. On the contrary, as the tablet is used interchangeably and within ever-diverse contexts, it manages to fulfill several roles throughout the course of a day, depending on the spatiotemporal order and the social context of use.

In the next section, we describe users' subjective interpretations of the tablet as constructed during and beyond their interaction with the IT artifact. In order to better structure our study and findings, we develop the

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<sup>1</sup> Quotes are marked with Bn, where n stands for the blogpost's number. All names have been replaced with pseudonyms for anonymity purposes.

discussion based on Desmet's and Hekkert's approach of experience of meaning [7].

#### 4.1 Interpreting the tablet

Desmet and Hekkert posit that through cognitive processes, such as interpretation, associations and memory, people are able to assign personality or other expressive characteristics to products, identify the symbolic significance these may hold or ascribe them with a personal one and recognize metaphors in them [7].

Within this vein, one of the concepts that surfaced among our empirical material was that of *personality assignment*. Users exhibit a strong attachment to the IT artifact, while they approach it as more than a mere computing device. Users themselves or members of their social environment interpret it as a person, prescribing a personality to it: *"I have two desktop PC's, a laptop, a netbook, a Kindle, an Android phone ...and an iPad. But it's that iPad that my wife refers to as my 'mistress.'"* (Andy, IT Project Manager, B14). At the same time, user narratives are ingrained with feelings and references that are typically reserved for a loved one: *"I'm a week into a relationship with the new iPad and I can definitely say we're staying together. Strictly speaking we're still in the honeymoon stage but that's not to say my giddy excitement and love struck feelings aren't valid."* (Mike, Operations Director, B36). Therefore, we see that users project life onto the artifact.

Similar findings have been reported by previous studies [30, 32]. For example, Turkle found that laptop users may feel at one with them, experience them as "co-extensive with the self" and directly report feelings of love toward the IT artifact [30]. Here, however, through the use of a vocabulary that is most often reserved for describing more intimate relationships (e.g., "mistress", "honeymoon", "a keeper", "co-respondent") and by developing relevant associations (e.g., "my wife is threatening to sue me for adultery", "why did I succumb to the charms of the iPad", "after all it was only our first date", "a week of reckless romantic abandon with the new iPad"), our findings differ in that, tablet users go beyond of assessing the device as simply their companion, but interpret it as a significant other.

All the while, the tablet holds a *personal significance* for users. The analysis of the empirical material depicts users' strong ties with the IT artifact and, while users document their experience and reflect on their interaction, a sense of attachment surfaces: *"Ever since I bought it, it has been glued to my hip. I take it almost everywhere with me. When I am sitting there watching the tv I'll be playing about doing*

*something, when I go to my friends or family I take it with me. I always find a reason to use it."* (Harold, Social Media Specialist, B38).

Desmet and Hekkert posit that attachment most often relates to a product that contains a "profound and sustained meaning" to the user [7], while Mugge et al. [16] argue that it may be attributed to its potential to communicate one's identity or group affiliation, and to preserve memories, among others. Indeed, the concept of identity and group affiliation manifestation through products is quite familiar. Specifically for Apple users, extant literature suggests that this form of attachment may relate to brand loyalty and faith-like feelings [3]. Yet, most users don't fit within this category: *"I'm no fanboy of apple. I would consider myself to be technologically agnostic and really look first at what will accomplish the objective at hand with a normally limited budget."* (Hank, Visiting Professor of Social Media & Strategy, B3). Moreover, there are several first-time Apple users: *"It took a lot for me to go into my local Apple store and explain to one of the 'geniuses' (?) that I was a Windows user who was unfamiliar with Apple's products but was considering an iPad."* (Laura, Freelance journalist, B24), while those who have previously used and owned other Apple products, suggest that the sum of their computing devices is an assemblage of brands. Therefore, we may safely conclude that the experience of attachment, prevalent in their accounts, doesn't relate to a loyalty or self-identification feeling.

Contrary to that, we see that the personal significance, which leads in this case to attachment, is based on those characteristics that satisfy user needs. For example, among the tablet's most valued features is that it allows users to carry out light work when away from the office through a more comfortable computing environment, therefore contributing towards a sense of relaxation: *"it has already carved itself a niche in my day: I spend less time poking at my phone and less time out of work hours sat at my laptop."* (Garland, Executive editor, B11). In addition, the extreme portability, the provision of several functionalities within a single, compact device and the always available internet connection, provide users with a much appreciated flexibility and are associated with a feeling of independence: *"I'm never without high speed internet access and I can take my mobile computing activities anywhere at anytime."* (Harry, HR professional, B16).

Thirdly, our analysis supports the tablet's *symbolic significance*, as the latter embodies several symbolic values, such as those of futurism, luxury, and paradigm-changing. The aesthetics and design of the tablet, which are considered to be among its expressive characteristics, lead users to consider the device as

something futuristic: *“It’s undeniably attractive hardware (...) and it feels futuristic in your hands in a way that a regular tablet PC seldom does.”* (Garland, Executive editor, B11). At the same time, the tablet’s price (e.g., *“over 15 million iPads sold so far and I think it is pretty clear that the iPad is more than a luxury device for those with too much money on their hands.”* (Leland, Naval architect, B26)) combined with the occasional uncertainty regarding its necessity (e.g., *“The iPad is undoubtedly a luxury; it’s hard, in my experience, to argue that it adequately replaces a laptop unless you really are doing the most basic of content production.”* (Garland, Executive editor, B11)), create an allure of luxury.

The final symbolic value that users see in the tablet is that of a post-PC era device: *“Because of the iPad, 2010 will likely be remembered as a landmark year in computing. It will rank right up there with 1984 when the graphical user interface debuted to the masses in the first Macintosh, and 1995 when the launch of Windows 95 made PCs much easier to use at a time when a lot more people were about to buy computers to connect to the Internet.”* (Bernard, Chief editor, B20). Such interpretations are based on the iPad’s success in popularizing the tablet (*“I suspect that the real significance of the iPad is that it legitimises the tablet format.”* (Mike, Academic, B60)), while managing to successfully serve users during their everyday, without entailing significant sacrifices in its usefulness (*“Based on my first three months as a mostly-iPad person, I’m convinced that I’ve arrived in the future of computing.”* (Leo, Editor, B51)). This symbolic value also depends upon user perceptions regarding the absence of product features and their relative weight when compared to other extant devices: *“If there’s one thing about the post-PC era the iPad demonstrates it’s that technical specs don’t really matter.”* (Dale, Business developer, B2).

Finally, users use illustrative metaphors to describe their interaction with the tablet. Before, during and beyond interaction, users associate the tablet with wonder and admiration, focusing on different features and the way these contribute in the experience. For example, while anticipating to acquire the tablet, i.e., at the level of non-physical interaction, the tablet is considered as something revered: *“he’s clutching two promising looking packages. Yesss! they contain the sacred Tablet and its duly-ordered accessories”* (Mike, Academic, B60). This interpretation permeates the experience and colors the actual, instrumental interaction: *“after countless nights reading in bed with a book light attached to my Kindle, I found the backlighting of the iPad a godsend.”* (Emory, Science Fiction writer, B41). Further to this, the tablet is construed as holding even supernatural powers: *“I am*

*simply thinking and the iPad is typing for me by reading my mind”* (Sam, Entrepreneur, B6). While within the context of developing metaphors, users may associate the tablet to something holly, and equally so, they may interpret it as possibly malevolent: *“it was time to see if this tablet could really fit in my digital life, or if it would live as the evil middle child between my Macbook and iPhone.”* (Dale, Business developer, B2). The common denominator is that users base their narratives on mainly pragmatic-related characteristics, such as ease of use, responsiveness and usefulness. These features appear particularly influential in these instances and become the elements on which users anchor their associations to divine or wicked imageries. In all cases however, the tablet, is seen holding extraordinary abilities.

What has been presented so far is summarized in Table 1. Next, we study these meanings further, seeking to examine the contribution of human factors towards the formulation of these experiences.

**Table 1. Experiences of meaning**

Subjective Interpretation	→ Experience of Meaning
Personality assignment	→ Significant other
Personal significance	→ Attachment
Symbolic significance	→ Futurism
	→ Luxury
	→ Paradigm-changing
Metaphor	→ Extraordinary abilities

## 4.2 Meaning through touch

With the introduction of touch computing, new forms of interaction modalities have swiftly replaced traditional input devices. The physical keyboard has been replaced by a virtual, on-screen keyboard and the mouse by user’s fingertips, while users are able to interact with devices by simply handling them (e.g., rotate to flip). Therefore, the user interface requires from the user to employ a series of gestures to interact with the device without any intermediaries. Since these human factors are entirely new for the majority of average users, it is only natural that these too contribute in the formulation of the subjective meanings discussed in the previous section.

Examining the interaction modalities, we see that users are expected to swipe within applications and between pages, rotate objects using multiple fingers, pinch and expand their fingers to enlarge a view and type using the on-screen keyboard. Largely, these gestures have been branded as rather easy and natural, thus characterizing the overall interaction mainly intuitive: *“somehow, passing a tablet around and swiping back/forth seems very simple and surprisingly non-geek.”* (Jacques, Strategy consultant, B23).

Focusing on the experience of a significant other, the analysis of our empirical material suggests that it is indeed partly associated with the appealing touch-focused interface of the device: *"So why did I succumb to the charms of the iPad? Quite simply, I have not been able to find a PC that offered what an iPad does. (...) none of these has the amazing battery life, fast on/off, ultra-handy form factor, a made-for-touch interface (rather than touch bolted on to a keyboard/mouse-centric interface) or a built-in app store."* (Laura, Freelance journalist, B24). In addition, users consider their physical interaction with the device as intimate, rather as merely utilitarian: *"If you haven't spent a few minutes playing with (or 'fondling,' as the Missus calls it) an iPad, I won't try to describe the user experience."* (Andy, IT Project Manager, B14).

Focusing on individual aspects of interaction modalities, we see that the specific experience of meaning relates to user preference of the virtual keyboard. Even though users consider the on-screen keyboard to be less efficient for several use cases, they attempt to train themselves on its use rather than use a physical one, driven by their need to remain 'faithful' to an inanimate object: *"It took me a about an hour to get the hang of the keyboard and I still prefer to type in landscape. I keep holding back on getting the external keyboard simple because it feels like I am not being true to the device."* (Hank, Visiting Professor of social media and strategy, B3).

Moving onto the experience of attachment, we see that several factors contribute towards its construction. With regards to the on-screen keyboard, again we see that even though users have the opportunity to use a wireless keyboard, interestingly enough, several of them refrain from doing so. Instead, when they are faced with heavy typing, they prefer to postpone it when possible or necessary: *"the iPad does not allow for easy one-hand typing - it's too heavy and too awkward. The simple workaround for me was to simply defer typing intensive tasks until I had a full keyboard."* (Gordon, Venture Partner and CEO, B10). In these instances, we see that this choice is dictated by users' need to preserve their mobility and the compactness of the device: *"I personally do not like the idea of a keyboard for the iPad - the whole point in my mind is that it is a self-contained device that shouldn't require external equipment (...). Also, add the extra weight and bulk of the keyboard, and you're getting into netbook size territory."* (Hawk, Marketing & Business development executive, B9). In other words, as portability and compactness constitute some of the users' needs, the virtual keyboard holds a personal significance and leads to attachment, because it manages to fulfill them.

Another interaction modality that contributes towards the experience of attachment is the tappable gesture: *"Within four hours, my wife was playing with the photo app, and sending pictures to people - she'd be meaning to do so for a while. Tap, tap, tap. She was doing that from the back porch with a frosty adult beverage to complement the activity. She was smiling. That fun was followed by an extended Facebook session (she's a big fan, I don't use it). Tap, tap, tap. This was lying on the couch with a tennis match on. More smiles (...). Everyone in the family is waiting for their turn at the iPad. My wife asserted her rightful place in the hierarchy later that evening, and took it upstairs to the bedroom to relax while watching TV. Tap, tap, tap."* (Chester, Chief Technology Officer, B13). Tapping through applications enhances user perceptions for an effortless and speedy interaction. In light of this, users approach their chores as enjoyable sessions rather than as tasks. Therefore, users become attached to the tablet and rather determined to continue on using it exclusively, even though it is considered a communal device and used by others as well.

Within the context of the symbolic significance, and specifically the experience of luxury, we did not find a relationship between it and the various interaction modalities. Admittedly, this was not unexpected as extant literature highlights that luxury correlates higher with attributes such as materials, packaging, and advertising [22]. Yet, human factors do contribute towards the construction of the experience of futurism: *"every time I reach out to touch the screen, instead of using a mouse, I feel like Tom Cruise in Minority Report"* (Ben, Chartered accountant, B31). Set in 2054, this movie depicts holographic screens and retina displays and introduced the wide audience to Natural User Interfaces. In the movie, the user was able to manipulate objects directly with his body and move objects from one screen to another with sweeping moves, while wearing electronic gloves [38]. These gestures are also present in the touch-focused paradigm examined in this study; users are required to swipe and tap on a touch screen in order to interact with the information system. Moreover, one could argue that the entire information system, i.e., the tablet, is in fact comprised of solely the touch screen, as no other devices, accessories or enablers are required: *"it feels futuristic in your hands in a way that a regular tablet PC seldom does. That's perhaps because those regular tablets make accommodations for general use: they have USB ports, card readers and physical controls, whereas the iPad makes do with minimal connectivity and the fewest possible buttons and switches."* (Garland, Executive editor, B11). Contrary to previous computing devices, such as laptops and desktops, that tend to rely heavily on extensions, the tablet is indeed

equipped with only few controls and ports. Furthermore, minimalism has been traditionally associated with futuristic design, and the device's self-contained character further exacerbates the sense of futurism, as it entails that all actions need to be carried out through direct interaction, as in Sci-Fi movies.

Finally, one of the meanings ascribed to the tablet is that of paradigm-changing, having users experiencing it as a landmark product: *"(...) when browsing on a computer, you are somewhat disassociated from the website, having to stoop to the intricacies of trivial physical barriers such as a mouse and keyboard. Surfing the web on a phone is even worse as we have to put up with a limited, small screen experience and farcical layouts and navigation. Interacting with the web through the iPad however, is a surprisingly intimate and tactile experience. (...) For content consumption, there are few competing devices that offer such a smooth user experience and the iPad offers a tantalising glimpse at the future of computing."* (Pete, UX designer, B30). As shown throughout user narratives, our analysis shows that there are several factors driving the formulation of experience of paradigm-changing; however, since our aim is to highlight the contributing human factors, we note that, paradigm-changing is based on the touch-focused user interface in its entirety, rather than on individual gestures and features.

The touch-focused interface is quite important as users approach the tablet as an object with extraordinary abilities. Specifically, it allows them to experience it as something magical or supernatural and we notice that there is a strong association between user subjective meanings and the available gestures: I can move images around with a swivel of my fingers, whether in pages (word document) or on slides. It's like magic. (Maddy, Digital strategist, B50). This sort of interaction, even though is characterized as 'magical', leading users to suggest that the tablet may be a metaphysical container of the entire internet, it is also considered as natural: *"Laying back on your couch or bed, pinch to zoom, rotate to landscape. It feels very natural and very much like you have the web in the palm of your hands. A superior web browsing experience in many subtle, but significant ways."* (Pete, UX designer, B30).

Previous interaction paradigms entailed that users needed to use some form of input device to communicate with the device, such as a keyboard, a mouse or a stylus. Over the years, this became the norm and, understandably, commonplace and natural. However, it is obvious that people do not interact with their environment through intermediaries, but through their own sensory modalities, i.e., touch, sight, etc. Therefore, as the finger gestures and the re-orientation

functionality are designed as metaphors of real-world gestures, they manage to be at the same time intuitive (because users are familiar with e.g., swiping the pages of a magazine) and enchanting and 'supernatural' (because they propose an entirely different interaction paradigm for one's computing needs).

## 5. Conclusions and Implications

Touch computing has managed to cross out the intermediaries between the user and the IT artifact. New interaction modalities have been introduced, such as swipe, pinch and tap, which invite users to control and manipulate the user interface directly with their own fingertips. This has resulted in a more intimate interaction and transformed touch-focused devices, such as tablets and smartphones, into more personal as they have brought IT artifacts closer to the individual.

In our study, we have found that users develop associations and are able to ascribe personality, personal and symbolic significance to the tablet and approach it with metaphors. In more detail, the tablet may be personalized, denoting a significant other, satisfy one's personal values leading to her/his attachment, hold a symbolic significance and be perceived as an object of luxury, a futuristic device or paradigm-changing, and, finally, users may develop analogies and see in the tablet extraordinary abilities.

As far as personality assignment and personal significance are concerned, we consider our findings to constitute an important point of departure from previous studies. Turkle for example, has found that computing devices, such as laptops, can be seen as one's companion [32], while Belk and Tumbat have found that attachment may be the result of brand loyalty [3]. Yet, our findings illustrate that users of touch-focused tablets go beyond this point and interpret the artifact as a significant other while attachment stems from the tablet's ability to satisfy user needs rather to communicate e.g., identity and personal values. Next, even though touch computing, and tablets in particular, are not new concepts within the IS and HCI literature, our study shows that they constitute a revolutionary form of computing for everyday users. In addition, users perceive it as holding extraordinary abilities. Both interpretations depend upon the user interface itself and the newly introduced interaction modalities. The gestures, through which users interact with the interface and the tablet, are in fact projections of their real-world counterparts and lead users to evaluate them as both natural and supernatural; on the one hand, the interface responds to gestures as real-world objects would respond, while, on the other hand, this overall naturalness and

intuitiveness is perceived as mysterious, instinctively responding to commands.

Focusing specifically on the differences between the virtual and the physical keyboard, and how these may contribute toward the construction of meaning, extant literature is scarce. Previous studies have shown that the traditional keyboard of a laptop or a desktop may be seen as a bridge to life experiences [30], represent one's access to an online community, where the user enters for socializing purposes [34], or be perceived as simply necessary for producing creative ideas [31]. Our findings, however, on the virtual keyboard are quite different, as we've seen it enabling users to associate the tablet with a significant other, and/or develop a sense of strong attachment.

Our study's contribution is twofold. On a theoretical level, our study enriches extant literature of user experience, as it documents user narratives and unfolds the subjective meanings that users construct while interacting with the tablet. Even though previous studies have explored meaning making, the advent of touch computing has changed interaction considerably, thus making it particularly useful to examine its impact on users' perception. On a practical level, our findings can inform experience and device design. It is often argued that one may design for an experience, but not an experience; experience may be triggered by artifacts, but develops beyond the designer's control, depends upon unpredictable factors and brings together motivation, emotion, actions and meaning. Consequently, experience design must ultimately focus and investigate the construction of meaning as well [4]. Therefore, our investigation can help experience designers towards assessing and understanding the impact of their design choices on user experience. Furthermore, while it may appear that most accounts are largely documentations of positive experiences, this is not the case. In several occasions (e.g., Roger, Mike), users report being somewhat disappointed by the usefulness and performance, and often resort to workarounds or choose to defer tasks; however, these issues do not relate to the cognitive ergonomics of the IT artifact.

Our study does not come without limitations. Our study is based on solely textual material, while most interpretive studies include interview material, as the latter facilitates a deep understanding between interviewer and interviewee. However, this can also be achieved through a constructive 'dialogue' between researcher and text and with the help of the hermeneutic circle, during which, we continuously reevaluate our interpretations (second-order constructions) against those of the users (first-order constructions), while examining the available material in multiple passes and reassessing our findings within

the context of extant literature [5]. This can be overcome in future studies via triangulation by conducting, for example, interviews and shadowing, so as to compliment the empirical material.

A second limitation may stem by the nature of the empirical material. Specifically, it may be said that our findings pertain to those who are both tablet owners and bloggers. Therefore, we may be missing insights from tablet owners who don't blog about their tablet experience. As a result, future studies would gain valuable insight by a detailed sampling, in line with tablet owners' demographics. Next, it must be noted that bloggers may focus solely on features, which they consider as most important, and which may not align to researchers' questions. Yet, precisely because we aimed to examine users' constructions, this allowed us to focus on their preferences and interpretations rather than our own preconceptions, which could endanger the exclusion of important aspects.

Finally, blogging allows for 'impression management'. Yet, this pertains to most research scenarios, since the researcher cannot guarantee that participants answer without distorting or concealing reality. Hookway argues that, while inconsistencies may arise through the use of blogs, this most often happens when the research question involves "the construction of certain cultural ideas" and how these may be "affected by sociological variables such as age and gender", often obscured by bloggers [11].

## 6. References

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