Empathy and Aesthetics:

Combating Stigma in the Design of Assistive Products

Ingri Ørsal Skogsrød
Department of Product Design
Norwegian University of Science and Technology

ABSTRACT

This article discusses how underestimating aesthetics in assistive products contribute to stigma, and how it manifests in terms of use and general dissatisfaction among users/wearers of assistive technology. Continuing, it will look at possible ways of curbing the unfolding of stigma by way of aesthetics. For the design process, the respective methods of Empathic Design and Human Centered Design will be explored, and it will be analyzed how they best aid the process of designing assistive products. In addition, the article will look at the validity of adhering to one method, and the effect this can have on designers as well as determining the designers' role. Results provide a basic understanding of the inherent problems of stigma in assistive products, and how a promising approach for managing stigma is to realize and prioritize the importance of aesthetics.

KEYWORDS: Empathic Design, Stigma, Aesthetics, Assistive Technology, Human Centered Design, Design Methodology.

1. INTRODUCTION

This article takes a look at design in assistive technology, expanding upon certain topics like stigma, aesthetics and empathy and why they are of utmost importance. In addition I will look at the evolution of Empathic Design and how it compares to Human Centered Design, as well as in relation to AT. I will look at how design methodology can best highlight the relevant and often ignored factors of AT design, as well as how the use of methods can affect the designer. Finally, summarizing the contributing factors will arguably determine what makes for the most suitable way of designing assistive products.

Methods used consist mainly of literary reviews of relevant texts within assistive technology and design methodology. Parallel to researching this article several interviews with users of assistive products as well as with health professionals in a hospital setting were conducted within another project. While there is no direct overlap, the conversations have influenced and contributed to my knowledge of assistive products and the writing of this article.

Results of this article provide a basic understanding of the inherent problems of stigma in assistive products, and how the best solution for this is realizing and prioritizing the importance of aesthetics in managing stigma. Employing empathic strategies and forming an empathic mindset provides a better understanding of user needs and proves even more important in designing for marginalized user groups, especially when the nature of the products can be intensely personal and invoke a state of vulnerability. In design methodology definitions are frequently inconsistent and overlap a great deal. Certain aspects of Empathic Design (ED) and Human Centered Design (HCD) seems to complement each other, and blurring the lines could potentially have a positive effect

on the discrepancy between theory and practice in HCD. While flawed -and not without caveat- designers instincts and insights is a necessary resource for aiding innovative products. Rigidly following any systematic method can potentially create a conflict for the designer and appears unfeasible in practice. An empathic mindset and a more flexible application of design methodology, most notably ED and HCD, can add valuable insight and help combat stigma via design, positively affecting the outcome of any project connected to assistive technology.

1.2 Stigma and Assistive Products

What sets assistive technology (AT) apart from medical devices or more mainstream products? A prominent factor is the stigma that often occurs when wearing/using an assistive product (AP). Stigma can be defined as "A mark that links someone to undesirable characteristics"[18]. Major links stigma to identity stating: "possessing a consensually devalued social identity (a stigma) increases ones exposure to potentially stressful (identity threatening) situations." [8]
Most people have the desire to be seen as normal, and products that reinforces an unwanted stigma can damage the users self esteem, and cause them to take steps to limit the influence [18], which will be expanded upon in this article.

Vaes, Stappers, Standaert, and Desager distinguish between 4 types of stigma:

1. Visible stigma, like wheelchair users, hearing aides etc.
2. Hidden stigma (such as HIV/aids).
3. Achieved stigma (homeless people, prisoners)
4. Voluntary stigma (piercings, political symbols, extreme fashion) [18].

The differences between visible and voluntary stigma are marked; while both can confront people's prejudices, a visible stigma can inspire pity whereas a voluntary stigma is based on choice, making the subject less likely to be pitied.

One can assume that most people with visible stigma might desire to blend in -perhaps experiencing relief if others do not notice their disability right away- the issue is more complex than that. There are many socio-cultural environments to consider, which can differ even within a group of people with the same type of disability. As an example, Graham Pullin draws attention to people who are hard of hearing, distinguishing between two separate groups; 'Deaf' and 'deaf'. Those who considered themselves Deaf with a capital D, saw their disability as a big part of their identity, to the degree where some felt ambiguous about surgeries and hearing aids designed to restore or surpass function. Socially, they were likely to interact quite a bit with other Deaf people. Others considered themselves deaf with a lower case d, used to interacting mostly with hearing people and generally positive to hearing aids and surgeries [1]. Their respective sub-cultures shape their identity, meaning they differ -sometimes drastically- in wants and needs. Of course, not all identify with a disability culture, but rather through their professional experiences, or within their family [21]. Making an effort to understand the users culture shaped identity therefore seems to be an essential part in any AT project [21].

1.3 Assistive Products and Inclusive Design

Universal, or inclusive design has a long history of being associated with AT, sometimes even regarded as the ideal standard for designing assistive products [1]. Inclusive design has undoubtedly brought sorely needed attention to the fact that that not all users are adult, able-bodied people within normal parameters of height, weight and cognitive abilities. However, giving a product the inclusive design treatment does not automatically make it a good, or even appropriate assistive product. As Pullin notes; "In inclusive design, any inclusive but otherwise mediocre design might only prove attractive to users who are currently excluded" [1], thus making it special needs design by default. This coincides with observations made by Jacobsen

[2], who states, “it is difficult to design a product that spans over several categories”. Not only is it undeniably easier to design for a more specific user, rather than being “all things to all people” [1], but more importantly marginalized user groups should be given more consideration, not less.

To borrow a phrase from James Leckey; you want to avoid the dreaded “flying submarine”; a term used to describe products saddled with over-compromise and functions. For many, good design often exemplify some form of restraint; sacrificing a function to create a better overall user experience, making it easy to use “without thought” or to produce a more attractive product [1].

This is not to undermine the importance of inclusive design, as its benefits are many and well established [13]. Indeed, assistive products are in great need of inclusive design, not necessarily in terms of usability, but as a strategy for their appearance; making AP’s blend better with mainstream products could potentially reduce stigma due to their becoming ordinary [2]. While an appliance may be best served by not crossing too many product categories, it is fully possible for the *form* to refer to something outside its primary category [2]. For example mainstream products in the vein of kitchen appliances or trendy health conscious products like pulse bands (Nike FuelBand, fig 1. Misfits Shine, fig 2), smart clothes, or health monitors (Scanadu SCOUT, ISpO2 Pulse Oximeter). This kind of crossover between exercise and wellbeing gadgets and medical tools is an interesting blend of medicine and commercialism, and carries little to no stigma.

Figure 1: Nike FuelBand.

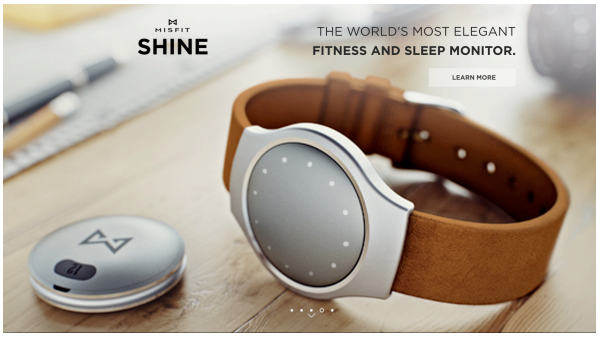

Figure 2: Misfits Shine, a sleep and fitness monitor.

Attractive products add value to the user experience and their daily lives. Having the finalized features make the product appear trendy, stylish and desirable to most people, stigma can gradually lessen, as their appearance is widespread and generally looked upon favorably. Eyewear is the ultimate example of a reformed AP, and the main component in its redemption is a mixture of aesthetics and marketing, slowly shifting public opinion from ‘visually impaired’ to ‘fashionable’.

However, going towards mainstream need not be the only way forward. People who use AP’s, long term or temporarily, are individuals (like everyone else) and younger users in particular like to maintain a certain style for themselves, which is difficult considering the utilitarian, medicinal appearance of many assistive products [2]. Some might prefer to make more of a statement, and a way to meet this need is allowing for personalization in order to meet individual preferences. Jacobson advocates this option, suggesting under-designing an AP can

allow for personalization as well as potentially lower product costs [2]. Alternatively, one can allow for options; the fitness monitor Misfits Shine -while not an AP, can be reasonably compared to the likes of safety alarms- can be worn in a variety of different bands in silicone, metal or leather, as well as an elaborate necklace, turning it into functional jewelry. They are all mainstream in appearance, but allow for a more personal product that can be worn different ways. Alternatively, by showcasing an AP in stead of normalizing or disguising it, you can have a positive effect on stigma as the attitude and individuality of the product tells others its visible by intent, indicating an active challenge rather than defensiveness [18] (fig. 3).

Figure 3: A plug Hearing Aid by DesignAffairs Studio.

2. VITAL AESTHETICS

This section presents examples to illustrate the effect aesthetics have on the people who use assistive products; their wishes, workarounds and non-use, showing observational, anecdotal evidence of the importance of aesthetics. Furthermore, it examines the influence aesthetics has over usability and emotion.

2.1 When appearance adds to stigma

"The field of usability design takes root in the cognitive sciences" -a combination of psychology, computer science, human factors, and engineering: all analytical fields. The hidden danger is to neglect areas that are not easily addressed in the framework of science and engineering [3]. While designers mostly occupy a strong position in the development and manufacture of mainstream products, the field of AT so far remains largely in the scope of engineers and medical professionals. Traditionally, AP's have been viewed as closer to medical tools rather than consumer goods, which goes a long way in explaining their utilitarian nature [2]. These connotations contribute to the focus of AT, which above all else has been usability; to restore or help function, and in a few cases provide superior function [1]. Appearance, if commented on at all, has ideally been as discreet as possible, either by invisibility (often via size) or by camouflage (flesh/pink coloured products to mimic skin, etc.) [1][18].

Owning an AP is most likely necessity born out of need, rather than a voluntary pleasure (the exception here would be contemporary eyewear), thus looking at an AP rather like a tool is not a baseless reasoning, yet AP's become so much more: in some cases they literally become a part of you. Regarding aesthetics as a vital function of AP's is not yet the norm, and many engineers considers the emphasis on appearance "self-indulgent" or frivolous [1].

Among users/wearers of assistive technology, the most vocal are younger people with physical disabilities [1][2]. Wilkinson and De Angeli found many examples of users modifying their products or using the more aesthetic option, like a smaller seat [14]. Others chose not to use the anti-tip feature as they looked like stabilizers -adding to the level of "assistiveness" communicated by the product [2]. This has potential to be both dangerous and detrimental to the users condition, and shows that appearance and perceived "assistiveness" has a huge impact on usability; a product that won't be used –or used incorrectly- because of a detrimental appearance is the definition of useless. In addition, many simply want their AP's to be more attractive, like a teenage girl who wants a more beautiful wheelchair [2] or to be more representative of

their individual style, like athlete Aimee Mullins who expresses her personality through different pairs of prosthetic legs [1].

Wilkinson and De Angeli noted that "aesthetics were seen to be prioritized above almost all other considerations, often even over functionality" [14]. This should not come as a surprise to anyone, considering the personal nature of most assistive products. For most of us, it is inconceivable not to have a choice in how we present ourselves, yet it is a choice often denied or severely limited for users of assistive products. While younger users tend to be more vocal, older users have been known to show dissatisfaction in other ways. On average, elders in a study conducted by Mann, Goodall, Justiss & Tomita owned 14,2 assistive products per person, and reported that they used 12 on average, a rather large number. While there were few direct complaints about how the products looked (2%), dissatisfaction with the appearance was observable in other ways. AP's can look alien in the context of a home environment, prompting some users to cover them. Others forgot to wear their AP, while usually remembering to wear things like jewelry -leading the researches to speculate that stigma aided in their 'forgetfulness' [23]. Alternatively, some chose more mainstream products like electric scooters rather than a walker –one is "for fun" while the other emphasizes old age and frailness. Yet others argued that they did not need certain AP's [23].

There seems to be a marked difference between perceived needs and actual needs among older users, and it affects use and product adoption. "Our research strongly indicates that assuming elders will use an assistive technology simply because they "need" it is misguided."[23]. The way potential users are introduced to an assistive product can have ha big impact on how they feel about it, heavily influencing product adoption [15]. Similarly, Correia de Barros, Duarte, and Cruz show that negative labeling and categorization of AP can increase the probability of the stigma process unfolding [22]. In the case of AT, many users are introduced to AP's via a middleman, like doctors or government institutions [2][15]. This could conceivably contribute heavily to the aesthetics of AP's, as manufacturers depend on the criteria set by the buyer, which in most cases (in Scandinavian countries) are someone other than the end user. By having an indirect link to their end users, manufacturers might not benefit financially by catering exclusively to the end user.

2.2 Aesthetics and emotion

We know that a stigmatic appearance matters in terms of use and product adoption, but owning and using an attractive product also gives us unquantifiable pleasure. Whether we like the look of something or not, the reaction is immediate and emotionally driven [3]. As an example, Norman notes that in the case of early personal computers, colour screens added no quantifiable value, apart form the fact that people wanted them. Emotionally, it added tremendous value; people were stimulated by it, liked it, and wanted it. They didn't want to go back [3]. How people feel about a product and how the product makes them feel, is just as important as being user friendly [14].

In a preview article for his book, Norman writes about the concept of "affect"; snap judgments we make that assign positive or negative valence to the environment. Cognitive function comes after the fact; affect happens independently of thought. He describes the connection between cognition and emotions thus: "Some emotions – affective states- are driven by cognition, and cognition is influenced by affect". Products with positive valence -which look good, feel good- seems to make behavior "go more smoothly". The positive affect makes us tolerate minor difficulties better, as the experience, overall, is pleasurable [3], meaning attractive things do indeed "work better". This is incredibly relevant for assistive products, as the scenarios in which they are used can often be considered stressful, and where the user might be in a vulnerable state.

The most striking aspect of the on-going tensions between usability and aesthetics is how detrimental they are to each other. The importance and impact of aesthetics is hard to measure, but we are emotional beings, and we all judge the aesthetics of products whether we consciously realize it or not [3]. Aesthetics should be considered an important function because of this alone. A lack of consideration is not a valid choice; the aesthetics will still speak for you. To borrow a quote from Paul Watzlawick; "One cannot *not* communicate."

Acknowledging the impact of aesthetics and making it a priority is the only way to exert some form of control on what that communication *is*. This especially resonates with AP's where we see the profound impact stigma can have on users, and where communication through the product form is important to promote acceptance both for AP users and the society we live in. Focusing on the look and feel of a product should therefore not be seen as vain, self-indulgent or something to be done for the sake of it, but a necessary part in focusing on the needs of the user [1].

3. DESIGN METHODOLOGY: BLURRED LINES

This section provides a brief overview of the more commonly used design methodologies and how they can overlap or come in conflict with each other or the designer, as well as what specifically benefits AP development.

3.1 Empathy or Empathic Design?

The original idea behind the method of Empathic Design, an article in Harvard business review by Dorothy Leonard and Jeffrey F. Rayport, was to use observation and analyze the data in cross-disciplinary teams to discover workarounds in existing products (user customization), hidden consumer needs (unarticulated user needs) and ideas for new products and functions as well as identifying a products intangible attributes, like people enjoying the clean smell of detergent [19]. Observation is key, as "people are generally highly unreliable reporters of their own behavior" [19], and the method was mostly advocated as a guide for new product development (NPD) [20].

To observe and collect information, Leonard and Rayport sensibly recommends multiple observers from different disciplines, as different people will record varying information when observing the same situation [19]. This is easier to achieve in a large study, or by in-house designers or larger consultant firms. It does not appear particularly achievable in smaller projects with few -or a single- participant, which can discourage design students, who often find that participants, time and financial resources are in short supply. In addition, many designers find that businesses often gather research data prior to a project, often before they are hired or involved at in any capacity [20].

Empathy as we more commonly understand it, is defined by Fulton Suri as "our intuitive ability to identify with other people's thoughts and feelings –their motivations, emotional and mental models, values, priorities, preferences and inner conflicts" [24]. In the article by Leonard and Rayport, empathy is implied rather than referred to explicitly. Yet others have re-envisioned ED, adding empathy as an important driving force in the design process and emphasizing more participatory research strategies [6] [16], and the result has created many different ways of using Empathic design, with no definitive method. "Development in Empathic design has been in the form of guidelines, rather than methodology. The definition often exists only in the designers head." [4]
However, in a literary review, Postma, Zwartkruis-Pelgrim, Daemen, and Du identified four principles of modern empathic design:

1. Addressing people's rationality and their emotions in product use in a balanced way by combining observations of

people's actions with interpretations of their thoughts, feelings and dreams.
2. Making empathic inferences about prospective users, their thoughts, feelings, and dreams, and their possible futures of product use.
3. Involving users as partners in NPD, so that researches and designers can continually develop and check their creative understanding in dialogue with users.
4. Engaging the design team members as multi-disciplinary experts in people research, thus encouraging researches and designers to join forces in designing and conducting people research to ensure that the users' perspectives are included in NPD. [25][20]

In designing AP's -or any product- it is important to be on the same level as the user, to make a concentrated effort to understand their wants and needs in order to eliminate assumption as well as the users perceived needs [11]. It is necessary to be able to "satisfy both functional and emotional needs of individuals" [6]. Many strategies endeavour to increase this understanding, like Empathic modelling; "experiencing with your own body the physical situations of others" [6]
Ethnography; observe and record (ethnography) "how people interact with products, services and experiences (authentic human behaviour)" [6] which is essentially the same as what Fulton Suri refers to as 'Shadowing'; "Looking at what people really do, either in their current natural context or with prototypes we expose to them" [24]
Another strategy is empathic design probes; "specifically designed material packages given to the potential users to document their private lives, contexts and experience." [5], which can be particularly useful for researching situations people consider embarrassing or private.

All the strategies mentioned support the designer in becoming "closer to the user through respectful curiosity, genuine understanding, and suspension of judgement" [16]. The more emotional approach, rather than rigorously adhering to a set methodology, allows for designers to try different research strategies at their convenience, the main point seemingly to create a greater connection –or "moments"- between designers and users, trusting that this will be a positive and motivating influence for both parties [16].
However, it is crucial to acknowledge the designers' empathic horizon; the limits to their own experience and understanding. Fulton Suri remarks that "empathy is a particular kind of imagination and, similarly, needs a continual reality-check" [24].

Empathic design takes a departure from HCD in that its research does not lend itself to the hard data and solid evidence based on a large number of people, nor does it care to. "Its strength lies in raising awareness of what makes life rich, personal and meaningful" [25]. Because this type of research is neither conclusive nor easily generalized, empathic design arguably embraces the designer's role in a way that HCD does not. "Team members (and stakeholders) need to read, interpret and explain users' stories, and envision possible futures based on their own interpretations and explanations." [25]

Another implication given how empathic design research often happens on an individual level - narrowing the scope instead of widening it- is the suggestion of a conflict between empathic and inclusive design. It is easy to imagine how individual sensibilities from empathic design combined with the needs of the many as required by inclusive design to result in a "flying submarine", overly compromised type of product.

3.2 Human Centered Design

Currently one of the most influential methods of design, user centered design -commonly referred to as human centered design- is a varied methodology/philosophy with a broad combination of practices, but mostly unified with two themes: 1) conducting research with real

people who are likely to use the product, and 2) using that research to drive the design solution [12]. Acknowledging the usefulness of consulting end-users in the design process remains one –if not the- most important discoveries in design, and the process is ongoing.

Modern HCD can be said to be based around four principles [9]:
1) Involving users to better understand their practices, needs, and preferences.
2) Searching for an appropriate allocation of functions between people and technology.
3) Organizing project iterations in conducting the research and generating and evaluating solutions
4) Organizing multi-disciplinary teamwork.

HCD can feel a bit like an ever expanding umbrella term for design, including participatory design, ethnography, co-design, the lead user approach, contextual design and empathic design [9] as part of HCD, depending on the source. They remark that the "collection of terms does not provide a clean concept of what is common in HCD –especially with each separate terms having several common interpretations." [7]
Friess has a similar conclusion, remarking that "Although it appears on the surface that no two definitions of HCD are exactly the same, sometimes, differentiating between two supposedly distinctive definitions of HCD is highly difficult. [12]

Many suggest HCD be re-envisioned further; for one, involving users in the initial stages of a project in the way that empathic design advocates is not the norm [6]. When working with AT, the designer often has no prior understanding of the user and their surroundings; by not including real users in the initial stages, valuable information can be lost. Steen argues to include empathy in HCD [9] Several researches have also called for a greater inclusion of this particular brand of empathic design in HCD [13][14][16], feeling it would enrich the methodology.

While the myth "the user does not know what they want" has been largely de-bunked [14], empathic design differs from HCD by acknowledging that while users usually have a good idea of what they need, it can be difficult to express. And while most are acutely aware of problems with existing technology or designs [14], this can be hard to extend to NPD and radical revisions, which can hard to envision or define. They can be so used to their various workarounds that they don't consider other alternatives, or they might perceive a need, but lack a defined idea of what. Other yet might be unused to verbally express what they want in a product, or perhaps find the topic difficult to discuss. This is particularly relevant to medical devices, as these users encounter additional factors that must be taken into consideration, such as stigma, illness, and elderly users perceived assistive needs versus actual needs [23]. Meanwhile technology is ever evolving and improving, allowing old problems to be solved in new ways.

3.3 Methodology vs. Designer

"I observed for one year matriculated in an institution that was extremely dedicated to HCD, and yet in practice, their process was less than empirically centered" Friess 2010, [12]

In HCD, analyzing empirical user data in order to make informed design decisions [12] has for many come to define the methodology. However there seems to be inherent problems related to blindly following a design methodology [17][12], one of which is how an over-reliance on user data can undervalue the contribution of the designer, and as a result create a conflict between the designers own instincts/insights and the desire to follow the 'correct' method [12]. Steen as well notes that there are "tensions between HCD principles and HCD practices" [9].

It would appear that in practice, a certain amount of flexibility regarding methods should be a designer's prerogative. Deciding against this can lead to a conflict between the designer and

methodology they adhere to. “At the very least, students of design need to understand that their own intuitions may clash with user-derived data, and they should be prepared to negotiate their own responses to the conflicting information.” [12]. There needs to be a balance between empirical data and an empathic understanding of user needs with the designers knowledge and imagination: “In a similar way to that in which Personas and Scenarios help designers imagine and contextualize users, users may also require assistance to imagine and conceptualize bespoke products designed with them in mind” [14]. This is where the designer adds value to a product, or in the words of Daniel Fallman: "Fieldwork, theory, and evaluation data provide systematic input to this process, but do not by themselves provide the necessary whole. For the latter, there is only design." [10]

A degree of prior knowledge and self-motivation are important factors for successfully using systematic design methodologies [17].
Daalhuizen, Person, and Gattol suggest “the use of different types of methods is not connected to performance in a straight manner” and that “method mindset play a key role in the way the designer experience methods” [17]. In other words, methodology can be a guide to great results, but prior exposure and preference, as well as “learning style, cultural background or personality traits” are thought to affect the level of success, particularly how the designer feels about the experience [17]. The nature of the project, resources and level of involvement also contribute to the relevance of any given methodology. By suggesting a more flexible approach to design methodology and - particularly in the case of AT- the inclusion of empathic strategies and mindset, designers can glean valuable insight and data they might not find otherwise.

4. CONCLUSIONS

Stigma related to AP are often closely linked to appearance or the level of “assistiveness” associated with the product [2]. Such visible stigma can have a negative effect on identity and self-esteem, causing an obvious conflict between users and many existing AP’s. While inclusive design by no means guarantees a good assistive product, it is worth noting that the idea of inclusiveness could be focused on aesthetics alone by having the form refer to more mainstream appliances, while still keeping the overall focus on an often marginalized user group. Mainstreaming aesthetics in AP can potentially reduce stigma and provide users with more options. Of course, not everyone wants to blend in; allowing for personalization via under-design, or playing with the inherent shock value of visible and voluntary stigma are all extremely worthy avenues for any designer to explore, as well as necessary to reaffirm or restore the users identity in the manner they prefer [1][2].

AP’s are highly personal products; most are in daily use, and some literally replace a body part or function. Despite this, regarding aesthetics as a vital function is not yet the norm.
Dissatisfaction with the aesthetics in AT is displayed in different ways; while younger, active users tend to be more vocal about aesthetics and might customize or use various workarounds, elders can often show non-verbal dissatisfaction through behavior. For elders there can be a discrepancy between perceived vs. actual need, and it should be noted that objective need does not necessarily translate to acceptance of this need or even continues use the relevant AP [2][11][23].
Changing the perception of AP via appearance and how they are introduced to the user has the potential to reduce this behavior. Aesthetics, stigma, and usability are closely intertwined when it comes to AT. The common definition of a useless product relates to functionality only, but the connection between aesthetics and stigma in AP’s means that if the appearance is making people feel “more disabled”, it can result in product abandonment or incorrect use, as well as causing emotional strain. All of the above can be dangerous or detrimental to the users condition, which means our definition of a ‘useless’ AP should change to include this.

Our emotional response to aesthetics is hard to quantify but crucial in practice. All products communicate through their appearance, and de-valuing aesthetics is a communication in itself [1]. Prioritizing aesthetics on par with other product functions is the only way to potentially control this communication, and its contribution to stigma in AT. Attractive products are a pleasure to use and cause us to tolerate small irritations better, making the experience go more smoothly [3]. Placing a higher value on aesthetics and variation, given the personal and stigmatic nature of many of these products, should therefore be seen as a necessary part in focusing on the needs of the user.

Empathic design has evolved from an observational method for NPD to include a variety of more emotional design approaches and empathic strategies [3][16]. These strategies give us great empathic tools for discovering user needs, particularly unarticulated ones. The research is often done on an individual level, by seeking to connect emotionally with the user, and so it's important to balance ED with more general data [24]. Tempering ED with empirical user data common in HCD practices can likewise prove a positive influence on HCD, as many call for the inclusion of more empathy in this methodology [9][12]. For the development of assistive products, a mixed method of relevant strategies from ED and HCD could serve the designer well. While users usually know what they want, they don't always know *how* they want it, nor should this be expected. AT is often seen in conjunction with the accelerating field of medical technology, and a designer's contribution could be crucial in finding new ways to meet old needs. A good assistive product, like any, is more than the sum of its parts.

Rigorous adherence to any methodology seems problematic in theory and proves difficult in practice. By looking at the more common design methodologies, it is clear that any definitions as such are by no means comprehensive or final, and there is a clear case of overlap. Further widening the gap between theory and practice is counterproductive; should a certain amount of flexibility in design methodology be a designer's prerogative? Allowing for some leeway according to individual preferences and project relevance could be of benefit to designers, and help push design methodologies continued evolution.

An empathic mindset in the form of willingness to get to 'know' the user is crucial to any project affiliated with AT, and one cannot hope to make a successful AP without it. However, empathy is not confined to ED, and exists as an underlying theme in many design strategies, without it necessarily being referred to explicitly. With AT, the need for empathy is apparent in every product function, considering the complex and unique challenges of the people who use them. People with disability are considered a minority, existing at a remove from 'most people', aka the typical user most designers have experience designing for. This adds another empathic hurdle in order to fully understand user needs, especially considering the majority of designers are able bodied [14].
Using empathic strategies and working to achieve an empathic mindset allow for a better understanding of user needs: for AT in particular it can add valuable insight in ways to manage stigma via design, positively affecting the outcome of any project connected to AT.

REFERENCES

[1] Graham Pullin, *Design meets disability*, Cambridge, MA: MIT Press, 2009.

[2] Susanne Jacobson, *Personalised Assistive Products: Managing Stigma and Expressing the Self*, pp. 1-169, Unigrafia Helsinki 2014

[3] D.A. Norman, "Emotion and design: Attractive things work better", *Interactions Magazine*, No 4, pp. 36-42, 2002

[4] Tuuli Mattelmäki, Kirsikka Vaajakallio, and Ilpo Koskinen, “What Happened to Empathic Design?” *Design Issues*, pp. 67-77, Vol. 30, No. 1 , Winter 2014

[5] Tuuli Mattelmiiki, Katja Battarbee, “Empathy Probes” ,PDC 02 Proceedings of the Participatory Design Conference, Malmo, Sweden, 23-25 June 2002

[6] Joyce Thomas, Deana McDonagh, ”Empathic design: Research strategies” Australias Med Journal, Vol. 6, No. 1, pp 1–6, January, 2013

[7] Marie K. Harder, Gemma Burford, Elona Hoover, “What Is Participation? Design Leads the Way to a Cross-Disciplinary Framework”, Design*Issues,* vol. 29, no 4, pp. 41-57, Autumn 2013

[8] B. Major, L.T. O’Brien, “The social psychology of stigma” *Annual Review of Psychology*, Vol. 56, pp 365, 2005

[9] Marc Steen, “Human-Centered Design as a Fragile Encounter” *DesignIssues*: Vol. 28, No. 1, pp. 72-80, Winter 2012

[10] Daniel Fallman, "Design-oriented Human-Computer Interaction." Human Factors in Computing Systems, the Proceedings of CHI (Association for Computing Machinery, 2003), 225—32.

[11] William C. Mann O.T.R. and Ph.D. a, Sara Goodall O.T.S. a, Michael D. Justiss M.O.T. and O.T.R./L. b& Machiko Tomita Ph.D. “Dissatisfaction and Nonuse of Assistive Devices Among Frail Elders” , 2002

[12] Erin Friess, “The Sword of Data: Does Human-Centered Design Fulfill Its Rhetorical Responsibility?” *Design Issues*: Vol. 26, No 3, pp. 40-50, Summer 2010

[13] Shraddha Sangelkar, Nicholas Cowen and Daniel McAdams, “User activity -product function association based design rules for universal products” *Design Studies*: Vol. 33, No 1, pp. 85-110, January 2012

[14] Christopher R. Wilkinson, Antonella De Angeli, “Applying user centered and participatory design approaches to commercial product development” *Design Studies*: Vol. 35, No 6, pp. 614-631, November 2014

[15] Janet Kelly, Ben Matthews, “Displacing use: Exploring alternative relationships in a human-centred design process” *Design Studies*: Vol. 35, No 4, pp. 353-373, July 2014

[16] Deana McDonagh, Joyce Thomas, Siying Chen, JuanJuan He, Yong Seok Hong, Yunjin Kim, Zhongren Zhang, and Feniosky Pena-Mora, “Empathic Design Research: Disability + Relevant Design” *European Academy of Design Conference, EAD09/040*, pp. 310-315, April 2009

[17] Jaap Daalhuizen, Oscar Person, Valentin Gattol, “A personal matter? An investigation of students’ design process experiences when using a heuristic or a systematic method” *Design Studies*: Vol. 35, No 2, pp. 133-159, March 2014

[18] Kristof Vaes, Pieter Jan Stappers, Achiel Standaert, and Kristine Desager, “Contending stigma in product design; Using insights from social psychology as a stepping stone for design strategies” *International Design and Emotion Conference London,* September 2012

[19] Dorothy Leonard, Jeffrey F. Rayport, “Spark innovation through empathic design” *Harvard Business Review*, pp. 102-113, nov-dec 1997

[20] Carolien Postma, Kristina Lauche, Pieter Jan Stappers, “Social Theory as a Thinking Tool for Empathic design” *DesignIssues*: Vol. 28, No 1, pp. 30-49, Winter 2012

[21] Ripat J, Woodgate R, “The intersection of culture, disability and assistive technology.” *Disability Rehability Assistive Technology*, Vol. 6, No. 2, pp. 87-96, 2011

[22] Correia de Barros, A., Duarte, C., Cruz, J. B. “The Influence of Context on Product Judgement – Presenting Assistive Products as

Consumer Goods." *International Journal of Design*, Vol. 5, No. 3, pp. 99-112, 2011

[23] Tad Hirsch, Jodi Forlizzi, Elaine Hyder, Jennifer Goetz, Jacey Stroback, Chris Kurtz . "The ELDer Project: Social and Emotional Factors in the Design of Eldercare Technologies." Carnegie Mellon University, 2000

[24] Jane Fulton Suri, "Empathic Design: Informed and Inspired by Other People's Experience"; "Empathic Design", edited by: Ilpo Koskinen, Katja Battarbee, Tuuli Mattelmäki, IT Press, 2003

[25] Carolien E. Postma and others, "Doing Empathic Design: Experiences from Industry", *International Journal of Design*, Vol 6, No 1, 2012