

A fashion phone for swedish style-Exploring outfit-centric design

Yanqing Zhang

Stockholm University

celia@mobilelifecentre.org

Oskar Juhlin

Stockholm University

oskarj@dsv.su.se

ABSTRACT

Fashion is not merely superficial surface or appearance, but closely related to the development of technology in history. As fashion deals with soft materials, it is becoming more interested for researchers in product design, interaction design or related technological innovation, such as wearable computing etc. However, it is demonstrated in fashion theory that fashion is not equal to clothing. It is a cultural production that goes through mechanisms eg. designers, style, dressing and practice etc. We believe that these could offer more opportunities to mobile design. We present a study on a design experiment of shape switching phones for Swedish Style people as a way to approach ‘outfit-centric accessory’ design, which focuses on designing mobile device as part of an ensemble. We connect mobile design to local fashion phenomenon ‘Swedish style’ which is featured by simplicity, clean cut and denim oriented etc. In contrast to the ‘fashion phones’ existing in history, which are usually decorative, luxurious or ‘bling bling’, this way of approaching fashion offers a very different aesthetics in mobile design. The design exercise contains the creation of a set of mock-ups and initial user study on five potential users. The user study shows the potential of varying mobile devices to fit different outfits. We hope this study could offer more opportunities to fashion-oriented mobile interaction design.

Keywords

Shape switching phone design, fashion, Swedish style, outfit-centric accessory, mobile interaction, wearable computing

INTRODUCTION

Contemporary fashion has permeated into all things in life beyond clothes. In 1993, Estelle Ellis delivered a speech titled 'what is fashion' in the Fashion Institute of Technology in New York, drawing public attention to a new concept of fashion in contemporary era (Blaszczyk 2007). She perceived fashion in anthropological terms, that is, as a cultural force that drew sustenance from social customs, group psychology, material life, economic institution, and other types of human interaction and in turn, influence them. Fashion is seen as a causal agent that has constantly reshaped all material things, from the fabric environment which surrounds our bodies to the nature of design to architecture.

The masculine technology has become fashionable in recent years. The book *Fashionable technology* published in 2008 generally introduces the interplay between fashion design and technology, showing a lot of practical fashion designs embedded with technology. The term fashionable wearables are defined as 'designed' garments, accessories, or jewellery that combine aesthetics and style with functional technology (Seymour 2008). The area of wearable computing has pointed to the challenges of developing solutions that get accepted into everyday practices of clothing, with a large number of fully developed products, each showing much potential from a perspective of utility, but that for various reasons has yet to become commercially viable. Examples include smart sportswear, socially connected T-shirts, and party dresses equipped with decorative light displays (Loschek 2009). In general, the role of hardware design becomes increasingly important with the availability of microcontrollers in everyday products (Djajadiningrat, et al. 2004). Then it is important to bridge industrial and interaction design to create devices with meaningful relations between appearance, action and function. Fashion studies may be particularly relevant to interaction designers in the physical domain, as they increasingly deal with soft material properties in objects carried close to our bodies.

In mobile interaction design there have been explicit attempts to provide designs that meet the demands of fashion conscious people who have been defined as those who are sensitive to their physical attractiveness and image and interested in clothing (Wan, Young and Fang 2001). The industry has for example provided designed accessories and hardware, with such consumers in mind, as well as marketed the devices in fashion environments. We think that there is more to do in this area, by learning from fashion conscious people's practices. It is shown in a recent study

of fashion bloggers' comments about mobile phones (Juhlin and Zhang 2011). The posts in their blogs that talked both mobile devices and other fashion items show how these people appreciate public visual aesthetics, accessories that goes with an outfit to provide a look, as well as variation of looks. Currently, on smart phones, the opportunity to create and vary visual aesthetics goes on at the screen of a phone, which is most normally turned towards the user and not available to see for people in the proximity. On the other hand, the backside of the device provides a form and look that cannot be altered, unless adding a cover. Again, it is the other way around when it comes to the clothes and other fashion objects. Garments and accessories are easily combined to be seen and to provide publicly visual codes, transmitting a range of messages to surrounding people (Hebdige 2011). The study (Juhlin and Zhang 2011) calls for increased attention in design to such demands i.e. that is supporting visual interaction that make it a more appreciated part of how people constantly vary the design of their outfits and dressed ensembles.

We present a design research exercise, on what we term outfit-centric design to account for fashion practices. The hypothesis here is that fashion conscious people have an orientation towards visually appealing objects, which become attractive when fitted with their outfits. The design research also investigates how to account for methods used by fashion design to generate adornment for its objects. Here we draw on fashion theorist Kawamura (Kawamura 2005) who points out that garment becomes fashion, when it is integrated within an institutional system, which includes branding, designers cult, runways etc.

These shapes are visible not only for the owner but also for people in the vicinity. The concept is presented as a set of mock-ups showing how we intend to use the digital device to show its shape. Providing a set of 22 designed samples, which vary in color and shape. They are made inspired by a specific style in fashion, called the Swedish style. This method is in itself inspired by how fashion design draws on aesthetic expertise, styles and brands to generate exalt. We acquired initial user feedback from five users, who were invited to try and combine the ready-made shape-switching samples to different ensembles taken from their personal wardrobe.

RELATED WORK

This study is influenced by fashion theory and the research investigating how product and interaction design use fashion as a strategy in mobile industry.

Articulating Fashion

Fashion is a multi-disciplinary area and has been defined in various ways. Basically, it could be understood in these ways: First, fashion is symbolic, signifying and it creates images. These values have already been discussed deeply in fashion theories, e.g. Kawamura and Barthes; second, fashion is about 'aesthetic obsession' (Wilson 2003), what you have on your body, both clothing and ornament, can make fashion statement; last but not the least, fashion is a changing phenomenon, both personal style and fashion as a cultural phenomenon is constantly changing through times. There are many theories dealing with different aspects within fashion. In specific, our study will draw on the theory of fashion system proposed by Kawamura and fashion practice. The rest of this section will discuss them respectively.

Fashion system:

Fashion is an important driver of taste and it molds our concept of what is considered beautiful and aesthetical (Kawamura 2005). Wilson argues in her book *Adorned in Dreams* (Wilson 2003), that the changing expression, of what is seen as fashionable, has to do with the evolution of aesthetic style that reflects ambiguities and dissonances in society. What's important here is the recognition that fashion is not the clothes in themselves, but instead the social institutions and practices, that make them some garments become fashionable (Kawamura 2005). The taste for particular objects, as in fashion, is influenced by culture, context and history and produced by 'fashion system' i.e. institutional and cultural arrangements that cause particular cultural objects to be adorned in a specific way. It is this social system that in intricate ways creates the constant fluctuation of taste, and links industrial production to the variations in consumer values.

Fashion practice:

We are particularly interested in concrete fashion practice by which we mean the daily dressing activity, linking representation of personal fashion taste with social context. Wilson also talks about the dressing, 'getting dressed in the modern world is a matter of bricolage' (Wilson 2003). A finished appearance is a combination of the coming together of garments and accessories that we have usually not made ourselves. Every individual is 'a walking collage', an artwork of 'found items'- or perhaps something like 'a contemporary installation', changing as it interacts with its audience. Thus, dress is a surface that people address themselves to the environment.

Fashionable Technology and Wearables

The embedding of electronics into clothes items has been investigated both in research and in the fashion industry now for many years. In this area, the term fashionable wearable (Loschek 2009) is sometimes used to account for designed garments, accessories, or jewellery that combine aesthetics and style with functional technology (Seymour 2008). Examples include smart clothes like Know Where Jacket, which integrates GPS technology and Life Shirt which measures health etc. (Loschek 2009).

A common observation made by researchers in this area has concerned the challenges of developing solutions that get accepted into real, everyday practices of clothing, thus standing a chance of becoming commercially viable. Parts of these complexities could be traced to the core challenge of designing interactive products to make a fit within an already established 'ecosystem' of clothing practices, which includes issues related to matching, presentation of identity, and belonging to certain culture.

For new products to count as 'fashion', would thereby involve more than agreed to be 'pretty' or well-crafted, e.g. as a layout following established principles of graphic design. Instead it has to connect to fashion practice and also get legitimized through fashion mechanisms. This involves not only a general appreciation of the object as such, but also its fit into a person's visual presentation of him or herself, as part of a social setting where appearances count.

In this paper, we will address this theme by exploring mobile interaction design from a perspective of a distinct dressing style as it was locally manifested in Stockholm at the time of study.

Fashion Oriented Mobile Design

This study particularly looks at mobile design and fashion's impact on it. This section will discuss the existing fashionable mobile design both in hardware and software.

Fashion in Mobile Hardware Design

The fashions of mobile phones have over the years taken effect mostly in hardware, e.g. in the selection of colors, shapes, and materials used for different handsets, and what user groups that the different models are marketed towards. In the beginning of this century, a sudden boom of so called 'luxury phones' appeared briefly on the market, made with precious materials such as crystals and gold. Other materials often seen in fashion e.g. leather and fabric are also used, e.g.

Nokia 8800 Arte and L'Amour Collection. The physical outside of the phones have also been used to display co-branding with fashion companies or designers (Jang 2006), such as Prada phones (LG) or Armani phones (Samsung). Most of these explorations were before touch screen phones came to dominate the market.

Perhaps the most prominent way that the mobile industry has approached fashion has been through cases, charms, stickers, shells and other decorations (Katz och Sugiyama 2006). The practice of attaching personal charms to mobile handsets stayed popular for a long time, especially in Asian countries, but has now almost disappeared, partly because some of the most popular mobile phone brands have stopped providing the means for attaching such charms. Today, many of the well-known fashion brands design and sell their own mobile cases and shells.

In product design, as well as in interaction design, visual style is normally just one of many central aspects, where also temporal and sensual features, such as how it feels to press a button, and what manual actions one may perform, has been brought up to discussions in HCI, in particular in the field of tangible, embedded and embodied interaction. One specific stream of research that is becoming increasingly relevant in terms of this is the embedding of electronics in new physical materials, such as soft textile sensors and shape-shifting, foldable, organic interfaces (Holman och Vetegaal 2008). Clothing is just one application domain for such technologies, since they open up for entirely new forms for high-tech interactive products in general. Examples from the mobile phone domain include Nokia Research's Morph concept exploring emerging 'bendable interfaces' a few years back.

Since electronic product design has traditionally been mostly concerned with form giving of physically hard appliances, these types of experiments point to new opportunities as well as challenges. We therefore see fashion as a valuable source of inspiration, basically since it is one of few domains with a long established tradition of dealing with soft materials in design.

In this paper, we will explore aspects of soft hardware in mobile interaction design, with fashion and dressing practice as its starting point.

Fashion in Mobile Interaction Design

There is a wide range of software and services targeted at fashion conscious users. These are



Figure 1 Kashanipour's Matching application

usually in the forms of apps for smartphones, meaning that their essential design features are entirely in software. Most such applications available for android phones and Apple's iPhones aim at supporting users in their selections of clothes to wear. In a recent overview, thirty-three such apps were found (Kashanipour 2012), such as the fashion camera, the mobile closet, the do-it-yourself fashion design. These applications commonly provide a digital mannequin to test out combination of different clothes setups.

Kashanipour (Figure 1) presents a first attempt to apply the outfit centric concept drawing on contemporary smart phone technology.

The left picture shows the simplistic case of taking a photo of a detail in the person's dress and then using it as a background of the screen, in order to match the phone with the dressed ensemble. This specific action could be easily performed with the standard software of any smartphone, but by designing an application that specifically promotes this use, it might trigger a fashion conscious person to treat the phone as a fashion item. The picture to the right shows a more elaborate case where the photographed image of the dress is instead placed on a sticker attached to the back of the phone. This example illustrates the important difference between personal expressions displayed on a small screen of a mobile device, and the public visual appearance of its back. In this sense, it differs from available mannequin apps since it invites the users to make the phone a part of his or her own outfit, rather than a tool for designing or selecting an outfit.

DESIGN PROCESS

The process to explore the outfit-centric concept is framed by a design space, consisting of fashion conscious people's orientation to dressed ensembles, with emergent organic interface technology. The exploration is done through a process that combines further studies of fashion conscious people's dressing practices and 'aesthetic laborations' (Atkinson 2006). We have complemented it with additional investigations of how people put together their outfits as a practical activity. These studies include on-line questionnaires, informal interviews with friends and a formally structured study reported below. Second, the design exercise is inspired by emergent technology research and especially that of organic interfaces (Holman och Vetegaal 2008). If such technology were available, it would provide designers with an extended opportunity to change the form of what we up to now consider to be static "hard"-ware.

Study of Dressing Practices

We interviewed four persons, of which three were females, in order to understand how fashion conscious people put together their outfits. They were all friends of the researchers and were selected based on their personal styles and interests in fashion. The interviews with the females were done at their homes, whereas the man preferred to be interviewed at his office. This study focused on how they selected items from their wardrobes and combined them into an ensemble. The following points are the main themes brought up in the interviews.

Variation

'If I wear pants for a while, and I will change to dress. But I definitely have different looks every day during the five working days'.

We could see the people vary their outfits on a daily base. But when being asked about accessory such as shoes, she answers: *'No. Maybe change in three days'.*

Thus it is clear that fashion pieces have different variations in creating a look. Fashion accessories such as bags and shoes may vary less frequently than clothes.

Matching

'Normally... since my pants which I often wear to work are either black or khaki, so if it is black, it is easy, almost any color and any style will match. If I wear khaki pants, then I will go for some plain color and earth tone clothes, or similar brown tones. So it is not that difficult to match. So I often do shopping and I do it a lot, because I will get tired of my clothes very easily. I don't want to wear old clothes and by shopping I could input new items into my wardrobe'.

The participant talked about color matching as an important approach to make a look. Here she discussed two ways in matching color right: one is 'black+any color'; the other is colors within similar tones, such as 'khaki+earth tone color'. In the end, she mentioned the change of her wardrobe, which is correspondent with 'change' and 'novelty' in fashion (Kawamura 2005). From all the interviews, we could see that the matching rules and orders also depend on where the clothes are going to be used, personal taste and what clothes are available in the wardrobe.

In general, matching could be done by color, styles and forms.

Activity

When being asked how to make the look before going out, we got the answers:

a). *'I take them out and fold them up and see whether the colors clash. I don't wear them'*;

b). *'I must take them out and try them on in front of mirror'*.

Putting together an outfit was then very much a practical activity including bringing clothes out of the wardrobe, juxtaposing them and then getting a visual look at the ensemble. The combinatory work was done in different ways. The man as in example a) does not wear the clothes, but only put them together to see. In example b), the pieces were tried on in front of a mirror as a way to see whether they looked okay as an ensemble.

They started off with some idea of a particular style in mind, such as a style from certain period (e.g. the 1960s); a celebrity; a specific item such as a dress or a top, or a color tone. The matching rules and orders vary a lot depending on where the clothes are going to be used as well as taste as well and what clothes are available in the wardrobe. Putting together an outfit was then very much a practical activity including bringing clothes out of the wardrobe, juxtaposing them and then getting a visual look at the ensemble. The combinatory work was done in different ways. The man always started with items such as shirt and pants, which were put on a chair for inspection. Some women picked items and held them in between themselves and a mirror. The items were also put on the bed beside each other, or tried on as a way to see whether they looked okay as an ensemble.

In all, we learned that the interviewees do spend time to match items together to an outfit. It also shows that matching is demanding and very much focused on visual presentation. Interestingly, we found the daily dressing practices do not include any digital devices. The reasons could be that they think mobile phones as a working tool rather than a fashion item. They often put the phones into their bags, then it is not visible to others. Furthermore, they usually have only one phone, which means that they don't have any choice to change. This is also an inspiration for us to do the shape switching design.

Selecting a Matching Principle

The concept of outfit-centric design has at its core the understanding that the visual appearance of the device should match the outfit. In Kashanipour's exercise, she used this possibility in a way, termed manual matching, to give the users as many opportunities as possible to change the appearance on the screen. In this exercise we followed the matching principles that were more

aligned with fashion logics (Kawamura 2005) such as drawing on designers' expertise in aesthetics.

The industrial designer plays an important role in bringing her knowledge into the design and providing a set of predefined options to fashion oriented people. The idea is to investigate a match mechanism that restricts users' opportunities, following the tradition in fashion where people buy prêt-à-porter (ready-to-wear) (Mazza och Avarez 2000) from specific brands, rather than make clothes themselves. The user gets to choose the appearance of the digital device from a limited set of options, provided by an expert skilled in design.

Swedish Style- Localization of Fashion in Design

In order to design mock-ups, which will inform us about the concept's qualities, the designer needs to accommodate not just for the outfit-centric concept, but also for users' taste. When we acquire for initial user feedback, users' approval or disapproval, will be influenced by how the concept in general would please them, but also by how the available design options we provide, fit with their style. Fashion, as it concretely takes form obviously vary not only in time, but also between geographical locations and within different sections of a society. Thus a fashionable outfit inevitably looks very different if we study people on the streets of e.g. Tokyo, Paris, New York or Shanghai, respectively. Since this project was physically located in Stockholm, we specifically analyze the characteristics of contemporary fashion from a local perspective, i.e. the so-called Swedish style (Falck 2011). The Swedish designers became popular internationally in the 60's, followed by a second wave of the late 90's, when brands like Acne and Tiger introduced the Swedish denim fashion. The third wave came in the mid-2000s with a fashion designers Carin Rodebjer and Carin Wester, and has also been reinforced the Swedish owned international retailer H&M.

This style is simple, clean, functional, uni-sex and denim oriented. Filippa Knutsson who has built the brand 'Filippa K.' says 'Beauty involved living in a white box—everything was supposed to be as pure and minimalist as possible' (Ben Saad 2007). In this style, the shape is dominated by sharp cuts as well as soft drapings, formulating a contrast. The design has clean lines but can be playful in form and cut and may have surprising details (Falck 2011). Moreover, this style is characterized by very sparse use of colors and patterned fabrics, with most items having shades of grey, black, beige, and denim. Swedish styled people hesitate about vulgar

super luxury that dominates many international fashion houses (Ben Saad 2007). Thus, the so-called fashion phones of the late 1990s, with predominantly bright colors, lots of details, and ‘bling’ can be seen as almost the opposite of the aesthetic norms addressed in this study.

Aesthetic Laborations

The industrial designer had the sole responsibility for the ‘aesthetic laboration’ (Atkinson 2006), to generate a concrete instantiation in the space described. Her work included participation in workshops on the topic ‘design naturally’ led Professor Cheryl Akner Koler and the industrial



Figure 2 samples, from geometric to organic

designer Parsa Kamehkhosh, investigation of emerging trends in fashion and design¹ as well as ideation (Jonson 2005) through e.g. water-colour sketching, and investigating alternative

¹ Viewpoint no 28, 2011

materials including various fabrics. We settled for developing a shape-shifting device, which would account for the design properties of emergent organic interface technologies. The use of particular shapes and forms are inspired by fashion aesthetics, where the design of clothes depends on the color of the fabric, as well as on the cut and form of the garment.

The final set of mock-ups is shown in figure 2. The colors are selected those of Swedish jeans fashion ranging from black to beige and white. The shapes range from the rectangular to organic form; from sharp cut to soft draping as well as from clean to more playful form and cut (see figure 2). In the following user study, we use the term ‘sample’, which is defined as ‘the first version of a garment made in real fabric’ in fashion (Sorger och Udale 2012), to name the designed creased mock-ups

INITIAL USER FEEDBACK

To acquire initial user feedback on the samples, we selected five women, based on recommendation from our friends, in the age between 20’s and 30’s. Their professions range from fashion designer to project manager. The participants are recommended by the authors’ friends and considered to orient to Stockholm Style. We also confirmed this during the interviews, when looking at the clothes they selected and the brands they use. The participants were invited to select samples out of our prêt-a-porter series (Figure 3), and then combine them with a dressed ensemble. Four interviews were done at their homes to make the study as realistic as possible. As we learnt in our study of dressing practices, people make their outfits close to their wardrobes. The fifth interview was done in a café. We present an analysis of how they combined the samples with their outfits, how they vary where the sample is located and select among the colors. Finally we discuss users who dislike the possibility to choose among a variation of forms.

Selecting Multiple Samples with Variations of Outfits

Three users chose different samples to fit with different personal outfits (Alice table 2 (outfit 7-10) Klara table 3 (outfit 16-18) Emma table 2 and 3 (outfit 11-15)). Alice, for example, was asked to first present a favorite cloth item; then an accompanying accessory and finally select one of our samples. She chose a yellow dress (see outfit 7 and 8), which she has been wearing a lot recently. In order to choose the matching accessory, she asked whether it was intended for ‘the day or evening’ but answered herself by creating one look for each occasion. The day look (outfit 7) is complemented with a black leather jacket and Converse shoes. For this outfit she selected a black sample (no. 18), and made it into a necklace, hanging on a black ribbon. Its shape is deformed

from a square, like it has been shrunk by external pressure. For the evening look (outfit 8), the dress was matched by a red lip bag, necklaces rings, black high heel shoes (not shown in this picture) and a black sample (no. 22), which is smaller than item no. 18 and more deformed.

In all, Alice, Klara and Emma used various samples as part of different outfits. It confirms our design approach to try to change the shape of a device to make it fit with fashion conscious people's appreciation to the visual appeal of publicly available complete dressed ensembles.

Variation of Items and Body Position

In the three tables, it is visible that all participants selected different positions for the samples on their outfits. In the example above, Alice changed the location of the device from wearing it as



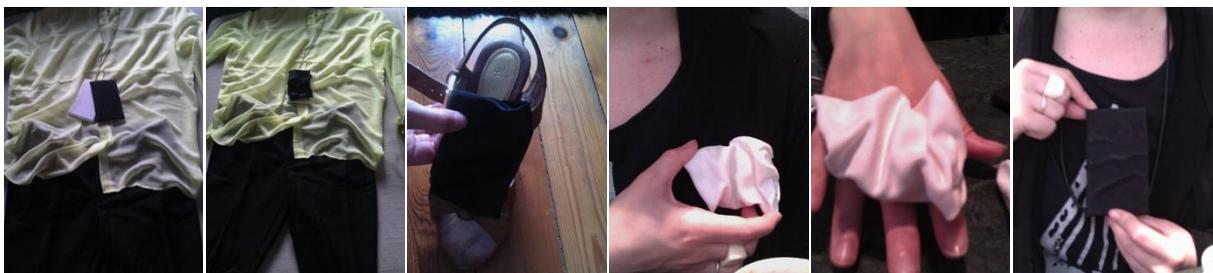
- | | | | | | |
|---|--|--|---|--|---|
| <p>Outfit 1
 Participant: Maya
 Item no: 19 (black)
 Outfit: Blue shirt inside, black suit outside, dark jeans
 Position of object: Pocket</p> | <p>Outfit 2
 Participant: Maya
 Item no: 19 (black)
 Outfit: Acne Sheer grey blouse, dark jeans
 Position of object: Hand</p> | <p>Outfit 3
 Participant: Maya
 Item no: 2 (brown)
 Outfit: Beige cashmere sweater, brown belt, jeans
 Position of object: Hand</p> | <p>Outfit 4
 Participant: Maya
 Item no: 4 (brown)
 Outfit: Filippa K. Grey long blouse, brown belt, jeans
 Position of object: Hand</p> | <p>Outfit 5
 Participant: Christina
 Item no: 22 (black)
 Outfit: Cream cardigan, Monki blue velvet dress
 Position of object: Brooch</p> | <p>Outfit 6
 Participant: Christina
 Item no: 22 (black)
 Outfit: Prints' dress inside, Black blazer
 Position of object: Pocket</p> |
|---|--|--|---|--|---|

Table 1 Variations of outfits



- | | | | | | |
|---|--|--|---|--|---|
| <p>Outfit 7
 Participant: Alice
 Item no: 18 (black)
 Outfit: Yellow dress, black leather jacket, Converse flats
 Position of object: Necklace</p> | <p>Outfit 8
 Participant: Alice
 Item no: 22 (black)
 Outfit: Yellow dress, red lip clutch, necklace, black high heel shoes
 Position of object: Hand</p> | <p>Outfit 9
 Participant: Alice
 Item no: 13 (white)
 Outfit: White sleeveless top, blue plaids skirt, red flat shoes, lipstick necklace,
 Position of object: Hand</p> | <p>Outfit 10
 Participant: Alice
 Item no: 17 (black)
 Outfit: Dark grey T shirt, Weekday dark jeans, grey leather boots
 Position of object: Hand</p> | <p>Outfit 11
 Participant: Emma
 Item no: 6 (beige)
 Outfit: H&M Black blouse, black miniskirt, necklace, silver watch, Black leather boots
 Position of object: Necklace</p> | <p>Outfit 12
 Participant: Emma
 Item no: 8 (beige)
 Outfit: H&M Black blouse, black miniskirt, necklace, silver watch, Black leather boots
 Position of object: Bag</p> |
|---|--|--|---|--|---|

Table 2 Variations of outfits



- | | | | | | |
|---|---|--|---|---|---|
| <p>Outfit 13
 Participant: Emma
 Item no: 9,16(white, black)
 Outfit: H&M Yellow blouse, H&M black pants
 Position of object: Necklace</p> | <p>Outfit 14
 Participant: Emma
 Item no: 9, 18(white, black)
 Outfit: H&MYellow blouse, H&M black pants
 Position of object: Necklace</p> | <p>Outfit 15
 Participant: Emma
 Item no: 20(black)
 Outfit: Monki Black sleeveless dress, thin brown belt, H&M brown pump shoes
 Position of object: Shoe lace</p> | <p>Outfit 16
 Participant: Klara
 Item no: 14(white)
 Outfit: Black graphic T shirt, black cardigan, black jeans
 Position of object: Brooch</p> | <p>Outfit 17
 Participant: Klara
 Item no: 14(white)
 Outfit: Black graphic T shirt, black cardigan, black jeans
 Position of object: Ring</p> | <p>Outfit 18
 Participant: Klara
 Item no: 17(black)
 Outfit: Black graphic T shirt, black cardigan, black jeans
 Position of object: Necklace</p> |
|---|---|--|---|---|---|

Table 3 Variations of outfits

necklace in the day-look, to wearing it in her hand for the evening look. Alice, Klara and Emma used the samples as necklace (outfit 7,11,13,14,18), brooch (5,16), ring (17), hand held (2,3,4,8,9,10), shoelace (15) and bag (12). The possibility to change the samples' positions on the body and the importance thereof was not conceived of in design, and we were surprised by their creative variation. This variation was in a sense made possible by the exercise condition, where the clothes, accessories and designed items were put on a bed. Had they been trying on the clothes, the shortages of attachment devices on the samples had perhaps refrained them from experimenting with body locations. In all, their creative use makes the demand for various ways of attaching it to the body evident. In the three tables, it is visible that all participants selected different positions for the samples on their outfits. In the example above, Alice changed the location of the samples from wearing it as necklace in the day-look, to wearing it in her hand for the evening look. Alice, Klara and Emma used the samples as necklace (outfit 7,11,13,14,18), brooch (5,16), ring (17), hand held (2,3,4,8,9,10), shoelace (15) and bag (12). The possibility to change the samples' positions on the body and the (2,3,4,8,9,10), shoelace (15) and bag (12). The possibility to change the samples' positions on the body and the importance thereof was not conceived of in design, and we were surprised by their creative variation. This variation was in a sense made possible by the exercise condition, where the clothes, accessories and samples were put on a bed. In all, their creative use makes the demand for various ways of attaching it to the body evident.

Color Variation

From the tables, we can see that black items were used more than other colors i.e. items (16-22) were chosen 11 out of 18 times. Still, white colors were selected five times (outfit 9,13,14,16,17) and variations of brown were selected four times (outfit 3,4,11,12). In all, three of the participants (Maya, Alice and Emma) varied the colors of the selected sample, to different outfits. For example Alice choose colors similar to the rest of the ensemble on two occasions (outfit 9,10) and colors that were contrasted to the ensemble in two other occasions (outfit 7,8). Thus, color is also of importance for matching the outfit.

Number of Samples

The way Emma used a combination of samples in the outfits no. 13 and no. 14 displayed a possible implication of the use of outfit centric design. When Emma picked a light yellow sheer

blouse (outfit 13), she matched it with a pair of black pants and accessorized them with a silver wristband. She then picked two samples (item no. 9 and 16) and tried to explore which suited best. Interestingly, she selected both of them. Then she changed the flat black item (no.6) to the black item no. 18 that is slightly more organic, which then created a new outfit (no. 14). Picking two objects for a single outfit was not according to our instructions since we considered the entire range of shapes as emergent out of a single shape-switching device. That is why we instructed the participants to only pick one item for a single outfit. Still, her creative approach and the disobedience to those instructions, show that there is a possibility and demand to combine more than one device with an outfit.

Preferring a Fixed Form

Two of the participants stated in the interviews that they were much less inclined to use several samples, and oriented towards a single sample during the entire exercise. Maya, for example, picked the black sample No. 19 to match with two different outfits (outfit 1, 2). The black suit was selected for work, and especially for formal meetings, complemented with a shirt and black pants. Then she did not want the sample to be seen and instead have it in her pocket. For after-work, she would wear a sheer blouse with a black tank top inside; a belt and a pair of black jeans, complemented with black high heel shoes (outfit no. 2). Although the outfit is very different she would stick with sample no. 19. In outfit 3 and 4 other selections of samples and outfits are examined, but she told us that she did not like them. The color was appreciated, but the shape was not desirable.

Maya and Christina's dislike of varying in between the shapes can be understood in different ways. First, their orientation to a single item might be due to an understanding of the set (see figure 3) as design variations of a contemporary mobile phone. This orientation to interpret the device as a smart phone was e.g. evident in their comments on the items' usability. Being asked to comment on the shapes, Christina said "I will be very annoyed, I think. Because I cannot visualize, I think I'm very set in my mind that how could I press keys and use it... I think it's also when the phones become smaller and smaller, it's becoming unpractical. You couldn't find the phone. How do you speak?" She also commented that an Iphone was in the right size. Her dislike seems to grow out of her lack of understanding of how the interaction with the device functionality is solved. Paradoxically, when she treated the samples as fashion accessories, Christina chose no. 22, the most organic and small, as she loved the shape, size and color. Her

reaction shows that it is hard to conceive of mobile phones and fashion accessories as one thing. For Maya and Christina, a mobile phone is more like a tool where their interest in form and fashion is not expressed. But fashion items could have much more diversity in forms.

Second, Maya mentioned in the interview that she was “trend sensitive.” As a trend follower, it is important to follow what is considered fashionable, and decision on prototype items where traditional guidance on whether this is trendy is missing could be difficult. They get used to the current shape of mobile device and may not be so bold to start a new trend. Therefore, she cannot think about something that has not existed yet. It points to weakness in how design concept is connected to the fashion system.

Third, the orientation to a single item can have been influenced by individual taste. We know that individual differences in aesthetic preferences can have an important impact on aesthetic responses to product design and shape. Emma, Klara and Alice, who varied the use of samples to different outfits, said that they liked the shapes. Maya and Christina, on the other hand, did not like the items since they did not match their minimalistic style. Maya said: “It would be like I have been wearing them for a day, ha ha... they get crinkled, so it’s a crinkled feeling. It’s not what I take out in the morning. I need to iron this.” Her taste was towards the sort of creases that appear when the body moves, rather than through ready-made shapes made by stitches and sewing.

In all, two participants refrain from selecting more than one sample, which could be seen as a negative reaction towards the concept per se. It did not just appeal to them to have an object that could change its shape in this way. But it could also be a reaction towards this particular instantiation, as we will discuss in the next section.

Aesthetic Appeal

The study provided feedback about the specific ‘Swedish style’ instantiation of the outfit-centric concept. First, the participants commented upon the texture of the mock-ups. Maya’s first impression was their texture: ‘It looks summer style fashion to me. Because I see these as cotton, but also the texture of linen.’ Similar to the visual orientation in fashion practices (Kawamura 2005), she discussed how it looks rather than how the samples feel. The visual impression of certain texture has a great impact on how she chose the object to match clothes. This interest tells us something on the level of detail in which the organic interface has to adapt. For a fashion

conscious person, it might not be enough if it could change shape, if its surface texture is not desirable. Second, the participants often considered the size of the samples. Maya thought the items were too big to put on clothes, so she tried to hide it into a pocket or a bag. Christina picked the same black shaped item all the time, partly since it was “the smallest one”. For Emma, the size of accessories could also create drama in contrast with her simple clothes. The important feedback to consider size is how folding could be made to change the overall size. The possibility of shape shifting to affect size could improve their matching.

DISCUSSION

The design exercise provided a better understanding of the outfit centric concept, and in specific, its visibility for other people in the proximity, how the device fits with the outfit, as well as how the variation should be applied. On a more general level, the design exercise influence how we approach fashion in mobile design, as well as product design and wearable computing.

Shape Switching Phone Design in Fashion System

This section summarizes how our design of shape-switching phone could approach fashion system, in specific, production of fashionable items and practice done by people in Swedish style.

Production

Kawamura says producing fashion is a collective activity, involving many people and processes. She particularly discussed the importance of designers and the related star designer system. First, we emphasize on the importance of designer’s role. The strong inclination towards prêt-a-porter within fashion, and its use in the design exercise, opens the possibility to adhere to other mechanisms such as designer labels and style. Individual designers are made important in the production of fashion. Many famous fashion brands are named after the starting designers, making the fashion design personified (Kawamura 2005). This is in contrast with product and interaction design where designers are often de-emphasized, making the items less personal. Especially in HCI, with proposed methodologies of e.g. participatory design, the role of a designer and the specific tastes and styles and cultural connotations that may bring to a specific design project, has been almost left out from the academic discussions.

Another important aspect of fashion is that of local styles, conveying an initial impression-making image that continues in between different items. This study draws upon the particular ‘Swedish style’, which means that the samples were never intended to please everyone, but to

illustrate how a particular manifestation of a fashion can inspire new designs of interactive products. Here we collaborated with an industrial designer who offered expertise in creating the shapes as a way to emphasize the role of designer in production, while also placing special attention to the local norms in fashion. The important point here is to show how the design of digital devices and applications could be molded into specific fashion styles, and how these fundamentally differ.

Second, we look at the design of the samples. The samples are guided by ‘outfit-centric accessory’ concept, inspired by ‘Swedish style’, and made of soft materials, fabric. The concept realized in design differs from previous so-called fashion phones in the following aspects:

- the ‘shape switching’ concept provides a 3-dimensional exploration. It is no longer a rectangular device, and the variation of shapes offer extended diversity in appearance. T
- the different shapes and sizes allow for experimentation with location on the body. The ways it changes shapes, and therefore also size, allows for experimentation with body location. The samples were used as necklace, brooch, handkerchief and small bag etc.. The form of use provide different visibility in social encounters, as well as give the items different contexts i.e. next to the trousers when used as a belt and next to a blouse or shirt when used as a necklace.
- the design exercises make visible the potential to design applications that connect visual aesthetics of mobile devices to dressed ensembles (e.g. prêt-a-porter, social media etc.).
- the design exercises display outfit-centric concepts that are inherent in the device, and thus allow for more extensive variation, than selecting in-between hardware gadgets that are in themselves fixed in their form and appearance.

Diffusion

Diffusion is about dissemination of fashion, ie. how fashion ideal is spread (Kawamura 2005). Fashion photography, which often appears in fashion media and advertising campaigns of fashion brands (Shinkle 2008), is essential in creating desire over fashion products and telling brand stories. Thus in our project, we invited professional photographer, a model and stylist to create ‘Swedish style’ looks. They together selected the garments and accessories as well as matched them with clean-cut hairstyle and light colored make-ups. We aimed to produce fashion photos (as seen in Figure 1), which could create desire for the shape switching phones’ accessorizing

Swedish style. If the photos appear in fashion magazines or public advertisement, they would disseminate the ideal 'shape switching phone is fashionable'.



Figure 3 Shape Switching phone presented in Swedish style (no.18)

Figure 3 shows some of the photos. We could see that the clothes are in dark color, blue, or black. The top in the first image is transparent and the suit in the second image has clean cut. The styling in the three photos is quite simple and unisex. All of these show a tendency to presenting 'Swedish style'.

Fashion Practice

Here we investigated dressing practice and we did a user study mimicking the dressing practice with the designed samples. Dressing practice is a process of selecting items, trying out and matching every single piece into a united look. The 'walking bricolage' is a combination of different things (Wilson 2003). It is the possibility to be different that is fascinated by fashion conscious people. The bricolage indicates that you could easily change one or a few items in the image you are creating to make a new look. Variation, then, becomes a key issue here. The concept of outfit centric design grew out of the identification of a mismatch in temporal variation between digital devices and fashion items. The use of fashion items varies, in the sense that we change among many items on a daily basis and also add to our wardrobe quite often. However, the way in which fashion conscious people vary their use of clothes and accessories is not the same for every type of object. For example, people change clothes on a daily basis, but not necessarily change their shoes or bags that often. When it comes to digital devices, such as mobile phones, people only have a limited amount to select from or just a single one, and we buy new devices on a yearly basis.

Designing a mobile phone that fits somewhat with such temporal variations is a challenge. This rate of variation is influenced by how our design items are perceived. If they are conceived to be something like a bag, they are not expected to change all the time. If we juxtapose it with bags or shoes, the potential for design is less obvious, but if we see a phone as clothing that varies more frequently, it will be more challenging.

The feedback from the participants, and especially Maya's desire for shapes that the movements of the body generates, rather than wrinkles sewn into the fabric, make us conceive of design for real time temporal variation of the shapes. The design exercise did not conceive of items that could dynamically transformed when in use, such as how wrinkles appear on a flat texture when it worn by its owner. What we conceived in this design exercise was something similar to wave-shaped, steel-clad architecture e.g. the Guggenheim Museum designed by Frank O. Gehry (Loschek 2009). Therefore, it would be interesting to explore a more dynamic organic interface which transforms its shape in real-time.

Contemporary vs. Emergent Technology

Kashanipour's design exercise shows how difficult it is to change the public visible appearance of a mobile device. She had to use stickers to achieve this, which is not the best solution to provide variation. In all, it seems that contemporary smart phones have critical hardware restrictions that make it difficult to provide for applications that meet the demands of outfit centric design.

In the design exercise reported in this paper, we instead choose to get inspiration from emergent technology. This gives us more freedom to experiment with public visual design. However, the downside of such approach is the uncertainty in understanding the potentials of this new design material. As with other design-oriented research (Holmquist 2005) we risk at engaging in a more or less meaningless activity since we might have exaggerated the technologies' capabilities. However, if the potential of organic interfaces do live up to some of its promises, we will soon need to discuss 'how' it should change its forms, rather than just being amazed that it 'can'.

There is also a middle level that is visible in the two design exercises discussed. First, an interesting option, which has not been investigated in the design exercise with contemporary smart phones, is to use social media as a public arena to display the device in combination with

the outfit. Then, the focus is not on the visibility in physical space, but on visibility on Internet. Second, the participants' interest in color variation, as displayed in the second design exercise, could be utilized in design solutions that do not support shape shifting. Color variation that is publicly visible and combined with the dressed ensembles, could be achieved by adding screens on the side or the back of a mobile device.

CONCLUSION

Our aim with this study was to explore the concept of a mobile phone more closely integrated with everyday dressing practices, and one that more easily can be adapted to a variety of looks. We think that fashion could inspire technology innovation in the aspects beyond beautiful appearance. With everyday dressing practice as a starting point, we further studied a particular style of fashion, 'Swedish style' and explored twenty-two samples in different shapes and four groups of colors, which we call 'shape switcher'. We conducted a user study on five women all with an aesthetic orientation towards the explored dressing style. Participants did vary the prêt-à-porter samples with different outfits, but in discussing the items as potential shapes for mobile phones, some of them were rather hesitant, mostly due to the conventional opinions on the form factors of mobile phones. In all, this design exploration on 'outfit-centric accessory' shows an intimate connection to fashion system: the production where designer plays a crucial role and samples were designed to suit a particular style, the fashion photography of the Swedish style phones, and the strong awareness of practices conducted by fashion conscious people. The designed samples, although only mock-ups and need further development, differ from the previous so-called fashion phones in the form factor, the relation to the human body and borrowing matching mechanism from fashion practice etc. This study offers new opportunities for designing fashion oriented mobile devices in the future.

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