Södertörns university | School of Communication, Media and IT
Master Thesis 15 hp | Interaction design | spring semester 2010 |
Interactive Media Design Master Program

Virtual size measurement for garments and fashion industry.

– Selection of right size at the online fashion buyers.

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Selection of right size at the online fashion buyers

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Abstract. Internet is one of the major achievements of 21 century by human kind. Retailers have moved their business towards a global market through internet. Human computer interaction is getting enhanced in different contexts. Consumers can now access the global markets online for the sake of shopping. Fashion industry is getting tremendous popularity in an online environment. Fashion is transformed into digital fashion where people from all over the world have easy access to the world of fashion and can interact and get hands on every piece of art. They can simply buy any fashion product anywhere in the world. The most important part in this domain is the interaction of the consumer with the media for the sake of spending money for goods having a fashion designer at the back end. So here the interaction needs to be precise and specific, especially when it comes to the sizing phase of the activity called shopping garments online. This paper investigates the current sizing trends offered by online fashion retailers and proposes the preferred state interface in order to discover the facts that enables consumers to finalize perfect size for them. The focus is on female users. The results will lead to understanding of the cause of confusion that consumer faces in selecting right size while shopping garments online.

Introduction

"Consumers have seemingly been switching their purchases from the physical marketplace to the internet market space" (Chin sung, 2009). "The Internet along with the rapidly growing power of computing has emerged as a compelling channel for sale of garments"(Cordier, Seo, and Magnenat-Thalmann, 2003, p.1).

Fabric, color, design, material and fitting are the core characteristics that a consumer considers and investigates thoroughly before purchasing garments. The consumer relies completely on the pictures and the item description mentioned by sellers in an online garment shop. Among all the characteristics, fit is most important and a basic requirement for buying garments. Along with the perfect fit one or two other characteristics can be ignored. In contrast if all other characteristics are present and outfit doesn't seem to be fit perfectly than those features are useless hence resulting in sizing as a primary factor for success of fashion market. A $200 suite that fits perfectly will outshine a $3000 suite that doesn't (*Men's suits and shirts*). "Sizing systems is an important component of apparel quality. Apparel cannot be top quality unless it fits satisfactorily the potential wearers" (Lee, 1994, p.1).

Selecting correct size of the garment is the major issue in online garment business. According to a recent poll by Lee, 71% of consumers find it difficult to find a good-fitting jean, an experience complicated when the shopping takes place online (Merriam, 2009). Pastore (2000) addressed that consumers are unwilling to take risks to make a purchase decision in the absence of the ability to fit on garments in person. "Most consumers are hesitant to purchase garments online or are unsatisfied with their online shopping experience" (Beck, 2001). "A number of recent studies identified the causes for consumer hesitancy, and of particular notes are the consumer's overwhelming concern with fit and correct sizing, and the inability to try on items" (Cordier *et al*. 2001, p.1).

> "Recently introduced capabilities allow the customer to view items together, such as a blouse and a skirt.... Even with these improvements in product presentation, a number of things can still go wrong when the consumer pulls the apparel item out of the box. The most common problems include poor fit" (Beck, 2001).

"Consumers that purchase garments online today base their purchase and size-selection decisions mostly on 2D photos of garments and sizing charts. This method is not precise enough and not interactive enough to provide right sizing" (Cordier *et al*. 2001, p.1). "These problems plaguing online apparel sales necessitate the implementation of a more powerful solution (Cordier, Seo, and Magnenat-Thalmann, 2003, p.1).

In order to come up with some meaningful interactive sizing solution consumer's behavior and requirements about selecting the right size for them needs to be accumulated. Researchers have investigated sizing problems in the online garment domain. Several sizing solution, models and methods have also been proposed. Several initiatives have been introduced about the concept of sizing across the world. Researchers are supposed to find out the specific reasons for the error that arises from current sizing criteria in an online fashion market. This will help to cure the problem, increase the consumer's satisfaction and reduce the return rate in the business. One of the most critical problems that impact the future development of interactive sizing methods is to find out, what are the factors that create confusion among consumers of online fashion for selecting the right size? The answer for this question will act as diagnostic data to be cured. To procure the confusing facts, current sizing methods offered and consumer's criterion for deciding the right size needs to be analyzed. I want to apply my interactive designer skill to search for creating and designing aesthetic interaction along with usability and functional aspects and precede my research for this problem.

To address this situation, this paper makes two contributions: (i) evaluation of typical current sizing methods offered by online fashion retailers. Online fashion buyers are subjected to this evaluation. A survey through email has also been performed. (ii) Discover the factors that makes consumer finalize the perfect size for them. The model for the second task is based on Frayling's (1993) *research through design*.

> "What is unique to this approach to interaction design research is that it stresses design artifacts as outcomes that can transform the world from its current state to a preferred state. The artifacts produced in this type of research become design exemplars, providing an appropriate conduit for research findings to easily transfer to the HCI research and practice communities" (Zimmerman, Forlizzi, J, & Evenson, 2007).

The model is tailored in accordance with the required task in this paper.

Motivation

I have been selling leather garments since three years on ebay.com and have experienced collaboration with consumers online regarding various order placements. Several issues faced by the online consumers included sizing as a major problem was discovered. Almost every consumer comes up with the question about sizing before purchasing and it is to be believed that it is really hard to manage this problem while selling garments online. The consumer gets really disappointed when after waiting for a long time the fitting for the delivered item is not up to the mark. I started offering custom sizing options as an experiment which solved the problem to a little extent. Instead of selecting

size from a size chart I offered them a form to be filled out. The form contains fields of different body measurements. The consumers were supposed to fill out the form by putting their body measurements along with options like if they want close fit or loose fit. Based on their measurements and requirements I used to choose size for them. For that I used to create patterns and match them with the garment measurements and this helped me a lot to choose best size that fits the client. From these three years of collaboration with online users I came to know about user experience regarding online sizing issues. This pre-discovery helped me to a great extent in this research process. The research methodology that I chose for this paper was selected depending on these personal experience findings. As its obvious what really needs to be analysed for improvment in this problem area.

Research Aproach

The methodology in this paper includes evaluation of current sizing methods offered by online fashion retailers. The evaluation was performed by a survey with several internet users. The results were more informative than expected. On the other hand the factors that makes users finalize size for them were discovered on the basis of Frayling's (1993) concept of conducting research through design and a model of interaction design research proposed by Zimmerman, Forlizzi, J, & Evenson, (2007) is applied. "According to this model interaction design researchers develop actual concrete problem framing. These framing of problem are produced through an active process of ideating, iterating, and critiquing potential solutions" (Zimmerman, Forlizzi, J, & Evenson, 2007). The process starts with the creation of the design artifact for a specific design problem.

Method benefits

1) "In evaluating the performance and effect of the artifact situated in the world, design researchers can both discover unanticipated effects and provide a template for bridging the general aspects of the theory to a specific problem space, context of use, and set of target users" (Zimmerman, Forlizzi, J, & Evenson, 2007).
2) "The design artifact transfers knowledge about technical opportunities, design communication and preferred state. This knowledge enables researchers, practitioners and education communities to observe the value of different theories, models, and technology (Zimmerman, Forlizzi, J, & Evenson, 2007). This observation is a relevant aid for further research or design process and motivates new research.

3) “The artifact reflects a specific framing of the problem, and situates itself in a constellation of other research artifacts that take on similar framings or use radically different framings to address the same problem” (Zimmerman, Forlizzi, J, & Evenson, 2007). “The artifacts made through design research have the potential to become pre-patterns (Chung *et al,* 2004)”.

Present trend

In today’s world, almost all of us belonging to age group below 40 have experienced buying garments online. “Online spending on apparels by consumers increased from 0.5 to 3.5 percent between 1999 to 2003” (*United States Census Bureau*).

Top designers, fashion retailers and fashion business people have already captured a tremendous part of media and instead of doing business only by street outlets, shopping malls and fashion houses, they have set up online fashion selling stores i.e. Ebay.com, designer platforms i.e. net-a-porter.com, and online brands i.e. giorgioarmani.com, transforming fashion into digital fashion where people from all over the world have easy access to the world of fashion and can interact with online fashion brands. They can easily buy any fashion product anywhere in the world. Rival retailers Marks and Spencer and Tesco have also recently revealed rejuvenated clothing websites (Felsted, 2009).

Almost, every online store offers sizing options and guides in form of sizing charts, text and pictorial guide of how to measure your size or what size would better fit you depending on your measurements and body type. One example can be seen in Figure 1 below. The purpose of the example is to have a look at the typical sizing criteria for an online women clothing store online.

Size Chart

UK SIZE	CONTINENTAL	BUST		WAIST		FULL HIP	
		cm	inches	cm	inches	cm	inches
6	34	79-82	31 - 32¼	60-63	23½ - 24¾	83-86	32¾ - 33¾
8	36	83-85	32½ - 33½	64-66	26¼ - 26	87-89	34¼ - 35
10	38	86-89	33¾ - 35	67-70	26¼ - 27½	90-93	35½ - 36½
12	40	90-94	35¼ - 37	71-75	28 - 29½	94-98	37 - 38½
14	42	95-99	37¼ - 39	76-80	30 - 31½	99-103	39 - 40½
16	44	100-104	39¼ - 41	81-85	32 - 33½	104-108	41 - 42½
18	46	105-109	41¼ - 43	86-92	33¾ - 36¼	109-113	43 - 44½
20	48	110-115	43¼ - 45¼	93-99	36½ - 39	114-119	45 - 47
22	50	116-121	45¾ - 47½	100-106	39½- 41¾	120-125	47¼ - 49¼
24	52	122-127	48 - 50	107-114	42 - 45	126-131	49½ - 51½
26	54	128-135	50½ - 53¼	115-122	45¼ - 48	132-137	52 - 54

Figure 1. Typical sizing chart for online retailers (Debenhams, 2010).

Here is an example of how online garment retailers provide guidance for taking measurements in written text form:

“When measuring yourself for any piece of women’s clothing, measure yourself in a non-padded bra. This will give you the most accurate measurement for a women’s dress or other item of women’s clothing you’re going to buy. And don"t pull the tape measure too tight”.

This type of text guides are usually used to guide consumers for selecting better sizes for them.

In figure 2, an example of a measurement guide in form of an illustration offered by an online garment retailer is shown. Here it can be seen that instructions and help is provided to measure different parts of body correctly i.e. waist, bust, hips, inside leg, dress length and skirt length. Under each heading related tips and recomendations are presented. By using these types of guides consumers can measure themselves with minimum risk of errors.

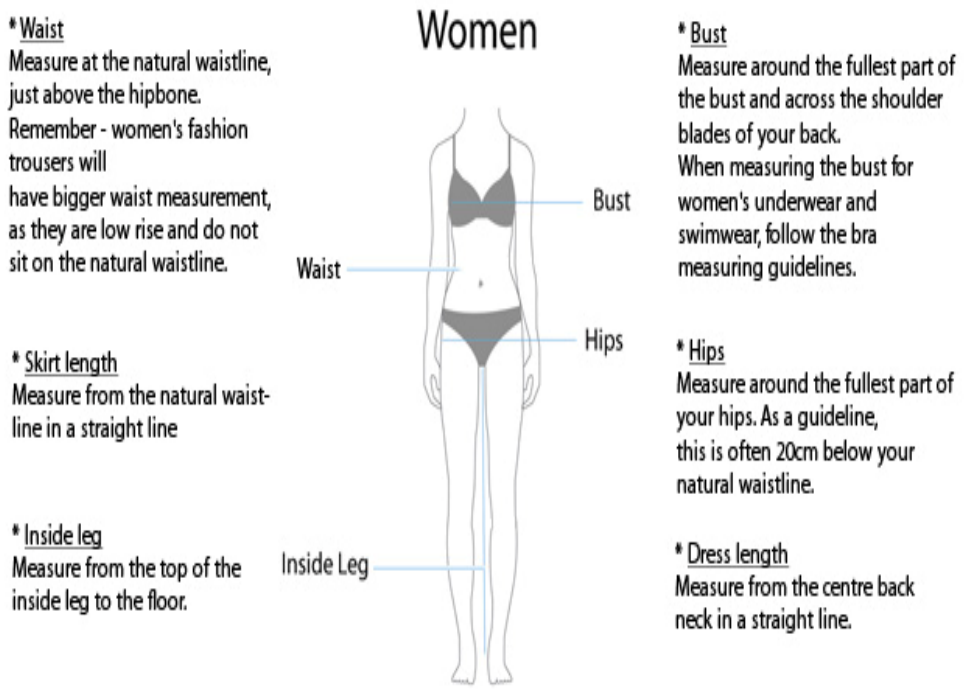

Figure 2. Measuring guide for online retailers (Debenhamns, 2010).

Evaluation survey

The two examples above represent a traditional pattern of size selection method, while shopping garments online. The figure 1 and the guide illustration (figure 2) were evaluated through an email survey. Figure 1 and figure 2 were sent to several internet users though email. They were asked to provide their size depending on this table and guidelines. The actual purpose of this survey was not to get the sizes of the users but to see the reaction of the users and to see what questions they ask regarding any confusion about selecting size for them. Those questions were predicted to be very useful for understanding the flaws of interactivity in these current sizing methods.

Results

Most perceptible questions that were received from informants were:

1. What is meant by continental?
2. I am from USA. I don't know what my size is for UK?
3. My bust is 24 inches and my bust is 35 inches. What size should I

choose?

These were the common questions that were received from majority of the users. These questions lead the evaluation of the current size charts to some corner with meaningful results. The questions above clarifies that users who have asked these questions are unable to select size from chart without relevant help and will avoid shopping from the retailer who offers this size chart. Users are unaware of different words used in these types of charts (figure 1) according to question one. Question 2 reflects the most important and confusing factor in this sizing method. Reason for moving the business towards the online market is to capture the global market. Internet stores provide an opportunity of buying products any where in the world by sitting at home. However question 2 indicates that users are unable to buy garments from the online global market due to lack of uniformity in sizing codes as figure 1 is showing sizes only for UK. "Selecting the right size is not a straightforward decision, since different manufacturers use different size charts for different size of garments. Size recommendation is a problem of relating body measurements to individual garment sizes" (Kartsounis, Magnenat-Thalmann & Rodrian, n.d). Different countries have different codes for offering sizes to consumers. In order to avail these opportunity consumers need to have proper information about their sizes according to every country's as well as every seller's criteria. In this situation the consumer must be aware of her UK size. USA size is useless. Although measurements are given to select relevant size but the consumer has to measure each time she changes the retailer. "Body measurements for each size category differ among apparel manufacturers" (Fellingham 1991). Furthermore "each manufacturer changes its standard body measurements over time. As a result, standard body measurements for a specific size code have been different not only among manufacturers but also for a single manufacturer over time" (Yoon and Jasper, 1995). Results from the survey were found related to findings of previous researchers. On basis of these evaluations a need for stability in size codes is in need. One group of researchers developed an up-to-date set of standardized body measurements that could be used by all manufacturers (Damenoberbekleidung Verband 1983; U.S. Department of Commerce 1971). Researchers stated that it is not feasible to compile a universally applicable, single set of body sizes because body shapes and measurements may differ significantly and body shapes may vary from country to country and also within countries (Yoon and Jasper, 1995). Moving on towards the third question it is percieved that even if the consumer is aware of her body measurements, still she is unable to choose size from a table sometimes. The meaurements of users sometimes does not match with any of the codes in the table. However sometimes it matches, but consumers are not able to judge

well. “The system now used for most women's ready-to-wear garments is that the former designates garment size with measurements of key body dimension (e.g., "size 8 for waist 28 inches")” (Yoon and Jasper, 1995). This system reduces the rate of consumer confidence due to misunderstanding about size and different body dimensions. Instead of looking for one solution of all these problems its better to come up with some new concept that eliminates all these confusions.

Preferred state

In order to discover the consumer’s preferences it is necessary to follow contextual inquiry method. The users need to be studied during their try on activity in physical fitting rooms. But due to the privacy problem this is not possible. So the study was carried out by analyzing consumers while using interface designed in the same pattern of a physical fitting room. Instead of eliminating the need for trying on the garment, consumers were provided a web environment similar to a physical fitting room. All features of the physical fitting room were included in the interface.

> The process starts with the creation of design artifact for a specific design problem. Artifacts intended to transform the world from the current state to a preferred state. The purpose of these artifacts is to produce knowledge and contributes significant inventions for further research and practice communities (Zimmerman, Forlizzi, J, & Evenson, 2007).

Interface

The preferred state interface created for this study was named “interactive sizing tool”. It starts at the point of the online purchasing activity when the consumer is done with the selection of design, color, material and other garment specs. Once the decision for the desirable product is finalized then the consumer needs to check for size. At this stage this interface starts. It has been a normal trend that at this stage consumers go to sizing charts and tables to select sizes for them such as M, L, XL or 12, 14, 16. Unlike this traditional method the interface adds an option of a “fitting room” to check the fit of different sizes. This interface starts with a measurement form to be filled out by consumers. Figure 3 shows the view if the measurement form for this interface. The test was conducted on three females. These three users were regular online buyers of garment. The interface was tested by them separately on different days. They were given dummy measurements to be filled out in the form. The purpose of this test was to analyze the consumer’s preferences for selecting size.

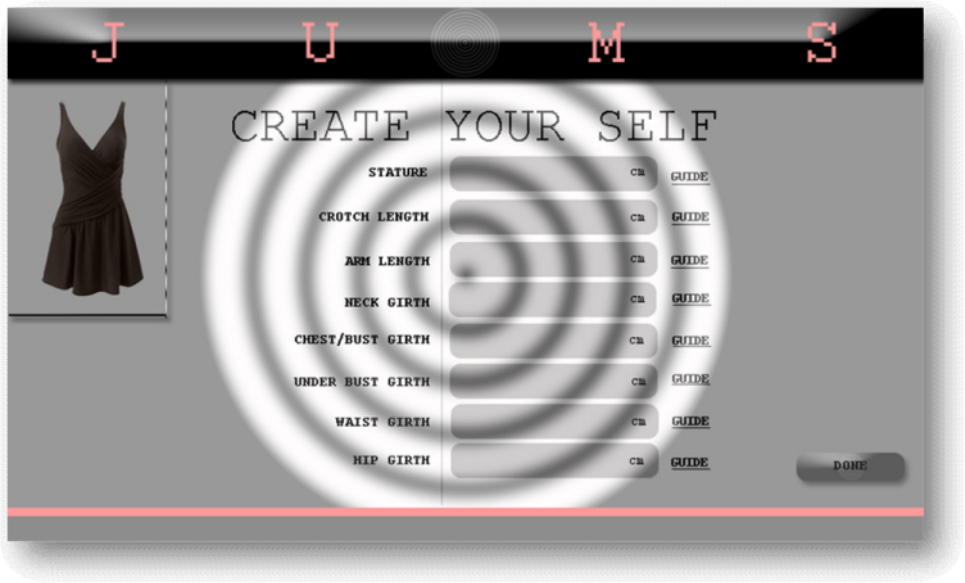

Figure 3. Measurement form

After filling out the form (figure 3) they were directed toward the virtual fitting room page (figure 4). This virtual fitting room was designed almost similar to a physical fitting room. The purpose was to check for the factors that makes users happy about the fit of the garment.

Figure 4. Prefered state virtual fitting room

Subjects were exposed to the virtual fitting room (figure 4) with all the sizes (S, M, L, XL) of selected garment hanging on the right side and the complete body forms adjusted according to the measurements given in the previous step. The mannequin represents the consumer's own body in two views called ORIGINAL VIEW and SEE THROUGH. Below these views there is a comment column which displays relevant messages for consumer's help and provides suggestions to consumers i.e. "HELLO…WELCOME TO THE FITTING ROOM". This comment box also creates an interactive environment along with its practical useful feature. It gives response to consumers for their actions, making them believe that there is something in the interface which is assisting them for help. It acts as a sale person to some extent and increases the consumer's confidence as well. "One desirable form of interactivity from a consumer perspective is the implementation of sophisticated tools to assist shoppers in their purchase decisions by customizing the electric shopping environment to their individual preferences' (Ha¨ubl, Gerald & Trifts 2000).

The subjects were asked to assume that the bodies in the interface was their own. The subjects started by trying different sizes one by one. First they picked "S" size. After Clicking on the small size they were able to see a small size garment on the body, see figure 5. This was the point where discovery of the consumer's preference about selecting size started. Here they were observed closely and were interupted by several questions.

The process was the combination of textual inquiry and the prefered state artifact, as proposed by Zimmerman, Forlizzi, J, & Evenson (2007).

Figure 5. Prefered state fitting evaluation.

In figure 5 it can be seen that the body is wearing an “S” size garment and the interface presents the view similar to view which the consumers see in mirrors in a physical fitting room. After getting to this page, the subjects were found very much immersed in the figure to evaluate the fit of the garment. All the three subjects after evaluating for a few minutes moved forward to try for the “M” size. They clicked on the medium size garment and moved to the page shown in figure 6. The same activity was practiced by the subjects through out the process.

Figure 6. Prefered state fitting evaluation.

Once again the consumers were found so much immersed in the page for purpose of evaluating the fit of the “M” size. After a few minutes they moved forward to check for the “L” size and the same routine was repeated.

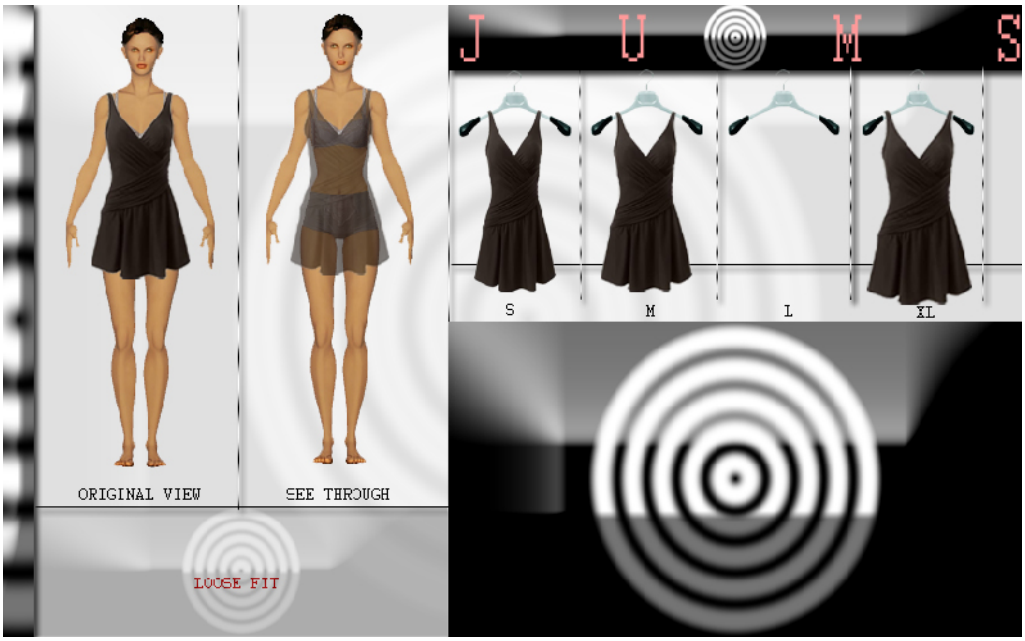

Figure 7. Prefered state fitting evaluation

After going through figure 7 the subjects finalized and announced that they would go for the size "M". It was surprising that all three subjects were found to follow the step in a similar manner and that they all decided to go for the "M" size.

This exercise provided very informative results for betterment of the online sizing issue.

Results

After the experiment was finished, subjects ended up selecting the right size for them. The subjects selected the "M" size. Why did they choose "M", why not "S" or "L"? The answer to this question will lead the investigation to discover the consumers' preferences in selecting sizes for them. And the answer was found through the questions asked during the activity. During the interface testing process when subjects moved from the "S" size view towards the "M" size view they were all asked "what makes you think that the "S" size is not a good fit?". From their responses, the reasons for rejecting "S" was because:

- The hem (bottom) of the garment is a little bit up which is against the design of the garment and the subjects wanted it to be a little below when they wear it.
- The side hips were exceeding slightly out of the garment seams and the

same was the case at the bust area.

All these answers were based on what they saw and these fitting factors made them decide that this is a too small size for them. Only one factor is enough to reject the size. Moving on further, the subjects were asked the same question when they moved to test for the “L” size. All of them surprisingly answered that although the “M” size seems to be perfectly fitted but they wanted to try “L” just for an option and to see that maybe the fit of the “L” size would look better. When the subjects finalized the “M” size for them they were asked to tell that what makes them think that “L” size is not a good fit. There answer made it clear that in the “L” size view it is obvious that the distance between seam lines of the garment and the body lines is unacceptable. The distance transforms the impact of the loosely fitted garment. At last, the subjects were asked to motivate why they selected “M” size. The answer was because all the seam lines of the garment were matching with the body lines, the hem of the garment is at right place and an overall view gives a remarkable look of the body and the garment collectively. All these results were confirmed by looking at the figures again in relation to these findings.

The information that has been gathered through this experiment is a relevant knowledge that is useful for interaction designers in this domain to consider in further development of sizing solutions. The most important factor that must be considered is to accurately present the contrast between the seam lines of the garment and the body lines as from the above investigation the consumer’s decision relies completely on these factors if such interactive solution is implemented.

Common comments and suggestions of the users about the preferred state interface:

- If such an application will be available they will shift their 90% garment shopping toward the online market instead of the physical stores.
- They would be able to shop with full confidence.
- This will enable them to save shopping time as they don’t have to get into the confusing philosophy of size charts and see the different sizing ranges of different countries.
- It is a straight forward and visible concept.
- The application is easy and simple to use

Discussion

Evaluation of current sizing methods available online resulted in fruitful

findings about the factors that causes confusion for consumers who buy garments online. Putting users in a preferred state and interpreting their user experience provided knowledge about consumers' preferences that makes them finalize their sizing decisions.

From the evaluation it is somehow clear, what are the major confusions that are faced by consumers in the current sizing methods. Above all the confusing factors, suppose if all these problems are cured, still the fit of the garment will be a surprise on the delivery of the garment. The surprise can be pleasant and unpleasant. In the above evaluation (i) there were few users who were able to send their sizes without any confusion. Two of the users were sent a top according to the size they sent. They were asked to give feedback after trying on the garments. Even the sizes they sent were according to their measurements but still their try on experience was not 100 % satisfactory. One said that it was a little loose at the waist and the other was unhappy due to a little bit too short sleeves. The point is to offer something which provides a try on facility in the online environment.

Interaction designers should focus on the problems and their solution in the light of the user experience. Instead of improving the current interaction method its better to learn what consumers are use to and what the consumers' preferences are. Solutions should be shaped according to the user's experience instead of shaping the users to the solution. The next step of this study was the consumers' preferences in finalizing the perfect size for them. For that reason a preferred state interface (Zimmerman, Forlizzi, J, & Evenson, 2007) was designed for a user test. The purpose of the test through the preferred state interface was to discover the factors that make consumers finalize correct size for them. Discovery of these factors was a meaningful success in understanding the missing and confusing features in the current sizing methods and will aid in establishing more appropriate interactive sizing methods. This paper is dealing with the issues of consumers in context of online garment shopping. The problems that consumers face for selecting the right size for them. First the evaluation of the current methods demonstrated the key issues which the consumers face. Basically here the consumer is being transferred from one platform to another. The consumer is being transferred from physical fashion outlets with physical fitting rooms towards a virtual world. So the important point to be taken into account here is that what if users are offered the same environment in this digital world which is customary. This means that instead of offering them size charts why not offer them some thing similar to physical fitting rooms. The physical fitting room must be designed on the basis of the consumer's preferences found in this paper and confusing factors in current methods must be eliminated. The customer has to know his/her size which he/she can pick from the existing size charts or sizing

tables, or one has to measure oneself according to the guidelines. Still, it is not possible to see the exact fit until the garment is tried on.

Consumers need to try on and see the fit of the garment before buying online to:

- Be sure of what they are buying.
- Reduce the hesitation of returning the garment when buying.
- Be confident while buying online.
- Be satisfied in their purchasing experience.
- Be easy going with the sizing phase of the activity instead of getting into the confusion of size charts.

Conclusion

The investigation in this paper provided relevant data and provided meaningful reason of consumer's hesitation in online purchasing. Consumers need to have some proper interactive sizing solution in order to shop online garments. Consumers need to try on garments before spending money. Without a try on feature, the solution to this problem would always be useless. The investigation in this paper resulted in very useful knowledge about the elements about user experience that can be put into the design process of designing the sizing solution for the online garment industry. Keeping track of all the resulted knowledge and information, the designing solution can lead the industry towards a meaningful and practical solution.

The future aspect of this paper is to come up with an interactive sizing solution which reflects the fulfillment of the online buying requirement specifications of consumers discovered above, and promotes the online garment industry. The solution where consumers can try on different sizes of garment on the body. This will increase the level of decision making confidence of consumers in the online fashion buying activity.

Acknowledgements

I would like to thank Ester Appelgren for the support and guidance during the writing of this article by providing valuable information and comments that shaped it. I would also like to express my gratitude to Syed Naseh And Nauman Bashir for the countless hours spend discussing and reflecting ideas about the ongoing writing. And last I would like to thank the

online garment buyers who gave me the possibility of conducting my study that resulted in this article.

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