Practical Meaning Construction of Fabric Materials in Maker Situations

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Abstract
There are compelling opportunities to design technologies for domains focused on touch, such as costume, fashion design or fabric-heavy DIY makers. In this position paper, we present findings from our studies relevant to how designers explore fabric, from interviews and anecdotes. We present interfaces inspired by these practices to encourage discussion on how to design technologies that support makers of varying experiences for exploring different materials like fabrics.

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ACM Classification Keywords
H.5.m. [Information Interfaces and Presentation (e.g. HCI)]: H.5.2 User Interfaces

Introduction
If two garment designers are asked to describe a fabric, their descriptors may be unclear or even contradictory. While words like “thin’ and “thick” may be used by different designers to describe denim, they may not be describing the same property or quality of the fabric. With these ambiguities present, there are interesting opportunities in designing technologies that support fabric exploration for such a tangible-centered audience like makers, sewing en-

thusiasts and costume or fashion designers who work with fabric regularly.

Our main contribution to the workshop is to present and show some of the processes our participants used to explore fabric, ranging from sewing hobbyists to costume experts. We also propose interface designs that work closely with such processes to motivate designing technologies for material exploration.

Practices in Exploring Fabric
The list below shows practices in how participants explored fabric for their projects:

1. **Used fabric** swatches, or small samples of fabric, from repositories or collections of fabric, to explore or find a desired fabric.
2. **Used descriptors**, specific fabric references, locations in store (fashion fabric, lining, drapery, upholstery sections), and other words to explore fabrics that match those ideas.
3. **Iterate** using practices from #1 and #2, until an ideal fabric of desired quantity is found.

Related Work

Bell et al generated a database of different materials [2]by crowdsourcing how people described different materials like texture, color, and gloss. Our goal is to help designers explore fabrics when they may not feel the fabric directly, such as shopping online. A repository for fabric may solve this, but has some limitations due to the audience used to feeling fabric directly.

Atkinson et al. collected descriptors and gestures that participants used on real-world fabric, extracted key features and gestures from the set, and implemented those gestures onto virtual fabric as a fabric browsing tool, all on an iPad [1]. As the user performed gestures on the fabric, the application the fabric moved accordingly. Such designs incorporate tangible behaviors, and similarly our interface designs also allow for these tangible behaviors.

Studies in Communicating Fabric Choices

We have conducted open-ended exploration studies that asked designers of varying experiences with fabric, to describe a collection of provided fabrics. We had a fabric bin and our collection had 22 samples of fabric, all different and selected from an expert costume designer. We asked participants to compare and describe various fabrics, and we recorded their responses to find trends. We also recorded anecdotes relevant to fabric, including their process in exploring and finding a desired fabric.

Current Practices in Choosing Fabrics

Our participants had different practices that can be summarized briefly in the list in the sidebar to the left. These practices applied whether a participant may begin with a precise, high-fidelity idea of a specific fabric, or with a low-fidelity general idea.

The first practice revolved around physical fabrics. The fabric bin was a pre-existing fabric swatch repository by costume designers. Similarly, the providing physical fabric swatches is commonplace in fabric stores, in-person or online.

The second practice used various ideas to describe fabric. Some described fabric by identifying the exact weave and composition of fabric, general descriptors like “thick” or “heavy”, or contextual words such as “feminine” or “rich”. One seasoned fashion designer described fabric relative to an audience and a set of fabrics associated with it, such as “denim for toddlerwear”.

Participants reported iterating using a combination of the two strategies to help explore fabrics. One participant, a seasoned hobbyist seamstress, anecdotally shared that she found a knitting pattern that recommended a specific soft yarn. She did not want to use the recommended yarn, but wanted something similar and soft. So she went to a yarn store in-person, and began exploring yarns by feeling them, using the recommended one as a starting point, and branching out to varying ones. After picking one, and finding that the in-person store did not have enough in stock, she simply recorded the product number details and purchased the desired yarn online, with the confidence of knowing exactly what she was purchasing. While yarns are

Figure 1: (a) A screenshot of a fabric bin interface, where all fabrics are shown to the user all at once. **(b)** A screenshot of a semantic network interface that starts with a collection of descriptors. As the participant selects descriptors, relevant fabrics appear on the left-hand side of the screen.

not fabrics, yarn is a similarly tangible domain that shows both having "soft" descriptors and specific materials in mind.

Interface Designs

We designed interfaces that incorporated these reported practices. To limit the discussion at a high level, we chose focus on how to organize and explore fabrics. These interfaces are shown visually, but may be translated to other interface modalities.

Fabric Bin

Figure 1a shows our fabric bin interface, starting with exploring fabrics first. Like a real fabric bin, the user browses and explores the pile. On the upper right hand of the screen is a box to separate compelling fabrics from the rest of the set. The interface also has a search box on the lower right hand side of the screen for participants to input descriptors.

Semantic Network

Figure 1b shows our semantic network interface, championing descriptors like in the second practice. The screen provides descriptors in a network, each node with a descriptor, and similar nodes are connected by a thicker line.

Any individual descriptor is selectable, and if a participant selects a descriptor, relevant fabrics are shown on the right hand side. Multiple descriptors can be selected to narrow the fabrics pile, such as "flexible" and "shiny".

Differential Interface

Figure 2 shows our differential interface, one that combines the two practices. Prior to this screenshot, the participant has selected two fabrics to compare. The screenshot highlights how to highlight similarities and differences between the fabrics. Like the prior interface, any descriptor is selectable to show fabrics relevant to the descriptor. Similari-

Figure 3: Using the differential model, if a user wants a fabric that is in between the stiffness of the two fabrics, the user can click on the darker area between these descriptors, and see a fabric swatch that is an intermediary.

ties and differences are highlighted, along with comparable or unique qualities, like the unique "plaid" in the figure.

In figure 2, 60% of participants who described the rightmost fabric used some drape term, while stiff, a close opposite, described the leftmost fabric with 57% of participants.

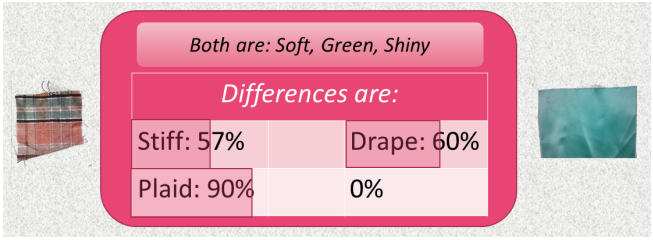

Figure 2: Design of our differential interface. The interface starts with comparing two fabrics, and showing similarities and differences between them.

If the user wants a fabric that is in between these two fabrics in terms of stiffness, the participant can click on the space between "stiff" and "drape" and show a new list of fabrics, as shown in figure 3. After exploring more fabrics that are of a desired stiffness, the process begins again, whether by clicking on individual fabrics, exploring descriptors, or finding fabrics that are in-between two fabrics, reflecting on the iterative nature of exploring fabric.

Reflection the Future of Fabrication

We envision future interfaces to leverage off existing practices of exploring fabric, going between ideas and physical fabric. These interfaces may extend from visual to more tangible interfaces that can simulate the feel of various fabrics. We also envision the qualities and ideas becoming prominent as well, even if it means simply typing in these qualities with keyboard and mouse.

There are also many open questions on how to represent the individual fabrics themselves. Fabric may be represented in a variety of ways beyond an image, such as a collection of associated descriptors, a video of the fabric moving, or 3D modeled virtual fabric.

Conclusions

In this work, we show current practices among makers and designers with fabric, from hobbyists to experts, in how they explore fabrics for a project. We collected these practices from studies where we asked costume designers and DIY hobbyists how they described fabric. Those participants shared how they used real pieces of fabric and ideas, like descriptors and fabric-specific references, to help explore fabrics. We present user interface designs that match these existing practices to encourage discussion on how to design technologies in a tangible-focused domain like fabrics. Our goal is that our insights and designs may spur discussion on how can technology facilitate exploring fabric for the DIY and Maker communities.

References

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