

National Textile Center

FY 2003 (Year 12) Continuing Project Proposal

Project No.: S02-CD04

Competency: Management Systems

Sensory Science: Social and Physical Interactions in Textile Evaluation

Project Team:

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Objective:

This project focuses on the need for a better understanding of the social and physical factors that interact to shape human sensory responses to textiles. Using an interdisciplinary sensory science framework we are developing, we will foster a comprehensive knowledge system to understand the various components and interactions that generate human preferences toward textiles. The objectives include:

- (1) To develop a relational model between (a) diverse consumer sensory (tactile and visual) responses and vocabularies and (b) physical “fingerprints” of materials in their two- and three-dimensional forms.
- (2) To create computerized visual simulation tools to model human sensory responses to textiles.

Progress Statement:

A study of consumers’ perceptions of garment sensory characteristics is well underway. We are focusing in this initial study on jeans, because it is a garment type with a wide range of fabric structures (e.g., the inclusion of stretch features), surface treatments (e.g., sandblasted), and three-dimensional attributes that influence the hang of the garment and the way it feels on the body (e.g., “rise” variations on the waist/hip area). Based upon an interview protocol previously used with over 700 consumers (e.g., Kaiser and Freeman, 1993; Freitas et al., 1997), we conducted focus group interviews on this year of the project with 80 undergraduate students to explore the garment (jean) qualities that were most meaningful to them. In addition to shedding light on the various “vocabularies” associated with jean perception, these interviews revealed some variations in preference as a result of identity and context variables (e.g., gender, wearing occasion) that should be of interest to textile and apparel manufacturers. Additionally, the subjects were shown a series of websites featuring jeans, and they were quite vocal about the insufficiency of the visual and written information provided to communicate sensory qualities adequately. To address this problem, we are continuing to study vocabulary issues and when and how they surface, so as to enable a more effective way of communicating sensory qualities to consumers, in retail situations (e.g., catalog copy, on-line shopping, television shopping) that do not offer a tactile dimension.

Meanwhile, various strategies for measuring physically discernible sensory dimensions are being compared and contrasted for efficacy. These strategies include two methods previously developed by Ning Pan and colleagues. The first of these involves the fabric “fingerprint” approach that uses a graphical technique to visually chart multivariate fabric parameters (e.g., tensile, bending, shearing, compression and fabric thickness, and frictional properties; Pan, Zeronian and Rhu, 1993). Previous work by Pan et al. (1998) has found strong correlations between fabric fingerprints done by instruments and ratings done by consumers. The second method is under development, and is based on a reliable and reproducible force-displacement curve through a fabric extraction method; this method would result in a computer algorithm based on pattern recognition, and it would select and map relevant fabric features that define fabric hand.

We are currently exploring ways of bringing the social and physical science methods together in such a way that maps the properties of concern to consumers with the vocabularies used to describe them, in order to identify the relevant sensory features that should be measured mechanically.

Next Year's Goals:

In the coming year, we aim to complete the studies of consumers' concerns and vocabularies in relation to sensory characteristics of garments. Continuing with our work with jeans, we will extend the consumer portion of the study to the realm of "embodied" sensory science—i.e., garment fit and style characteristics that are experienced on the body. Secondly, we plan to use the data derived from this year's efforts to identify the relevant sensory features that should be measured mechanically. Working collaboratively, we will develop novel methods for measuring not only two-dimensional, but also three-dimensional attributes mechanically. The subsequent (third) year's efforts will revolve around the development of the visual simulation tools for both two- and three-dimensional materials and their sensory qualities.

Approach:

We will purchase jeans that represent the array of brands, sensory properties, and style features that both male and female consumers have identified as important or meaningful to them. The next step will be to construct a laboratory "retail environment" enabling consumers to select and perceive sensory characteristics in garment (three-dimensional) form. This environment will include an opportunity for consumers to try various garments on their bodies to tap a more embodied approach to sensory science. Measures of fit, as well as personal and style evaluations, will be used to expand and refine our method for evaluating and comparing visual, tactile, and vocabulary issues pertaining to sensory science.

The data derived from the "retail environment" study will be used to identify the relevant sensory characteristics for mechanical measurement in the laboratory. The greatest challenge is to develop a strategy for measuring sensory properties of fabrics in their three-dimensional form. Experimental approaches will be developed to achieve such a simulation, and these will be compared with two-dimensional approaches previously developed (i.e., the fingerprinting method) and under development (i.e., the fabric extraction method). All of these approaches will be mapped in relation to consumer evaluations and vocabularies.

Outreach to Industry:

In the coming year, we will develop contacts with fiber, fabric, and apparel producers and retailers who have an interest in jeans. These informal conversations will allow us to identify potential partners, as well as to enhance the degree to which our research outcomes can be implemented and communicated in a meaningful manner. Our goal in this regard is to strengthen the connections and communicability among fiber, fabric, and apparel producers and retailers, with respect to sensory science—attributes that are more than visual, but that in an increasingly technological culture make tactile sensory attributes more of a challenge to convey. Most notably, we aim to center consumers as the dominant perceivers in a context of increasingly complex sensory science.

New Resources Required:

Postdoctoral expertise is required to assist in the development of the instrumentation for the fabric extraction method. Materials for this instrumentation are also required, as well as the purchase of a wide array of jeans and denim fabrics. Graduate students will conduct much of the consumer sensory work.

References:

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