# Color perception of moving fabric



#### SATテクノロジー・ショーケース2025

## ■ はじめに

This study investigates color perception in the context of moving fabrics, examining how people **(Kyoto Institute of Technology)** perceive color differences in real fabric, video representations, and CLO3D-rendered fabrics. It seeks to understand how movement speed and fabric parameters affect these color perceptions. Draped fabric in motion creates varying visual effects that are essential for accurate product development and quality control in the fashion and textile industries.

The purpose is to understand how people perceive color differences in moving garments and how these perceptions change with variations in movement speed. This paper contributes in two ways. First, it offers a positive direction for color cognition and vision science in the textile industry by addressing gaps in previous studies, which mainly focused on image analysis and observer feedback without adequately understanding color perception of moving fabric. Second, it provides practical guidelines on color perception in relation to moving fabric, lighting, and drape properties. Also, I believe that accurately and realistically displaying textile product designs, and understanding fabric movement, positively influences both consumers and manufacturers in producing high-quality products and making purchasing decisions, ultimately contributing to sustainable development.

## ■ 活動内容

This study is composed of three interrelated experiments designed to analyze color perception across different representations of moving fabric. Experiments are visually analyze using semantic differential scaling with a  $\pm$ 3-point scale across 8 bipolar adjective pairs, and MATLAB are used to assess six different plain-woven and knitted fabrics (hard-soft, thin-thick, heavy-slight, stiffness- suppleness, rough-smooth, shiny-matt, transparent-nontransparent, and stretch - non stretch).

1. **Experiment on Real Fabric in Motion:** The first experiment examines how color is perceived on real fabric moving at varying speeds, assessing how fabric characteristics and drape property affect color appearance.

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- 2. Video Analysis of Moving Fabric: The second study evaluates color perception from videos of moving fabric to see how visual representation via recorded media compares with real-life fabric motion.
- **3. CLO3D Rendered Fabric Motion:** The third component involves 3D-rendered fabric in motion, using CLO3D to simulate the appearance of color in a virtual environment. This experiment helps assess if digital renders can accurately represent the visual effects seen in real fabric motion.

### 関連情報等(特許関係、施設)

The experiments were conducted at the Kyoto Institute of Technology's Color and Affective Engineering lab, which is equipped with advanced lighting systems, high-speed cameras, and digital rendering software. The lab's facilities enabled precise control over experimental conditions, ensuring the reliability of the data collected.



What is the main factor that affects the color change of fabric?

