

SOSHO: Take a Social Shower

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Figure 1: SOSHO: Take a Social Shower

Abstract

Physical temperature and social warmth exhibit a bidirectional relationship that can be translated into interactive design. We applied the *WARM-COLD* image schema to tangible user interface (TUI) design, leveraging natural mapping principles to create an intuitive embodied interaction. SOSHO (SOCial SHOWer)—a shower-shaped lighting interface—enables users to manipulate color temperature through familiar valve rotation, connecting thermal perception to social concepts. Through this design approach, SOSHO interprets the social ritual of ancient bathing, offering a material instantiation of social connection in everyday interaction.

CCS Concepts

• **Human-centered computing** → **Human computer interaction (HCI)**; **User centered design**.

Keywords

Human-Computer Interaction, Tangible User Interface, Design, Human Factors, Embodied Cognition

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1 Social Temperature

Studies have found the influence of physical temperature on human psychology and social behavior. Williams & Bargh (2008) demonstrated that individuals holding warm coffee perceived others as having warmer personalities compared to those who held cold coffee, revealing that the insula mediates the relationship between bodily temperature and social cognition without conscious awareness [10]. IJzerman & Semin (2009) extended this, showing that participants holding warm beverages rated social proximity higher [6].

Other research has demonstrated bidirectional relationships between social experiences and physical temperature: socially excluded participants perceived lower room temperatures, preferred warm beverages, and showed decreased finger temperature, while physical warmth alleviated negative emotions associated with exclusion [5, 11]. These findings show that social connectedness and physical temperature are closely intertwined, mutually influencing one another.

2 Color as Temperature

The question remains of how temperature-based interventions can be effectively implemented in everyday contexts. Ou et al. (2004) demonstrated that colors can be categorized into three dimensions: activity, weight, and warmth, with the warmth dimension showing consistent cross-cultural associations—red and orange perceived as warm, blue and cyan as cold [9].



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Figure 2: Color as Temperature



Figure 3: Image Schema of Shower

Löffler (2014) clarifies this connection, arguing that colors are systematically linked to physical properties through embodied experience [7]. The study found that color associations with the *WARM-COLD* image schema depend largely on hue (red to blue). Löffler proposes that color properties can connect to abstract concepts via image-schematic metaphors: if color temperature relates to physical temperature, which connects to social proximity, then red and blue could also connect to social proximity. Thus, manipulating color temperature in lighting has the possibilities of serving as a cue activating related thermal concepts.

3 Image Schema of Shower

The question then becomes: how should the lighting interface be designed for effective implementation? Hurtienne & Israel (2007) proposed image schemas— abstract representations formed through body-environment interactions—as a framework for intuitive interaction [4]. These schemas (e.g., *IN-OUT*, *UP-DOWN*, *WARM-COLD*) operate below conscious awareness and are metaphorically extended to structure abstract concepts. For example, *UP-DOWN* extends to quantity (more is *UP*), while *WARM-COLD* extends to social relationships (*friendliness is WARMTH*).

Hurtienne & Israel proposed applying image schemas to tangible user interface (TUI) design. Building on this framework, this study designed interactive lighting connecting color temperature and social temperature through a metaphoric shower interface. A shower



Figure 4: Ideation Process

naturally combines the *UP-DOWN*, *IN-OUT* or *STRONG-WEAK* and *WARM-COLD* schema 3. The shower interface employs natural mapping [8]: manipulating the valve produces warm (low K values, red) or cold (high K values, blue) color temperatures, enabling intuitive operation. This shower-shaped lighting interface, which we named *SOSHO* (*SO*cial *SHO*wer), can leverage the physical temperature schema through color temperature, potentially extending to social temperature via semantic activation approach [2, 4, 7].

4 Design and Prototyping

SOSHO follows the overall form of a shower and consists of an input section and an output section. The input section consists of a two-axis rotary handle, each measuring continuous rotation values. The output section consists of four pairs of servo motors and LEDs.

The first axis of the input section corresponds to temperature control in a shower and controls the color temperature of the lighting. When the user rotates the handle, the value is measured in real-time and mapped to color temperature, controlled through LED RGB adjustment via Arduino.

The second axis of the input section corresponds to water pressure in a shower and controls the visual effect of water droplets falling. The rotation value of the handle is mapped to the output motors. When the handle is not rotated at all, the motors remain stationary, and as the value increases, the four output motors begin to operate. Each output motor generates random offsets in real-time, creating a visual effect of water droplets falling irregularly. As the handle value increases, the random offset distance of the motors increases, changing the physical positions of the modules. As the offset distance increases, the visible area of the modules expands, naturally increasing the brightness. The color temperature and position of the four LED modules can be expressed by the following equations:

$$\text{Position: } P = P_0 + R(D), \text{ where } R(D) \text{ is a random integer in } [0, D]$$

$$\text{Color Temperature: } K_{out} = O(D) \times K, \text{ where } K \in [K_{min}, K_{max}]$$

$$\text{and } O(D) = \begin{cases} 1 & \text{if } D > 0 \\ 0 & \text{if } D = 0 \end{cases}$$

The structures of the shower head and the handle are shown in 5. Vertical movement was implemented using a rack and pinion, and circular LEDs were installed inside each module. Two servo motors



Figure 5: Showerhead & Handle Structure

were mounted inside the handle, and the position values were read using the encoder embedded in the motor and used as input values. Due to the high gear ratio of the motor, the handle does not sag under its own weight without any additional mechanical structure. It could also act as a damper, providing a feeling similar to operating an actual shower valve during manipulation.

5 User Study

This study aims to confirm the possibility that color temperature manipulation through a tangible interface, designed based on the theoretical foundations discussed earlier—the bidirectional relationship between physical and social warmth, the universal perception of temperature through color temperature, and intuitive interface design using image schemas for meaning activation—can regulate social warmth. User study proceeds in the following sequence:

Participants were divided into two groups: one group was instructed to operate only warm light, and the other group to operate only cold light. After using SOSHO, participants were asked to think of an acquaintance and then complete the IOS(Inclusion of Other in the Self Scale) questionnaire [1], followed by a usability survey about the lighting. Finally, after the surveys, participants were asked whether they would give a reward to themselves or to the acquaintance they had just thought of [6, 10]. Responses to all items except the reward question were collected using a 7-point Likert scale.

5.1 Results

A total of 40 valid responses were collected from participants (female: 18 & male: 22) aged 19–30 years (mean: 22.7, SD: 2.11). Of the 40 participants, 20 used cold light and 20 used warm light. The results are shown in 6 7 8 9. Regarding reward selection for oneself or acquaintances, statistical significance was confirmed based on the confidence interval, consistent with the previously examined studies 1. However, since no statistically significant differences were found in other measures, including the IOS, the possibility that the observed difference in the reward may have been due to chance cannot be ruled out. Although no significant differences were found in other items, contrary to previous studies, it is noteworthy that the group exposed to warm light showed higher mean scores across all measures. Given that the warm group consistently scored higher across all items, this suggests a potential connection or tendency in the relationship between lighting color temperature and social warmth, as proposed above.

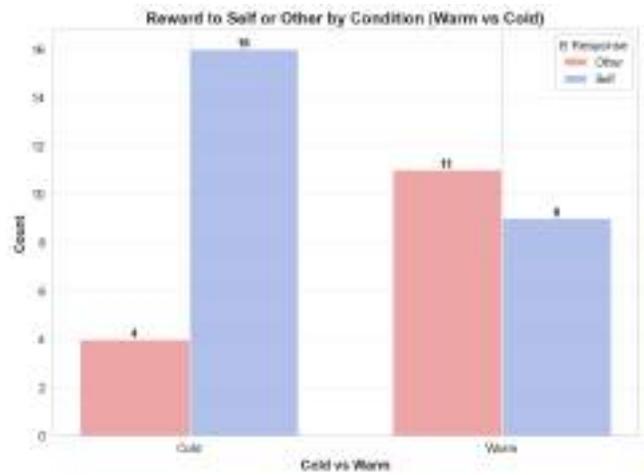


Figure 6: Reward to Self or Other

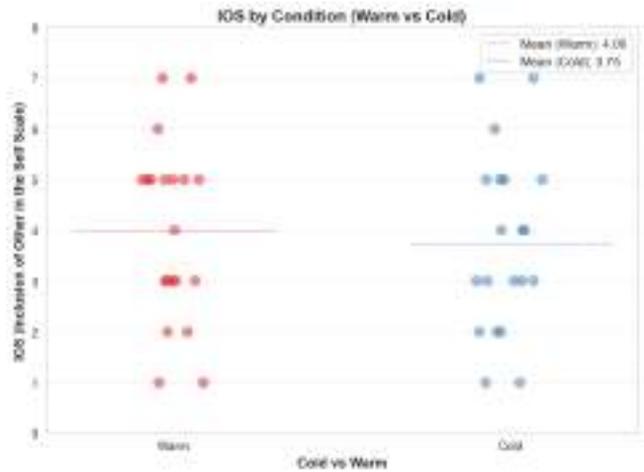


Figure 7: IOS Difference

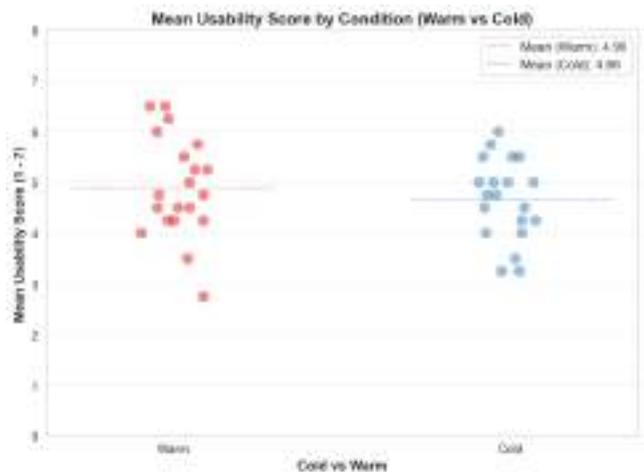
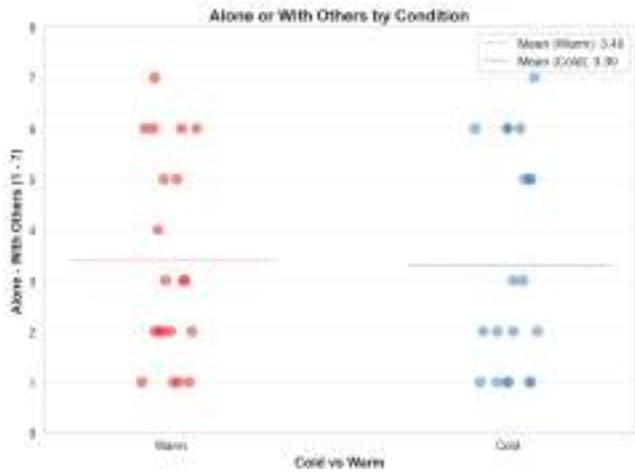


Figure 8: Usability Score Difference

Table 1: Confidence Intervals

	Cold	Warm	Odds Ratio/Difference	95% CI
Reward to Other	20.0%	55.0%	0.21	[0.04 0.99]
Use Alone or With Other	3.30 (0.49)	3.40 (0.46)	-0.10	[-1.45 1.25]
IOS	3.75 (0.40)	4.00 (0.40)	-0.25	[-1.39 0.89]
Usability	4.66 (0.80)	4.90 (0.99)	-0.24	[-0.81 0.34]

**Figure 9: Use Alone or With Other**

6 SOSHO

Through this exploration, we have demonstrated how theoretical insights about warmth and social connection can be materially instantiated. By bridging psychological research, design implementation, and user experience, SOSHO illustrates the potential for transforming mundane routines into meaningful social rituals. Our preliminary findings suggest that such reconfigurations of daily practices can open new possibilities for intimacy and connection in contemporary life.

In ancient Greco-Roman times, bathing was a social ritual of communal bonding [3]. However, with technological developments such as the construction of domestic water infrastructure and the spread of electric water heaters, showering gradually became “hyper-privatized” [3]. SOSHO can be viewed as an attempt to revive the essential ‘social’ dimension that has been lost in bathing. By rearranging the material, conventional, and conceptual dimensions, SOSHO seeks to reinterpret the social and ritualistic meaning of showering in contemporary context.

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**Figure 10: How SOSHO Can be Used**

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