

THE COLOUR + GENDER FRAMEWORK: RE/DECOLOURING GENDERED SYMBOLISM IN PRODUCT LANGUAGE

Martina LABARTA LABRADOR¹ and Ingrid CALVO IVANOVIC²

¹Politecnico di Milano, Italy

²Universidad de Chile, Chile

ABSTRACT

Designers use product language to construct meaning through visual and material features. Among these, colour plays a central role in evoking gender associations and narrowing the imagined user to a gendered default. Design practice, often driven by market logic, relies on the stereotypical female-male dichotomy, reinforcing binary “pink and blue” assumptions. Yet colour can also support alternative pathways beyond gender-targeting rooted in normative roles, fostering more inclusive and gender-sensitive design approaches. This paper tests the Colour + Gender (C+G) Framework, which addresses two persistent gaps in design education: the uncritical use of colour as a carrier of meaning and the limited resources and knowledge for recognising how gender shapes product languages. The study draws on a qualitative focus group with product design students. The session combined reflection on positionality, a chromatic mapping exercise, and a recolouring exercise, all examined through a gender lens. Participants analysed selected products to surface their interpretations of gendered meaning and to assess how such reflection informs design practice. Results confirm recurring relational patterns in colour parameters: lightness acts as a directional cue, mid-range values increase ambiguity, and extreme saturation reinforces binary readings. However, the product category emerged as the primary filter in gender attribution. The study refines the C + G Framework as a pedagogical tool to support more conscious, gender-sensitive design decisions.

Keywords: Design education, colour, product language, gender-sensitive design, design methods

1 INTRODUCTION

Product language examines how products communicate nonverbally [1]. The materiality of everyday objects conveys meanings that are deeply tied to their context [2]. These meanings both shape and are shaped by sociocultural constructions, often reinforcing existing inequalities. Namely, gendered narratives remain subtly yet pervasively embedded in products [3]. In this context, colour operates as one of the most powerful and immediate aesthetic cues, reinforcing gender biases and stereotypes [4–5]. As a result, intentional and unintentional colour-based gendering affects people’s choices and hinders efforts to design more inclusive, gender-plural products [6,7].

As designers, we hold agency in aesthetic decisions, acknowledging that responsibility and final choices might be shared with other stakeholders. Aesthetics, however, is typically seen as a product of designers’ “intuition” [8], paradoxically described as “indescribable” [9]. When aesthetic elements, such as colour, can potentially carry stereotypical meanings, acting on “gut feeling” can be risky [10,11]. Scholars and practitioners advocate for ongoing multidisciplinary research to develop stronger theories, methods and tools that assist designers in being intentional [12,13]. The lack of awareness and training on colour is pervasive in most educational design contexts, especially in top polytechnic schools [14]. Design students are rarely taught to address colour purposefully and in relation to its emotional and social impact [14]. Therefore, our work aims to contribute to the gap in the uncritical use of colour as a carrier of meaning, starting with design education, and the limited resources and knowledge for recognising how gender shapes product languages.

1.1 Colour beyond hue: lightness, saturation and gendered meaning

Although gendered colours feel long-established, associations such as “pink for girls, blue for boys” are modern and are largely driven by Western culture. By mid-century, widespread marketing of gender-coloured toys and clothing cemented these associations as “natural,” despite their cultural origin. Such cues continue to signal expected behaviours and reinforce social norms. Among the three colour attributes, hue remains the primary indicator people use to identify a product’s intended gender (98%), followed by name and description [15]. Beyond hue, the other two colour attributes, namely lightness (how light or dark a colour is) and saturation (its intensity, from vivid to muted), also play a role: lighter, multi-coloured, or shiny products are typically coded as feminine, while darker, restrained, or matte products are coded as masculine [16,17]. Colour plays a central role in shaping gendered perceptions of products, yet its influence is frequently oversimplified or reduced to hue-based assumptions.

1.2 The Colour + Gender (C + G) Framework: rationale and structure

Our previous study [18] demonstrated that gender coding in product design emerges from the interplay of lightness, saturation, hue, and form or shape rather than from hue alone. Based on this, a preliminary version (v.1.0) of the **Colour + Gender (C+G) Framework** was proposed, articulated around three overarching goals: (i) preventing the reinforcement of gender stereotypes through binary chromatic decisions, (ii) challenging reductive strategies such as “pink-it-and-shrink-it”, (iii) and promoting ambiguity and plurality to broaden the spectrum of product identities.

To operationalise these goals, the framework proposes a set of design implications based on HSL colour parameters and their relationship to gender perception (Table 1). In the following sections, we present the testing of the C+G Framework in an educational context to evaluate its practical effectiveness and capacity to support students in navigating gendered assumptions embedded in product aesthetics.

Table 1. C + G Framework guidelines for gender-sensitive colour decisions in product design

Parameter	Pattern	Design implication
Lightness	Lighter tones: femininity Darker tones: masculinity	Primary directional lever
Saturation	Low saturation: femininity High saturation: masculinity Mid-range values: androgyny	Mid-range values create more ambiguity and plurality
Colour relationships and proportions	Polychromatic with dominant hue: binary Balanced polychromies: androgyny Near-zero saturation monochromia: gender neutrality	Varied palette structure shifts or blurs gender reading
Form features	Primary shapes: masculinity Organic shapes: femininity	Form-colour interaction is strongest in archetypical categories

2 METHODS

The study used a qualitative methodology. Data were collected during a half-day focus group involving four product design students at Politecnico di Milano, Italy. The session began with an exercise in which participants examined their own privilege and reflected on how their positionality may shape their design choices. They then explored how this became explicit in their personal colour-gender associations. The group extended this examination to product colour palettes. These activities laid the groundwork for the final exercise, in which participants proposed a new chromatic solution for a selected product to shift its gendered perceptions.

2.1 Positionality mapping

Participants received a printed canvas featuring a “wheel of privilege” (adapted from the Canadian Council of Refugees), a visual representation of factors that shape social power imbalances (e.g., Gender, Citizenship, Skin Colour, Formal Education, Ability, etc.). They were asked to colour the area they identified with, considering that positions closer to the centre indicate fewer systemic obstacles and greater privilege, while positions closer to the margins indicate higher vulnerability. A blank space allowed participants to add any factors they considered relevant. The activity was anonymous and completely voluntary, so participants could share to the extent they felt comfortable doing so.

2.2 Chromatic compass: surfacing personal colour-gender associations

To surface participants' gender biases, a Miro board featuring a "gender identity compass" was provided. This activity took place before any explanation or discussion, to avoid influencing their choices. The compass included four main coordinates: masculine, feminine, androgynous (i.e., both feminine and masculine), and gender-neutral (i.e., neither feminine nor masculine). Students were asked to choose a colour for each coordinate and for the intermediate positions between them.

2.3 Palette-to-product mapping: analysing colour-gender readings

In this phase, colour, gender, and products intersected. A paper-based canvas featuring a two-axis map (i.e., feminine–masculine and androgynous–gender-neutral) was given to each participant. The androgynous side appeared as a closed semicircle to represent the binary constraint, whereas the opposite side lacked an explicit boundary to allow openness. A separate area was reserved for "uncertain" cases.

Participants mapped 15 product palettes across four typically gender-connoted product categories (i.e., electric razor, hair dryer, game controller, and electric screwdriver), see Figure 1. The colour palettes under analysis were derived from product images to enable a more detailed chromatic analysis. Proportions were qualitatively estimated based on visual dominance, and each palette was ordered from the most prevalent colour (dominant hue) to the least. Using the HSL model (hue, saturation and lightness), five levels classified colours by lightness and saturation (low, medium low, medium, medium high, and high). During the exercise, participants first mapped the products using only their palettes, then repeated the mapping with the full product images. This allowed the examination of colour associations independently of, and in relation to, product shape and category.

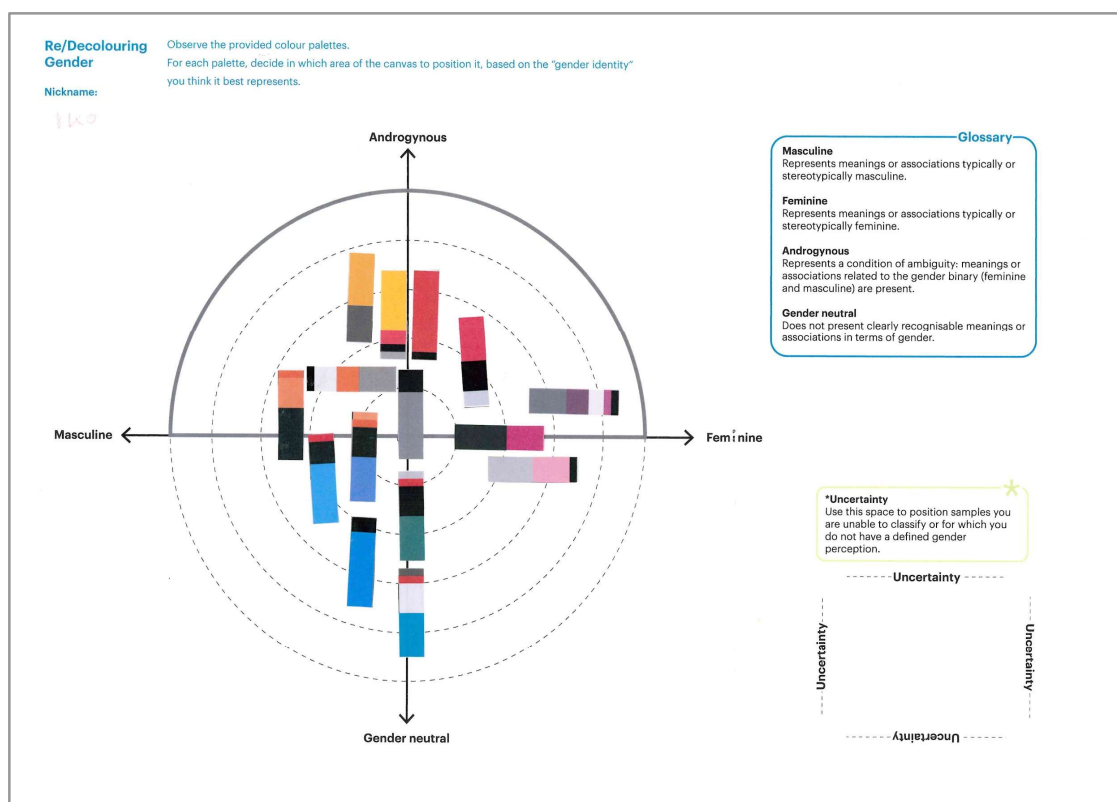


Figure 1. Mapping of the chromatic palettes of products using the chromatic compass canvas, corresponding to the category 'electric screwdriver'

2.4 Re/Decolouring exercise: proposing alternative chromatic solutions

Here, the focus shifted from analysis to decision-making. Each student was assigned one product from the same category they had worked with, along with a provocation to shift the product's perceived gender. The "recolouring" process unfolded in four sequential steps, each allowing modification of only one colour property while keeping the others fixed. At each of the four sequential steps, students

proposed two alternatives and selected one to carry forward: varying hue (step 1), shifting lightness toward lighter or darker (step 2), shifting saturation toward more desaturated or more saturated (step 3), and adjusting colour proportions within the palette (step 4). Students documented their choices for each step on a Miro board. Colour adjustments were made in a preset Photoshop file.

3 RESULTS AND DISCUSSION

3.1 Positionality shapes design perspective

The self-positioning exercise highlighted several missing dimensions perceived as shaping privilege and vulnerability. Participants noted that although they had reflected on some of these aspects at a personal level, they had never been given space to consider them in an educational academic context. The activity, beyond providing an operative way to map one's privilege, led participants to consider how their identity shapes their design practice.

3.2 Colour-gender associations reflect binary intuitions

The chromatic compass revealed that participants initially approached gender as a binary construct. Masculine and feminine coordinates were filled in first and more quickly, while gender neutrality emerged only after discussion. Colour choices were guided by intuition, self-expression, and social acceptability, often referencing clothing and trends.

Neutrality was frequently associated with desaturated tones such as black, grey, and white, or with colours perceived as detached from gender coding, such as green. However, even in this abstract task, colour was rarely considered independently from context. As one participant observed, the same colour applied to a hoodie or to a razor carries different implications. This anticipation of context foreshadowed later findings.

3.3 HSL parameters directionally guide gender attribution

Lightness acts as the primary directional cue across palettes. Lighter palettes clustered toward femininity, darker palettes toward masculinity. Even when hue remained similar, shifts in lightness altered gender attribution.

Colour relationships and proportions shape gender reading relationally, not in isolation. Palettes dominated by a single hue or strong contrast tended toward binary positions, whereas balanced palettes gravitated toward the centre or the androgynous axis. Gender perception was therefore relational rather than dependent on isolated colours.

Saturation alone is ambiguous. Its effect depends on combined HSL values. Highly saturated palettes often reinforced binary readings, while mid-range lightness and saturation repeatedly produced more ambiguous or androgynous placements. These mid-range combinations appeared to soften categorical cues and reduce polarity.

3.4 Product archetype overrides chromatic cues

When participants evaluated full product images rather than palettes alone, product category emerged as the strongest determinant of gender attribution. For instance, the razor retained strong gender associations despite a colour change, suggesting that normative archetypes stabilise gender readings. In addition, one game controller was placed along the androgynous axis despite the presence of stereotypically feminine features (pink colour and organic shape) because it did not align with expectations of a "gamer's room."

Archetypal form overrides colour in strongly gender-coded categories. Sturdy geometries were described as harder to neutralise through recolouring. Softer or less defined forms were easier to reposition. Some hairdryers were described as resembling construction tools, while others appeared "gentler" aesthetically. These formal qualities shaped the mapping more than colour adjustments alone. This finding indicates that stereotypical male-coded cues might be harder to challenge.

Neutrality is reframed as personal expression rather than the absence of gender. In some cases, participants deliberately positioned a product at the centre because they perceived it as lacking gender coding. Within this reasoning, colour was framed less about how others read you and more about what you like. Gender neutrality was described as allowing greater freedom from preconceptions and was surprisingly associated not only with desaturated colours but also with bolder, more complex shades.

3.5 Re/Decolouring reveals both potential and limitations

The Re/Decolouring gender exercise further tested the initial assumptions on HSL properties and gender perception (Figure 2). The results confirmed several patterns already observed in the mapping phase, but they also revealed limitations.

Lightness consistently shifts gender attribution across the recolouring steps. Each increase in lightness pulled the product away from masculinity, confirming it as a directional variable.

Colour proportions within the palette carry more gender weight than hue. In the razor case, a dominant beige base was described as neutral and stable, while a bluish-purple accent carried the gender shift. Neutrality functioned as ground; connotation resided in the accent.

Saturation effects are context-dependent and resist generalisation. In some cases, higher saturation aligned with femininity; in others, reduced saturation was used to approach neutrality. However, desaturation was sometimes perceived as restrictive. For one participant, neutrality meant expanding interpretive possibilities rather than flattening the palette with muted colours.

Black is not perceived as neutral when applied to gendered product archetypes. In the hairdryer case, black-only solutions were rejected in favour of bolder combinations. Lightness adjustments alone produced limited variation, and technical constraints occasionally influenced decisions.

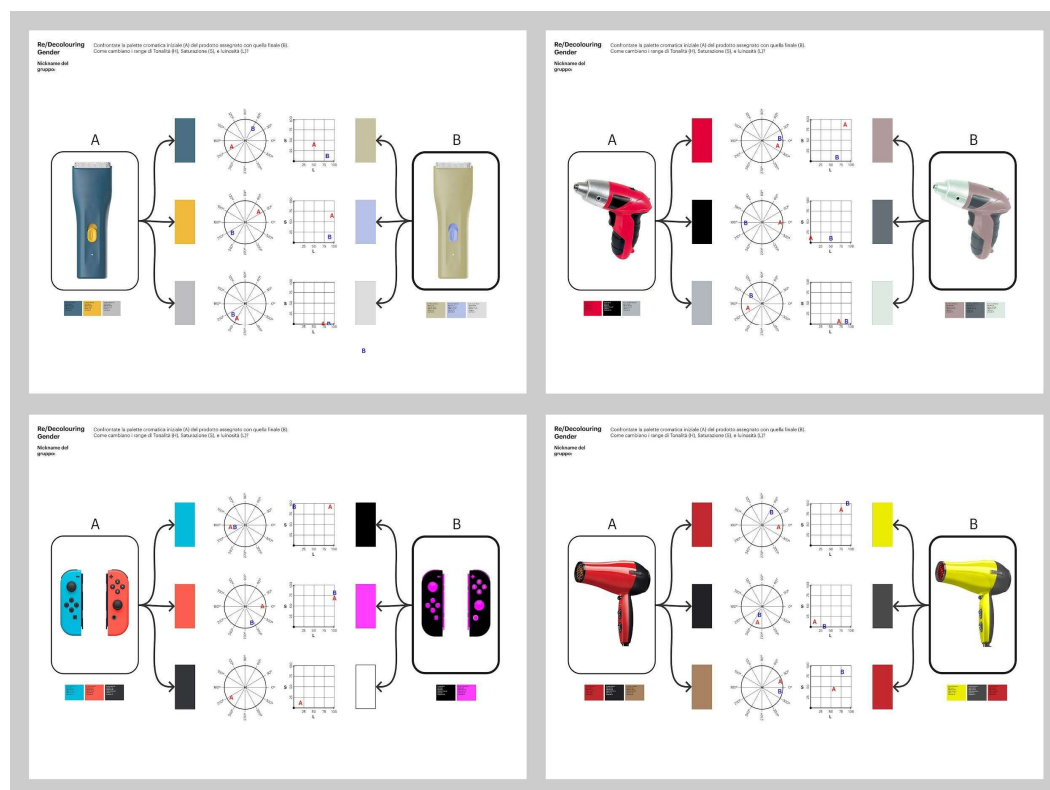


Figure 2. The Re/Decolouring exercise canvases explicitly show a shift in the initial colour palettes in terms of their hue, lightness and saturation, for a change in the perception of products' gender

Across cases, shifts toward femininity tended to strengthen non-neutral accents, while shifts toward neutrality increased the dominance of balanced or stabilising tones.

4 CONCLUSIONS AND FUTURE WORK

The study examined how gendered colour cues are perceived and interpreted and evaluated the practical utility of the Colour + Gender (C+G) Framework. The findings confirm that lightness acts as a directional cue, shifting gender attributions even when other chromatic variables stay constant. They also corroborate the importance of colour relationships and proportions, which more clearly shaped gender than hue alone. Mid-range combinations of lightness and saturation repeatedly produced ambiguous or androgynous readings, revealing a perceptual zone that operates beyond binary coding.

Our work also identifies areas requiring further investigation. Product category and archetype strongly guide gender attribution, which means chromatic parameters cannot be examined in isolation and warrant systematic testing across broader object families. Together, these insights refine the pedagogical value of the C+G Framework by showing how it can support more critical, reflective, and gender-sensitive colour decisions in design education. By framing colour as the interplay of hue, lightness, and saturation (and the proportional relationships among them), we give students a methodical way to navigate colour choices in practice. A strong grasp of these processes, we argue, underpins more intuitive and creative work; we believe mastering the tools frees you to create. Making explicit how colour performs gender gives students a solid foundation for reflection and agency in driving change. We also witnessed how reflection can encourage more plural and less stereotypical chromatic thinking. Students' tendency to reinterpret rather than erase gender cues points to a more nuanced design ambition than simple neutralisation. Future work will test the framework within course curricula as a tool to help students navigate colour choices in design studio projects.

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