

Modern Color Perspectives and the Development of a Visual Testing Method

DANIEL UHRSKOV HILLEBERG
ZEALAND – ACADEMY OF TECHNOLOGY AND BUSINESS
FEBRUARY, 2026

Abstract

In contemporary visual design practice, colors are omnipresent yet increasingly difficult to articulate, evaluate, and justify in professional contexts. Designers today operate within a landscape of kaleidoscopic color abundance, shaped by digital tools, AI-generated palettes, stock imagery, and rapidly shifting visual trends. While color theory has a long and well-documented history across science, art, and culture, there is a growing gap between theoretical knowledge and practical methods for testing and communicating visual decisions in modern design workflows. This gap is particularly evident in the later stages of design processes, where designers are expected to validate and argue for visual choices using more than subjective preference.

This working paper presents Visual Color Project, a two-year research initiative conducted at Zealand – Academy of Technology and Business. The project investigates how designers perceive, use, and talk about color in a digital age and addresses the lack of structured, practice-oriented tools for visual evaluation. As a central outcome, the paper introduces VERT (Visual Emotional Rational Test), a visual testing method designed to bridge emotional response and structured data in the evaluation of visual elements such as color schemes, moodboards, typography, branding, and visual identities.

The research is grounded in an extensive critical and narrative literature review of color theory, combined with an explorative design research methodology. Empirical data was collected through pilot studies, cultural probes, and comparative testing against established usability methods such as Think-Aloud testing. The findings demonstrate that VERT supports the development of a shared visual language, facilitates richer feedback from test participants, and produces more actionable insights than unstructured verbal methods alone.

The paper contributes to design research by proposing a practical, adaptable testing framework that reconnects designers with both the emotional and rational dimensions of color, strengthening decision-making in professional practice and design education.

Keywords: color theory, visual design, design research, visual testing, emotional response, VERT, color language.

[Link for Visual Color Project website](#)

[Link for downloading VERT test](#)

[Link for Empirical Foundation of Vert](#)

[Link for Literature Review](#)

1. Introduction

The introductory assumptions are partly informed by observations from my own professional practice as a graphic designer and lecturer in visual design. Through years of teaching and client collaboration, I have repeatedly encountered difficulties in articulating and defending visual decisions, particularly those related to color. These experiential observations serve as a starting point for the research inquiry. In the following sections, they are examined, contextualized, and critically nuanced through engagement with relevant literature and empirical investigation.

1.1 Context and background

Color plays a fundamental role in human perception, communication, and decision-making. As French painter and artist Fernand Léger famously stated, “*Man needs colour to live; it’s just as necessary an element as fire and water.*” Colors shape not only aesthetic experiences but also influence behavior, emotion, memory, and meaning-making across cultural, historical, and technological contexts. In contemporary design practice, color is employed strategically within branding, marketing, user experience (UX), and interface design, where it can directly affect user engagement, trust, and choice.

Despite this importance, designers today operate in a paradoxical situation. Never before have so many tools, systems, and resources for color selection been available ranging from AI-driven palette generators to extensive digital archives and trend forecasts. Yet, it is my experience, that in a professional practice, designers often struggle to articulate and justify their color choices in a precise and convincing manner. Color decisions are frequently explained through vague preferences, intuition, or subjective taste, rather than through structured argumentation grounded in both emotional response and empirical insight (Fine, 2022; Hartelius, 2013; Polanyi, 2009).

This tension between color's acknowledged importance and the lack of a shared professional language for discussing it forms the starting point for Visual Color Project.

1.2 Identifying a research gap

Existing color theory literature is extensive and diverse, spanning scientific, artistic, cultural, and philosophical perspectives. Historical color systems, perceptual models, and pigment-based classifications coexist with contemporary digital color spaces, branding frameworks, and trend-driven approaches. While this body of knowledge is rich, much of it remains either descriptive, inspirational, or technically abstract when applied to everyday design workflows.

In practice-oriented design contexts, especially within UX and visual communication, established usability testing methods - such as Think-Aloud protocols - tend to prioritize functionality, navigation, and cognition, often at the expense of aesthetic and emotional dimensions (Ericsson & Simon, 1993; Boren & Ramey, 2000; Nielsen, 2012). As a result, visual qualities such as color, tone, and atmosphere are underrepresented in structured testing and evaluation processes. This creates a methodological gap: designers lack accessible tools that allow them to test, discuss, and validate visual design decisions - particularly color - using both emotional and rational criteria.

Visual Color Project addresses this gap by exploring how color can be approached not only as an aesthetic surface, but as a communicative and testable component of design practice.

1.3 Research aim and questions

The primary aim of this research is to investigate how designers can work more systematically, confidently, and transparently with color in contemporary digital design processes. Rather than proposing yet another color theory or aesthetic framework, the project seeks to develop practical methods that help designers articulate visual intentions, evaluate perceptual responses, and support decision-making with structured evidence.

Specifically, the research examines how historical and contemporary color paradigms influence current design practices, and how the transition from material, pigment-based color systems to digital color environments has affected designers' relationship with color. At the same time, the project explores why professional discourse around color and aesthetics often remains underdeveloped, despite the increasing visual complexity of digital products and interfaces.

A central research question guiding the project is therefore:

How can a structured, practice-oriented testing method support designers in evaluating and communicating color and other visual elements through a combination of emotional response and empirical data?

This question is further informed by subsidiary considerations concerning language, perception, and methodology - particularly how designers and test participants articulate visual experience, and how testing frameworks may either constrain or enable meaningful dialogue about aesthetics.

1.4 Project contribution and expected value

Visual Color Project contributes to both design research and professional practice by bridging theory, empirical investigation, and applied methodology. Its central contribution is the development of VERT (Visual Emotional Rational Test) - a visual testing method designed to evaluate color, typography, moodboards, branding, and other visual elements through a structured yet intuitive process.

Rather than positioning objectivity and intuition as opposing forces, the project argues that meaningful design evaluation emerges from their combination. VERT operationalizes this perspective by translating emotional and perceptual responses into comparable visual data, without reducing aesthetic experience to purely quantitative measures. In doing so, it offers designers a shared framework and vocabulary for discussing visual qualities that are often considered "soft" or difficult to formalize (Batchelor, 2000; Fine, 2022; Polanyi, 2009).

Beyond the test method itself, the project contributes a broader conceptual framework for understanding color in a digital age. Through the development of the Circle Model (Image 1), the research synthesizes historical, cultural, scientific, and practical perspectives on color, offering designers a navigational tool for situating their work within a wider theoretical landscape.

The expected value of the project lies in its applicability across professional design practice and design education. For practitioners, it provides a concrete method for validating visual decisions and communicating them to clients and stakeholders. In business contexts, VERT is also applicable as a customer-oriented evaluation tool that helps organizations understand how specific visual choices are perceived by defined user groups. By making perceptual differences visible and discussable, the method can support co-creative design processes where stakeholders and customers participate more actively in

shaping visual direction, thereby strengthening alignment between brand intention, customer experience, and final design decisions. For educators and students, it offers a pedagogical tool that supports reflective practice, visual literacy, and the development of a more nuanced language for discussing aesthetics. At a societal level, the project responds to the growing visual saturation of digital environments by advocating for more conscious, accountable, and articulate approaches to visual design.

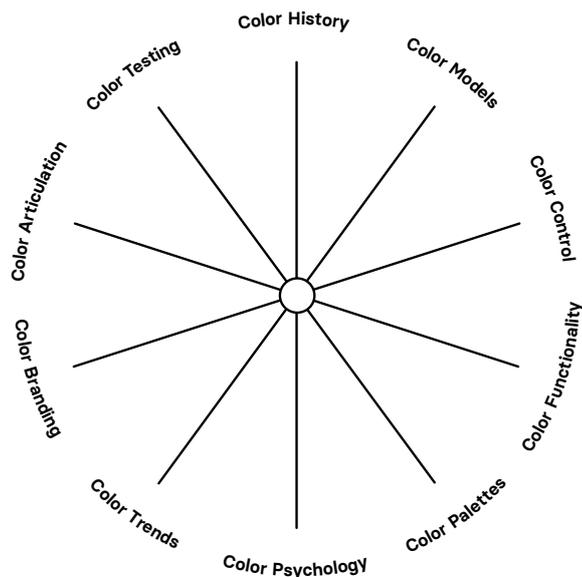


Image 1: The model maps historical, scientific, cultural, and practice-oriented perspectives on color and functions as an analytical framework for positioning contemporary color practices within the Visual Color Project.

2.0 Literature Review and Theoretical Framing

2.1 Establishing a foundation for the research project

Color theory constitutes a broad and inherently interdisciplinary field spanning science, art, philosophy, psychology, design, and cultural studies. Historically, the study of color has oscillated between attempts to systematize perception through measurement and classification, and more experiential or symbolic approaches that emphasize emotion, meaning, and cultural context (Fine, 2022; Loske & Bader, 2024). This dual orientation continues to shape contemporary understandings of color and directly informs how designers approach color in professional practice.

The purpose of this literature review is to establish a conceptual foundation for Visual Color Project by synthesizing key historical and contemporary perspectives

on color. Rather than pursuing a unified or prescriptive theory, the review maps dominant paradigms, tensions, and blind spots within color theory. This mapping approach reflects the complexity of color as both a physical phenomenon governed by perceptual mechanisms and a culturally mediated experience shaped by language, history, and ideology (Batchelor, 2000; Gadamer, 1975).

The review draws on classical color systems and treatises, modern scientific and psychological research, and contemporary design-oriented publications. By situating these sources in relation to one another, the review clarifies how current design practices have inherited, adapted, or in some cases neglected earlier frameworks for understanding and working with color. This synthesis provides the theoretical grounding for the subsequent methodological development of VERT.

2.2 Contextual foundation, research orientation and scope

Historically, color theory emerged from material and technological constraints. Early color systems were closely tied to pigments, dyes, and physical substances, and color knowledge developed through craft, experimentation, and empirical observation. Canonical works such as Werner’s *Nomenclature of Colours* (Syme, 1821; Werner, 1814) and Chevreul’s chromatic systems (Chevreul, 1839; 1864) exemplify efforts to stabilize color perception through classification, shared reference points, and systematic notation. These systems served scientific, artistic, and communicative purposes and were deeply embedded in their historical contexts.

In contrast, contemporary color practice is largely situated within digital environments. Color today exists primarily as code, light, and interface rather than as material substance. Designers navigate RGB values, hexadecimal codes, algorithmically generated palettes, and trend forecasts, often detached from the material origins and historical contingencies of color (Loske & Bader, 2024; St. Clair, 2016). While this shift has dramatically expanded creative possibilities, it has also introduced new challenges related to perceptual consistency, communicative precision, and experiential grounding.

The scope of this research therefore spans from pigment-based paradigms to present-day digital workflows. Rather than privileging one paradigm over another, the project adopts a contextual orientation that considers how historical and contemporary color systems coexist and influence current design decisions. This approach allows color to be examined not merely as a technical variable, but as a historically situated and culturally charged phenomenon with implications for both perception and practice.

2.3 Current paradigm: Kaleidoscopic color abundance

One defining characteristic of contemporary color practice is abundance. Designers are confronted with an almost limitless spectrum of color options, supported by digital tools that automate palette generation, simulate harmony, and predict trends. This condition of kaleidoscopic abundance fundamentally alters the context in which color decisions are made.

While increased availability may suggest greater creative freedom, several authors point to unintended consequences (Fine, 2022; Loske & Bader, 2024; Virilio, 1995). Abundance can lead to decision fatigue, superficial engagement, and a tendency to treat color as an interchangeable aesthetic layer rather than as a meaningful design decision (Virilio, 1995; Hardik Dewra, 2023). When color choices are endlessly reversible and rapidly iterated, the act of selection risks losing intentionality.

This paradigm is further reinforced by AI-driven tools and stock-based design practices, where color decisions are frequently derived from existing datasets rather than contextual analysis or experiential testing. As a result, color solutions may appear refined and contemporary while remaining weakly articulated or insufficiently grounded in user perception. The literature suggests that this environment privileges visual consumption over reflective evaluation, creating a gap between visual sophistication and communicative clarity (Virilio, 1995; Dewra, 2023; Loske & Bader, 2024).

2.4 Further paradigms in color theory

Beyond the paradigm of abundance, the literature reveals several overlapping perspectives that continue to shape how color is understood and applied. Scientific paradigms approach color as a measurable phenomenon grounded in optics, neuroscience, and perceptual psychology. These perspectives emphasize objectivity, repeatability, and universality, offering valuable insights into how humans perceive and process chromatic stimuli (Mahnke, 1996; Russell, 1980).

In contrast, cultural and critical paradigms treat color as a carrier of meaning shaped by history, power structures, and ideology. Authors such as Batchelor and Fine argue that color theory has been historically marginalized and disciplined through Western, formalist traditions that privilege form, structure, and neutrality over chromatic expression (Batchelor, 2000; Fine, 2022). From this perspective, color is never neutral but always entangled with cultural values and symbolic hierarchies.

A third paradigm emerges from design practice itself,

where color is approached pragmatically as a tool for branding, differentiation, and emotional impact. Here, color decisions are often guided by intuition, experience, and trend references rather than systematic testing or theoretical grounding (Neumeier, 2003; Hartelius, 2013). These paradigms coexist in practice, but the literature suggests that they are rarely integrated into coherent workflows. Designers frequently oscillate between scientific authority, cultural reference, and personal judgment without tools that allow these perspectives to meaningfully inform one another.

2.5 Perspectival reflection: Chromophobia and the absence of language

A recurring theme in the literature is what David Batchelor terms chromophobia, the historical tendency to marginalize color in favor of form, structure, or concept (Batchelor, 2000). Although contemporary design culture celebrates color visually, this ambivalence persists at the level of discourse. Color is often framed as subjective, emotional, or secondary, making it difficult to defend, critique, or articulate in professional contexts (Batchelor, 2000; Fine, 2022).

This absence of language is further reinforced by cognitive research on verbal overshadowing, which suggests that articulating perceptual experiences can distort or simplify sensory impressions (Schooler & Engstler-Schooler, 1990). When individuals are asked to verbalize visual perception, they may default to vague descriptors or emotional shorthand, resulting in feedback that is difficult to operationalize in design processes (Schooler & Engstler-Schooler, 1990; Ericsson & Simon, 1993).

The literature thus points to a paradox. Color is omnipresent and influential, yet the professional vocabulary for discussing it remains underdeveloped (Fine, 2022; Hartelius, 2013). This gap between experience and articulation represents a critical challenge for contemporary design practice and provides a central motivation for developing new tools that can support structured, reflective dialogue about visual perception.

2.6 From cataloging colors to curating color experience

Taken together, the literature indicates a shift from cataloging color toward curating color experience. Early color systems prioritized classification, naming, and standardization, whereas contemporary challenges call for methods capable of capturing perception, emotion, and intention within specific contexts (Loske & Bader, 2024; Fine, 2022).

Visual Color Project positions itself within this shift by moving beyond static color models toward dynamic evaluation. Rather than asking which color is correct, the project asks how color is perceived, articulated, and negotiated within a design process. This reframing positions color not as an isolated variable but as a relational and experiential component of visual communication.

This theoretical framing establishes the foundation for the methodological development of VERT, which seeks to operationalize insights from color theory, psychology, and design research into a practical testing method capable of bridging emotional response and structured evaluation.

3.0 Methodology

3.1 Research design and methodological orientation

Visual Color Project was conducted as an explorative design research project, combining qualitative research methods with iterative development of design artefacts. The overall research design aligns with principles from explorative design research and action research, where knowledge is generated through cycles of investigation, experimentation, reflection, and refinement within a real-world context (Sørensen, Mattsson, & Sundbo, 2009; Reason & Bradbury, 2008).

Given the interdisciplinary and historically layered nature of color theory, the project required a methodological approach capable of handling complexity, ambiguity, and multiple epistemological perspectives. Rather than applying a single linear method, the project combines literature-based inquiry, empirical testing, and artefact development. This approach reflects the understanding that color knowledge is not purely objective or measurable, but emerges through the interaction between perception, language, context, and design intention (Fine, 2022).

The methodology can be divided into two interrelated strands:

- (1) a literature-based mapping and synthesis of color theory paradigms, and
- (2) an empirical, iterative development and validation of the VERT test method.

3.2 Literature review methodology

The literature review underpinning Visual Color Project was conducted as a critical and narrative review,

supplemented by mapping review techniques. Due to the extensive and heterogeneous nature of color theory literature, a purely systematic review was not considered appropriate. Instead, the review emphasizes synthesis, contextualization, and paradigmatic analysis.

The review draws on historical color treatises, scientific studies, psychological research, and contemporary design literature. This approach corresponds with the typology of review methods described by Grant and Booth (2009), where critical and narrative reviews allow for interpretive depth and the construction of a coherent theoretical narrative across disciplines. Elements of meta-narrative review were also applied in order to trace how different research traditions have conceptualized color across time and contexts (Greenhalgh et al., 2005).

The literature was collected, categorized, and analyzed through two indices: a comprehensive index mapping the breadth of relevant sources, and a focused index identifying key works that directly informed the conceptual frameworks and methodological development of the project. This mapping process resulted in the development of the Circle Model, which functions as both an analytical typology and a structuring device for positioning the project's contributions within the broader field of color theory.

3.3 Empirical approach and development strategy

The empirical component of the project focused on the development of VERT (Visual Emotional Rational Test) as a practical method for evaluating visual design. The development followed an explorative and iterative process grounded in empirical observation, user testing, and comparative evaluation. This approach reflects the principles of explorative design research, where artefacts are developed and refined through real-world application rather than controlled laboratory conditions (Sørensen, Mattsson, & Sundbo, 2009).

The empirical work was structured into four main phases:

Phase 1: Pilot study (VERT 1.0) - Image 2

The initial phase involved a pilot study conducted with design students working on a real visual identity project. The purpose of this phase was to test the foundational structure, usability, and conceptual validity of the early VERT prototype. Pilot studies are widely recognized as critical for identifying methodological weaknesses and feasibility issues prior to broader implementation (Van Teijlingen & Hundley, 2001).

The pilot revealed that VERT supported more structured feedback and helped validate design hypotheses, but also exposed challenges related to manual execution, clarity

of instructions, and the selection of polarity parameters. These findings informed the first major revision of the tool.

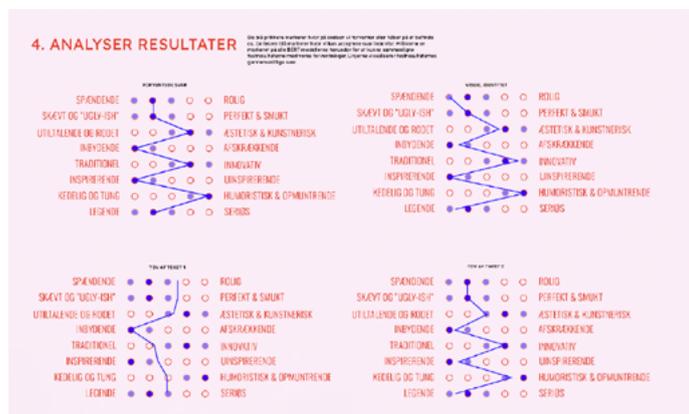


Image 2: Some of the material from the pilot project with a group of design students testing a visual identity with the first version of VERT.

Phase 2: Cultural probes and observational testing (VERT 2.0–3.0) - Image 3

In the second phase, VERT was distributed as a cultural probe to multiple groups of design students. Cultural probes, as described by Gaver, Dunne, and Pacenti (1999), are particularly suited to capturing open-ended, situated feedback while minimizing researcher intervention.

Students were provided with a VERT kit including test sheets, manuals, markers, and overlay materials, and were instructed to use the tool independently in a design case involving moodboards and packaging. Data was collected through executed test materials, observational notes, and an open-ended survey. This phase generated rich qualitative insights into how users interpreted, adapted, and negotiated the structure of VERT in practice.

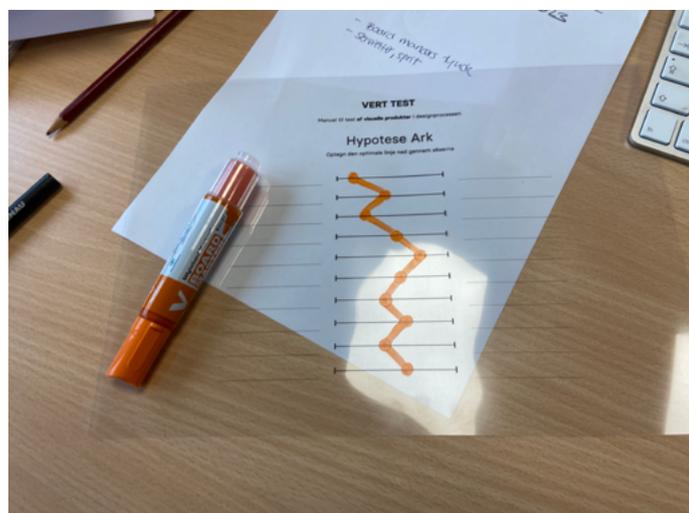


Image 3: The transparent overlay sheets for layering response lines with the board marker as a part of the Cultural Probe experiment.

Key findings highlighted the tool’s ability to stimulate dialogue and articulate emotional responses, while also raising concerns about potential bias introduced by predefined adjective pairs. These insights led to revisions that increased flexibility and clarified facilitation guidelines.

Phase 3: Comparative testing (VERT 4.0–5.0)

The final empirical phase involved a structured comparative study between VERT and the Think-Aloud method, a widely used usability testing technique (Ericsson & Simon, 1993; Nielsen, 2012). Design students tested identical visual materials using both methods and reflected on the differences in feedback quality, structure, and usability.

The comparative analysis demonstrated that VERT consistently elicited more structured, articulate, and comparable responses than Think-Aloud testing, particularly in relation to emotional and perceptual aspects of visual design. At the same time, the comparison highlighted the importance of balancing structure with openness to avoid over-directing participant responses.

The results of this phase informed the final refinements of the VERT method, including simplification of test steps, improved graphical clarity, and the introduction of open axes for participant-defined descriptors.

The empirical development and testing of VERT described above are further elaborated in a separate article titled Empirical Foundations of VERT. This article presents a more detailed account of the empirical design process, including methodological reflections, test materials, participant observations, and iterative refinements across versions of the tool. While the present working paper focuses on situating VERT within a broader theoretical and methodological framework, the supplementary article provides in-depth documentation of the empirical evidence underpinning the development and validation of the VERT method.

Phase 4: Professional validation and iterative refinement (VERT 6.0)

Following the structured comparative phases, VERT 6.0 has been further developed through feedback from professional colleagues, conference presentations, invited talks, and real-world applications beyond the educational setting. The method has been demonstrated and tested in professional contexts, resulting in a series of refinements and optimizations. These include adjustments to graphical clarity, simplification of facilitation steps, calibration of polarity parameters, and experimentation with alternative visual structures. Some expanded versions introduced additional axes or more complex visual mappings; however, these iterations often increased cognitive load

and reduced participant clarity. The final version therefore reflects a deliberate balance between methodological precision, usability, and experiential simplicity.

3.4 Data collection and analysis

Data across all empirical phases consisted primarily of qualitative material, including observational notes, completed test sheets, participant discussions, and survey responses. Rather than applying formal statistical analysis, the data was analyzed through thematic interpretation, comparative reflection, and synthesis across iterations.

The analysis focused on identifying patterns related to usability, articulation of visual perception, quality of feedback, and the relationship between design intention and user response. This qualitative, design-oriented analysis is consistent with research-through-design traditions, where artefacts themselves function as generators of knowledge (Sanders & Stappers, 2008).

3.5 Ethical considerations and research limitations

All empirical testing was conducted within educational contexts with informed participants. No personal or sensitive data was collected, and participation was voluntary. Accessibility considerations are also relevant when VERT is used to evaluate color. In cases involving color vision deficiency, outcomes depend on the specific palette presented as the test medium, and different forms of color blindness may affect perception in different ways. For this reason, it is recommended to use contemporary simulation tools that can preview palettes as perceived under different types of color vision deficiency prior to testing. At the same time, VERT can be particularly valuable for testing palette responses within a colorblind target group, since the method supports structured comparison of perceptual responses and makes divergences visible across participants.

Methodologically, the project acknowledges limitations related to sample size, contextual specificity, and the interpretive nature of qualitative analysis. However, these limitations are considered acceptable within an explorative design research framework, where the goal is not generalization but the development of transferable methods and insights applicable across design contexts.

4.0 Results

4.1 Overview of research outcomes

The primary outcome of Visual Color Project is the development of VERT (Visual Emotional Rational Test) as a validated method for testing and articulating visual design decisions. In addition to the method itself, the project has generated several interconnected research outputs, including a conceptual framework for understanding contemporary color theory, a typology of color paradigms (the Circle Model), and a structured approach to visual evaluation that integrates emotional, rational, and perceptual dimensions.

The results presented in this section focus on what the empirical investigations revealed about (1) how designers and test participants engage with visual testing, (2) how VERT functions in practice compared to established methods, and (3) how structured visual testing influences articulation, reflection, and decision-making in design processes.

4.2 Results from the literature review as a research output

The literature review itself constitutes a central research result. Through a hermeneutic and mapping-based synthesis of historical and contemporary color theory, the project identifies a shift from material and pigment-based paradigms toward digital, abundance-driven color practices. This shift has significant implications for how color is perceived, selected, and discussed in contemporary design workflows.

The review demonstrates that while color theory has expanded in volume and accessibility, particularly through digital tools and trend-based platforms, this expansion has not been accompanied by a corresponding development of professional language or testing methodologies. Instead, the literature reveals a fragmentation between scientific measurement, cultural symbolism, and intuitive practice. These findings substantiate the project's initial hypothesis that designers operate within a kaleidoscopic color environment without sufficient methodological support for evaluation and articulation (Fine, 2022; Batchelor, 2000).

The Circle Model (Image 1) emerges as a direct output of this synthesis. By categorizing color theory into distinct yet overlapping domains, the model provides a conceptual structure for positioning both historical knowledge and contemporary practices. It also functions as a reference framework for situating VERT within the broader field of color research and design methodology.

4.3 Empirical findings from Phase 1: Pilot study

The pilot study revealed that even a rudimentary version of VERT facilitated more structured discussions about visual design than previously used methods. Participants were able to align their design hypotheses with user responses more clearly, indicating that the basic polarity-axis structure supported hypothesis validation.

However, the pilot also exposed several limitations. Manual documentation was perceived as cumbersome, and participants expressed uncertainty regarding the selection and interpretation of adjective pairs. These findings confirmed the need for clearer facilitation guidelines and a more refined graphical structure. Importantly, the pilot demonstrated that VERT had conceptual validity, even though its execution required significant refinement.

4.4 Empirical findings from Phase 2: Cultural probes and observational testing

The cultural probe phase produced extensive qualitative data revealing how users independently interpreted and applied VERT. One of the most consistent findings was that VERT acted as a catalyst for dialogue. Test participants articulated their perceptions more precisely when guided by bipolar adjective axes than in unstructured feedback sessions.

At the same time, the observations revealed tension between structure and openness. Some participants questioned whether predefined adjectives might guide responses too strongly. This concern aligns with existing critiques of structured testing methods, where framing can influence outcomes (Ericsson & Simon, 1993). Nevertheless, the data showed that VERT encouraged deeper reflection rather than limiting expression, particularly when combined with post-test discussion.

Survey responses from this phase indicated high perceived usability and relevance. Only a small minority expressed skepticism regarding the method's applicability. The majority reported that VERT helped them articulate perceptions that would otherwise have remained implicit or difficult to verbalize. These results suggest that VERT addresses a known challenge in visual testing: the difficulty of translating visual experience into language.

4.5 Empirical findings from Phase 3: Comparative testing with Think-Aloud

The comparative study between VERT and the Think-Aloud method provided the most explicit evidence of VERT's added value. Across test sessions, VERT

consistently produced more structured, comparable, and actionable feedback than Think-Aloud testing.

While Think-Aloud allowed for spontaneous verbalization, participants frequently struggled to articulate their responses beyond evaluative statements such as "I like it" or "I don't like it." This observation supports earlier critiques of Think-Aloud testing in visually complex contexts, where verbalization alone may oversimplify perception (Nielsen, 2012; Schooler & Engstler-Schooler, 1990).

In contrast, VERT enabled participants to locate their perceptions along defined axes, which reduced cognitive load and supported reflection. Designers reported that the visual aggregation of responses made discrepancies in perception immediately visible, prompting constructive discussions about design intention versus user interpretation.

At the same time, the comparative study confirmed that excessive rigidity could hinder exploration. This insight led directly to refinements such as the inclusion of blank axes and streamlined test steps, reinforcing the importance of adaptability within structured methods.

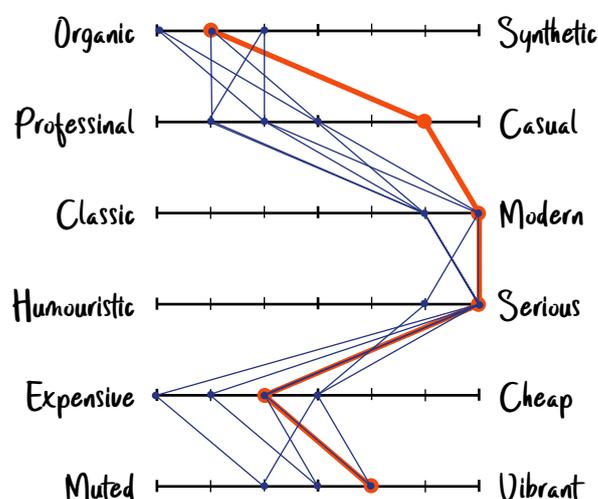


Image 4: The orange line represents the designer's hypothesis, indicating the intended positioning of the visual element along each bipolar axis. The thinner blue lines represent individual test participant responses plotted on the same axes. By overlaying intention and perception within a shared visual framework, the method enables intuitive comparison, pattern recognition, and reflective discussion of discrepancies and alignment between design intent and user experience.

4.6 Final output: VERT as a validated testing method

The culmination of the empirical process is VERT 6.0, a refined visual testing kit designed for use in both educational and professional contexts. In its final form,

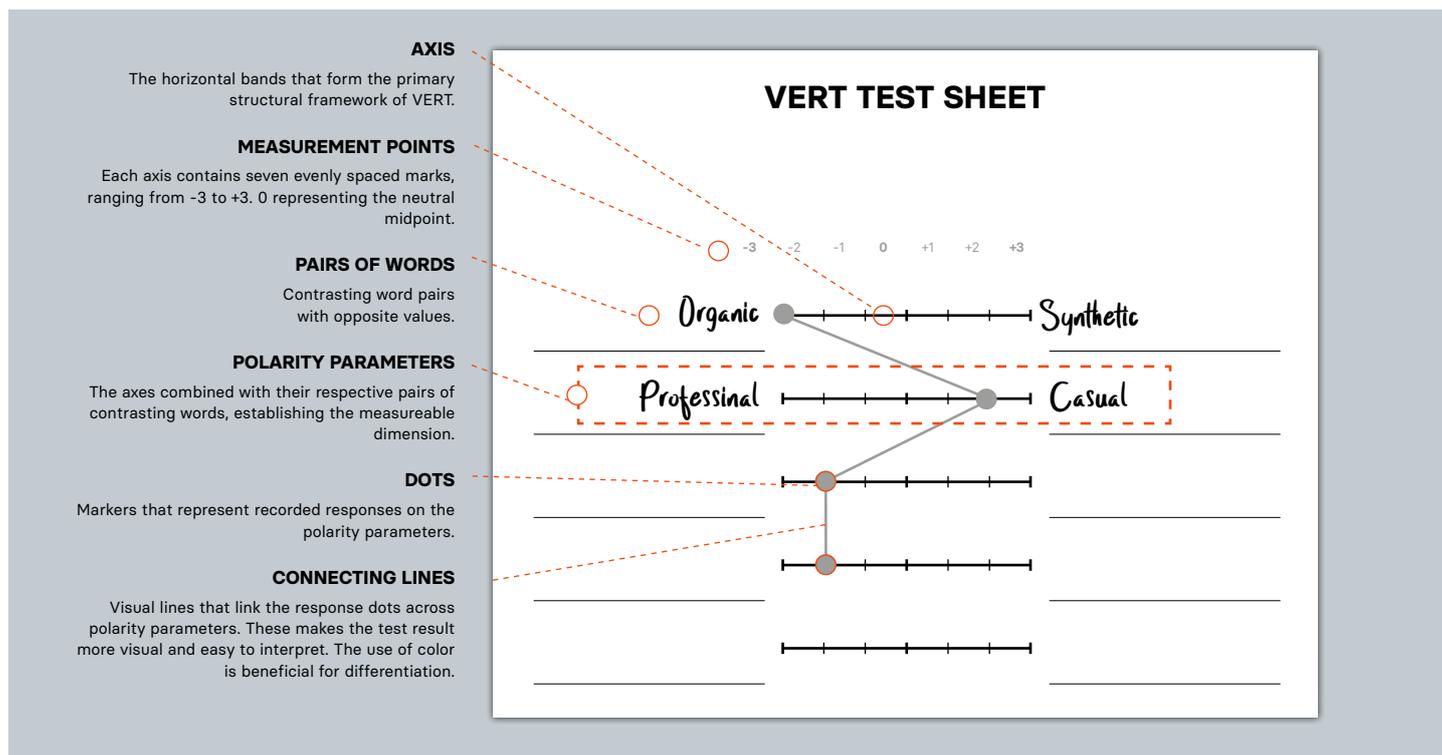


Image 5. Annotated VERT test sheet illustrating the internal logic of the method. The bipolar axes define opposing perceptual values, while the orange line represents the designer’s visual hypothesis. The thinner lines with dots indicate individual participant responses plotted along the same axes. The visual overlay enables direct comparison between intended and perceived outcomes, making perceptual differences explicit and supporting structured interpretation and discussion

VERT is structured around a system of bipolar axes that translate perceptual and emotional responses into visual, comparable data. Each axis represents a polarity between two opposing values, for example calm–energetic or traditional–contemporary, which are selected in relation to the specific design intention being tested (Image 4).

Prior to testing, designers formulate a visual hypothesis by positioning an expected value along each axis. This hypothesis functions as an explicit articulation of design intention and is visually represented as a reference line within the axis system. During testing, participants are asked to indicate their perception by placing points along the same axes, allowing individual responses to be mapped directly against the initial hypothesis. This creates an immediate visual comparison between intended and perceived outcomes.

The internal logic and systematics of VERT are further illustrated through the annotated test sheet (Image 5), which clarifies how axes, polarity parameters, hypothesis lines, and participant responses interact within a single testing surface. The test sheet makes the method operational by assigning clear roles to each component, showing how visual hypotheses are tested, how responses are registered, and how results can be read both individually and in aggregation.

By formalizing visual evaluation through axes, polarity parameters, and structured visual mapping, VERT

balances methodological clarity with interpretive openness. The method does not aim to identify a single correct response, but to make perceptual differences visible, comparable, and discussable. In this way, VERT functions not only as a testing tool but as a language-generating framework that supports precise, reflective, and confident dialogue about visual design decisions across professional contexts.

5.0 Discussion

5.1 Testing, intention, and the myth of objectivity

A recurring discussion throughout the development of VERT concerns the notion of objectivity in visual testing. One of the central tensions addressed in this project is the assumption that user testing can capture neutral or unbiased responses to visual stimuli. The empirical findings from all three phases suggest that this assumption is problematic. All testing situations are constructed environments, shaped by framing, language, and methodological choices.

Rather than treating this as a limitation, Visual Color Project acknowledges that testing is inherently interpretive. This perspective aligns with constructivist views of perception, where meaning emerges through interaction rather than measurement alone (Kelly, 1955).

VERT does not claim to capture objective truth about color perception. Instead, it structures subjectivity in a way that makes perception discussable, comparable, and actionable within a professional context.

This reframing challenges a widespread belief in design practice that data-driven methods eliminate bias. The results suggest that the value of VERT lies not in objectivity, but in transparency. By explicitly presenting opposing values on bipolar axes, the method makes the framing visible rather than implicit.

5.2 Intuition versus data in visual decision-making

Another key discussion point raised during the project concerns the relationship between designer intuition and empirical data. A common critique encountered during testing was the argument that designers should rely on intuition rather than user data, particularly when working with aesthetic and emotional dimensions.

The findings complicate this dichotomy. The empirical sessions demonstrate that intuition and data are not opposing forces, but interdependent. VERT does not replace intuition; it externalizes it. Designers articulate a hypothesis based on their intuition, which is then tested against user perception. This process mirrors Schön's notion of reflective practice, where professional knowledge is developed through cycles of action and reflection rather than rule-based optimization (Schön, 1983).

Furthermore, the comparative studies show that without structured tools, intuition often remains tacit and difficult to communicate. This aligns with Polanyi's concept of tacit knowledge, where practitioners "know more than they can tell" (Polanyi, 2009). VERT functions as a mediating artifact that helps translate tacit visual judgments into shared reference points.

5.3 Language, cognition, and the difficulty of talking about color

One of the strongest insights across the project is the persistent difficulty test participants face when verbalizing visual perception. This challenge is well documented in cognitive research on verbal overshadowing, which suggests that verbalization can distort or simplify perceptual experience (Schooler & Engstler-Schooler, 1990).

The empirical findings suggest that VERT mitigates this problem by shifting the cognitive task. Rather than asking participants to describe what they see, the method asks them to position their perception relative to two values. This reduces the demand for spontaneous verbalization

and supports more reflective articulation.

This observation supports the project's broader claim that the lack of language around color is not merely a cultural issue but also a cognitive one. The widespread reliance on vague descriptors such as "nice", "clean", or "modern" can be understood as a coping strategy rather than a lack of competence. VERT addresses this gap by providing a scaffold for language without prescribing interpretation.

VERT addresses this gap by providing a scaffold for articulation through selected parameters and visual structure, while acknowledging that the choice of terms and the framing of axes are inherently normative and may introduce bias. The method therefore relies on transparency and contextual calibration of descriptors rather than claims of neutrality.

5.4 Chromophobia, professionalism, and the status of color discourse

The discussion also returns to the concept of chromophobia, as described by Batchelor, where color is historically treated as secondary, emotional, or excessive compared to form and structure (Batchelor, 2000). Although contemporary design culture is visually saturated, the empirical observations suggest that this ambivalence persists at the level of professional discourse.

During testing sessions, students repeatedly expressed hesitation or humor when discussing emotional responses to color. This behavior reflects a broader professional norm where emotional language is perceived as unscientific or subjective. Fine's critique of color theory as entangled with cultural and ideological hierarchies provides a useful lens for interpreting this phenomenon (Fine, 2022).

VERT challenges this norm by legitimizing emotional response as a valid data point within a structured framework. By integrating emotion into a rational testing format, the method reframes affect not as a weakness but as an essential component of visual evaluation.

5.5 Structure versus openness in visual testing methods

A final discussion point concerns the balance between structure and openness in testing methodologies. While the results clearly indicate that structure improves articulation and comparability, they also reveal the risk of over-constraining perception.

Critiques raised during Phase 2 and Phase 3 regarding

adjective bias highlight an important methodological consideration. Any predefined framework risks guiding responses. A related methodological consideration concerns the bipolar axis format itself. While polarity parameters are effective for comparison and aggregation, they can also introduce dichotomy issues by framing perception as an either–or continuum. If the design intention is to communicate nuance, simultaneity, ambiguity, or layered complexity, a bipolar axis may be insufficient and may risk producing “false dichotomies” in the interpretation of results. Future iterations of VERT could therefore explore alternative depictions, for instance multi-directional spectra, radial or web-based mappings, or other non-linear structures that allow multiple qualities to co-exist rather than compete along a single line. The project addresses this by introducing flexible components, such as blank axes and facilitation guidelines that encourage open discussion alongside structured evaluation.

At the same time, the empirical sessions conducted in this study demonstrate that the simplicity of bipolar axes has proven both efficient and fruitful in practice. The axis structure makes designer intention explicit and provides participants with a clear and cognitively manageable task. Experiments with more complex visual formats and additional parameters often resulted in confusion and a shift of attention from the design object to the test structure itself. In several sessions, increased structural complexity appeared to reduce participant vulnerability and spontaneity, leading to more cautious and less intuitive responses. The bipolar format therefore represents a pragmatic compromise between nuance and usability. It supports meaningful articulation while maintaining clarity and emotional accessibility within the testing situation.

Although a multi-dimensional or non-linear visual model may appear theoretically more refined from an academic or philosophical perspective, such complexity proved less applicable in situated practice. As an applied research project grounded in real design contexts, the priority of this study has been usability, clarity, and experiential immediacy within the testing situation rather than theoretical completeness.

This reflects a broader methodological stance aligned with explorative design research, where methods are treated as adaptable frameworks rather than fixed protocols (Sørensen, Mattsson, & Sundbo, 2009). VERT is intentionally designed to be adjusted, negotiated, and contextualized rather than applied mechanically.

5.6 Implications for design education and professional practice

The discussion suggests several implications for both education and practice. First, there is a clear need for

tools that help designers articulate visual decisions beyond personal taste. Second, structured visual testing can strengthen professional confidence by providing a shared language for discussing perception.

In educational contexts, VERT functions as both a testing method and a pedagogical tool. It exposes students to the complexity of visual perception while offering a concrete framework for reflection. In professional settings, the method supports decision-making by bridging the gap between intention, perception, and justification.

These implications reinforce the project’s core argument: that the challenge in contemporary color practice is not a lack of tools or inspiration, but a lack of methods that integrate perception, language, and reflection into the design process.

6.0 Conclusion

This working paper has presented Visual Color Project as a research-based response to a central challenge in contemporary visual design practice: the growing gap between the experiential power of color and the limited professional language available to articulate, test, and justify visual decisions.

Through an extensive literature review, the project has demonstrated that color theory is characterized by enduring tensions between scientific measurement, cultural meaning, and intuitive practice. While contemporary design operates within a paradigm of kaleidoscopic color abundance, this abundance has not resulted in a more precise or confident use of color. On the contrary, the findings suggest that unlimited access to color has contributed to decision fatigue, superficial engagement, and a weakened vocabulary for discussing visual perception.

The empirical development of VERT addresses this gap by offering a structured yet flexible testing method that bridges emotional response and rational evaluation. Across multiple development phases, VERT has demonstrated its ability to support richer articulation, clearer comparison, and more reflective dialogue than conventional methods such as Think-Aloud testing. Rather than eliminating subjectivity, the method makes perceptual differences visible and discussable, thereby strengthening professional decision-making.

A key contribution of the project lies in its reframing of visual testing. VERT does not position itself as an objective measurement tool, but as a framework for structured subjectivity. By externalizing intuition, legitimizing emotion, and providing a shared language, the method enables designers and test participants to engage more consciously with visual perception. This aligns with the

project's broader theoretical positioning, where color is understood not as an isolated variable but as a relational and experiential component of visual communication.

The findings also highlight important implications for design education. VERT functions not only as a testing tool but as a pedagogical instrument that supports reflective practice. By introducing students to structured evaluation without suppressing intuition, the method encourages a more confident and articulate engagement with color, aesthetics, and emotion. This contributes to developing professional literacy in an area that has traditionally been treated as vague or secondary.

From a practice perspective, the project suggests that the future of color work lies not in more tools, palettes, or automation, but in better frameworks for testing, discussion, and justification. In a design landscape increasingly shaped by AI-generated content and stock-based aesthetics, methods like VERT offer a way to reintroduce intention, reflection, and accountability into visual decision-making.

Finally, Visual Color Project positions VERT as an evolving framework rather than a finalized solution. Its development follows an explorative design research approach, where iteration, critique, and adaptation are integral to methodological validity. Future work may explore digital adaptations of the method, broader professional applications, and further empirical validation across disciplines and contexts.

In conclusion, this research demonstrates that strengthening the language of color is not merely a theoretical concern but a practical necessity. By integrating historical insight, empirical testing, and design methodology, Visual Color Project contributes a concrete response to a persistent problem in visual design practice: how to make color choices meaningful, communicable, and defensible in a professional context.

Links for Visual Color Project and the VERT test

Link for Visual Color Project website: <https://www.grafiskformgivning.dk/visual-color-project-opening>

Link for downloading VERT test: <https://framerusercontent.com/assets/bLFpQhbsLKRUD6S8z7WveHW-Dos.pdf>

Link for Empirical Foundation of Vert: <https://framerusercontent.com/assets/QZArZK7ApWpawpB3OJbU7s-BfOo.pdf>

Link for Literature Review: <https://www.grafiskformgivning.dk/visual-color-project-literature-study>

References used in this article

- Batchelor, D. (2000). *Chromophobia*. Reaktion Books.
- Boren, M. T., & Ramey, J. (2000). Thinking aloud: Reconciling theory and practice. *IEEE Transactions on Professional Communication*, 43(3), 261–278.
- Chevreul, M. E. (1839). *Cercle Chromatique*. Librairie Renouard.
- Chevreul, M. E. (1864). *Des couleurs et de leurs applications aux arts industriels à l'aide des cercles chromatiques*. Paris: J. B. Baillière.
- Dewra, H. (2023). *Decision Fatigue: The Hidden Enemy of User Experience!*. UX Design.
- Ericsson, K. A., & Simon, H. A. (1993). *Protocol Analysis: Verbal Reports as Data*. MIT Press.
- Fine, A. (2022). *Color Theory: A Critical Introduction*. Bloomsbury.
- Gadamer, H. G. (1975). *Truth and Method*. Sheed & Ward.
- Gaver, W., Dunne, T., & Pacenti, E. (1999). Cultural probes. *Interactions*, 6(1), 21–29.
- Grant, M. J., & Booth, A. (2009). A typology of reviews. *Health Information and Libraries Journal*.
- Greenhalgh, T., et al. (2005). *Storylines of research in diffusion of innovation*. Elsevier.
- Hartelius, A. M. (2013). *Visuel kommunikation i et følelsesperspektiv*. Samfundslitteratur.

Kelly, G. (1955). *The Psychology of Personal Constructs*. Norton.

Loske, A., & Bader, S. (2024). *The Book of Color Concepts (Vols. 1–2)*. Taschen.

Mahnke, F. H. (1996). *Color, Environment, and Human Response*. Wiley.

Neumeier, M. (2003). *The Brand Gap*. New Riders Press.

Nielsen, J. (2012). *Thinking Aloud: The #1 usability tool*. Nielsen Norman Group.

Polanyi, M. (2009). *The Tacit Dimension*. University of Chicago Press.

Reason, P., & Bradbury, H. (Eds.). (2008). *The SAGE Handbook of Action Research*. SAGE Publications.

Russell, J. A. (1980). A circumplex model of affect. *APA*.

Sanders, E. B. N., & Stappers, P. J. (2008). Co-creation and the new landscapes of design. *CoDesign*, 4(1), 5–18.

Schooler, J. W., & Engstler-Schooler, T. Y. (1990). Verbal overshadowing. *Cognitive Psychology*, 22(1), 36–71.

Schön, D. A. (1983). *The Reflective Practitioner: How Professionals Think in Action*. Basic Books.

Sørensen, F., Mattsson, J., & Sundbo, J. (2009). *ICE and the Experiment Method*. Roskilde University.

St. Clair, K. (2016). *The Secret Lives of Colour*. John Murray.

Syme, P. (1821). *Werner's Nomenclature of Colours*. Natural History Museum.

Van Teijlingen, E. R., & Hundley, V. (2001). *The importance of pilot studies*. University of Surrey.

Virilio, P. (1995). *Speed and Politics*. Semiotext(e).

Werner, A. G. (1814). *Werner's Nomenclature of Colours*.

References used in the project

This research project draws on a wide and interdisciplinary body of sources spanning color theory, design research, psychology, philosophy, usability studies, and professional design practice. The diversity of references reflects the complex and multi-layered nature of color as both a perceptual phenomenon and a culturally embedded design variable.

In addition to the references listed below, Visual Color Project includes a standalone Literature Index, which functions as an extended mapping of historical and contemporary color theory sources. This index is presented separately and serves as a broader contextual resource rather than a direct reference list for this working paper.

The following reference list documents all sources explicitly used across the research project, including the working paper, Visual Color Project website, the literature review, the methodological development of VERT, and related empirical documentation. All references are included to ensure transparency, traceability, and adherence to academic standards.

Books and Scholarly Publications

Batchelor, D. (2000). *Chromophobia*. Reaktion Books.

Boren, M. T., & Ramey, J. (2000). Thinking aloud: Reconciling theory and practice. *IEEE Transactions on Professional Communication*, 43(3), 261–278.

Chevreul, M. E. (1839). *Cercle Chromatique*. Librairie Renouard.

Chevreul, M. E. (1864). *Des couleurs et de leurs applications aux arts industriels à l'aide des cercles chromatiques*. Paris: J. B. Baillière.

Dewra, H. (2023). *Decision Fatigue: The Hidden Enemy of User Experience!*. UX Design.

Ericsson, K. A., & Simon, H. A. (1993). *Protocol Analysis: Verbal Reports as Data*. MIT Press.

Fine, A. (2022). *Color Theory: A Critical Introduction*. Bloomsbury.

Gadamer, H. G. (1975). *Truth and Method*. Sheed & Ward.

Gaver, W., Dunne, T., & Pacenti, E. (1999). Cultural probes. *Interactions*, 6(1), 21–29.

Grant, M. J., & Booth, A. (2009). A typology of reviews.

Health Information and Libraries Journal.

Greenhalgh, T., et al. (2005). *Storylines of research in diffusion of innovation*. Elsevier.

Hartelius, A. M. (2013). *Visuel kommunikation i et følelseperspektiv*. Samfundslitteratur.

Kelly, G. (1955). *The Psychology of Personal Constructs*. Norton.

Loske, A., & Bader, S. (2024). *The Book of Color Concepts (Vols. 1–2)*. Taschen.

Mahnke, F. H. (1996). *Color, Environment, and Human Response*. Wiley.

Neumeier, M. (2003). *The Brand Gap*. New Riders Press.

Nielsen, J. (2012). *Thinking Aloud: The #1 usability tool*. Nielsen Norman Group.

Polanyi, M. (2009). *The Tacit Dimension*. University of Chicago Press.

Reason, P., & Bradbury, H. (Eds.). (2008). *The SAGE Handbook of Action Research*. SAGE Publications.

Russell, J. A. (1980). A circumplex model of affect. *APA*.

Sanders, E. B. N., & Stappers, P. J. (2008). Co-creation and the new landscapes of design. *CoDesign*, 4(1), 5–18.

Schooler, J. W., & Engstler-Schooler, T. Y. (1990). Verbal overshadowing. *Cognitive Psychology*, 22(1), 36–71.

Schön, D. A. (1983). *The Reflective Practitioner: How Professionals Think in Action*. Basic Books.

Sørensen, F., Mattsson, J., & Sundbo, J. (2009). *ICE and the Experiment Method*. Roskilde University.

St. Clair, K. (2016). *The Secret Lives of Colour*. John Murray.

Syme, P. (1821). *Werner's Nomenclature of Colours*. Natural History Museum.

Van Teijlingen, E. R., & Hundley, V. (2001). The importance of pilot studies. *University of Surrey*.

Virilio, P. (1995). *Speed and Politics*. Semiotext(e).

Werner, A. G. (1814). *Werner's Nomenclature of Colours*.

Academic Articles and Research Papers

Boren, M. T., & Ramey, J. (2000). Thinking aloud: Reconciling theory and practice. *IEEE Transactions on Professional Communication*, 43(3), 261–278.

Ericsson, K. A., & Simon, H. A. (1993). *Protocol Analysis: Verbal Reports as Data*. MIT Press.

Gaver, W., Dunne, T., & Pacenti, E. (1999). Cultural probes. *Interactions*, 6(1), 21–29.

Grant, M. J., & Booth, A. (2009). A typology of reviews. *Health Information and Libraries Journal*.

Greenhalgh, T., et al. (2005). *Storylines of research in diffusion of innovation*. Elsevier.

Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? *Field Methods*, 18(1), 59–82.

Hennink, M. M., Kaiser, B. N., & Weber, M. B. (2019). What influences saturation? *Qualitative Health Research*, 29(10), 1483–1496.

Schooler, J. W., & Engstler-Schooler, T. Y. (1990). Verbal overshadowing of visual memories. *Cognitive Psychology*, 22(1), 36–71.

Sørensen, F., Mattsson, J., & Sundbo, J. (2009). *ICE and the Experiment Method*. ICE-Project Working Paper, Roskilde University.

Van Teijlingen, E. R., & Hundley, V. (2001). The importance of pilot studies. *Social Research Update*, University of Surrey.

Professional and Online Sources

Adobe Color. Adobe Inc. Last accessed: 10.12.2024.

Brignull, H. (2011). Deception vs. honesty in UI design. *A List Apart*. Last accessed: 12.03.2025.

CloudResearch. Determining sample size. Last accessed: 12.03.2025.

Coloro. Color system website. Last accessed: 10.12.2024.

Dewra, H. (2023). Decision fatigue and UX. *UX Collective*. Last accessed: 12.03.2025.

IDEO. (2012). *Design Thinking for Educators Toolkit*. IDEO.

Jutt, H. (2024). Color psychology. *Medium*. Last acces-

sed: 10.12.2024.

Nielsen, J. (2012). *Thinking aloud: The #1 usability tool*. Nielsen Norman Group. Last accessed: 12.03.2025.

Pantone. Pantone official website. Last accessed: 10.12.2024.

Qualtrics. Sample size determination. Last accessed: 12.03.2025.

Teixeira, F. (2024). The state of UX in 2025. *UX Collective*. Last accessed: 12.03.2025.