



SPONSOR



KONICA MINOLTA

# XVII CdC - CONFERENZA DEL COLORE

12-13 September 2022

## BOOK OF ABSTRACTS

Istituto di Fisica Applicata “Nello Carrara” del Consiglio Nazionale delle Ricerche IFAC-CNR

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TEMI DI INTERESSE

1. **Colore e misura/strumentazione.** Colorimetria, fotometria e atlante dei colori: metodo, teoria e strumentazione; controllo qualità e coloranti alimentari, tinture, colore biologico e sostenibile.
2. **Colore e digitale.** Riproduzione, gestione, correzione digitale del colore, elaborazione delle immagini, grafica, fotografia, produzione di film e video, stampa e stampa 3D, visione artificiale, realtà virtuale, imaging multispettrale, visualizzazione dei dati. Imaging del campo luminoso. Fusione multi-sensore. Localizzazione del colore, riconoscimento, imaging HDR, sistemi ADAS.
3. **Colore e illuminazione.** Metamerismo, resa cromatica, adattamento, costanza cromatica, apparenza, illusioni, memoria e percezione del colore, colore in ambienti extra-atmosferici, lighting design, tecnologia dell'illuminazione, comfort visivo.
4. **Colore e fisiologia.** Meccanismi della visione nei loro aspetti sperimentali e teorici, visione e apparenza del colore, deficit, anomalie, aspetti clinici e biologici, sinestesia, salute, benessere.
5. **Colore e psicologia.** Fenomenologia dei colori, armonie cromatiche, colore e forma, aspetti percettivi, emotivi, estetici e diagnostici.
6. **Colore e produzione.** Alimenti e bevande, agricoltura, tessile, materie plastiche, ceramica, vernici, gemmologia, colore nell'industria alimentare.
7. **Colore e restauro.** Archeometria, materiali pittorici, diagnostica e tecniche di conservazione, restauro e valorizzazione dei beni culturali.
8. **Colore e ambiente.** Rappresentazione e disegno, urbanistica, progetto del colore, architettura, design degli interni, paesaggi e orticoltura, colore e sintassi architettonica, identità territoriali, biodiversità.
9. **Colore e design.** Arredo, CMF design, moda, tessuti, texture, cosmetici, food design, museografia.
10. **Colore e cultura.** Arts and Crafts, storia, filosofia, estetica, etnoantropologia, graffiti, geologia, sociologia, lessicologia, semantica, antropologia della visione, patrimonio e cultura del cibo, denominazione dei colori.
11. **Colore e educazione.** Pedagogia, didattica del colore, educazione estetica, educazione artistica.
12. **Colore e Comunicazione/Marketing.** Grafica, comunicazione, packaging, lettering, visibilità, pubblicità.
13. **SESSIONE SPECIALE: Colore per la bellezza, cosmetica e acconciatura.** La bellezza è un argomento ampio studiato nell'ambito dell'estetica, della cultura, della psicologia sociale e della sociologia. La scienza e tecnologia cosmetica mirano alla bellezza ed è sono parte fondamentale nella nostra società.

TOPIC OF INTERES

1. **Color and Measurement/Instrumentation.** Colorimetry, photometry and color atlas: method, theory and instrumentation; quality control and food coloring, dyes, organic and sustainable color.
2. **Color and Digital.** Reproduction, management, digital color correction, image processing, graphics, photography, film and video production, printmaking and 3D print, artificial vision, virtual reality, multispectral imaging, data visualization. Light field imaging. Multi-sensor fusion. Color localization, recognition, HDR imaging, ADAS systems.
3. **Color and Lighting.** Metamerism, color rendering, adaptation, color constancy, appearance, illusions, color memory and perception, color in extra-atmospheric environments, lighting design, lighting technologies, visual comfort.
4. **Color and Physiology.** Mechanisms of vision in their experimental and theoretical aspects, color vision and color appearance, deficiencies, abnormalities, clinical and biological aspects, synesthesia, health, well-being.
5. **Color and Psychology.** Phenomenology of colors, color harmonies, color & form, perceptive, emotional, aesthetic and diagnostic aspects.
6. **Color and Production.** Food and beverages, agriculture, textiles, plastic materials, ceramics, paints, gemology, color in the food industry.
7. **Color and Restoration.** Archaeometry, painting materials, diagnostics and techniques of conservation, restoration and enhancement of cultural heritage.
8. **Color and Environment.** Representation and drawing, urban planning, project of color, architecture, interior design, landscapes & horticulture, color and architectural syntax, territorial identities, biodiversity.
9. **Color and Design.** Furniture, CMF design, fashion, textiles, textures, cosmetics, food design, museography.
10. **Color and Culture.** Arts and crafts, history, philosophy, aesthetics, ethno-anthropology, graffiti, geology, sociology, lexicology, semantics, anthropology of vision, food culture and heritage, colornaming.
11. **Color and Education.** Pedagogy, didactics of color, aesthetic education, artistic education.
12. **Color and Communication/Marketing.** Graphics, communication, packaging, lettering, exposure, advertising.
13. **SPECIAL SESSION: Color for beauty, cosmetic and hairstyle.** Beauty is a wide topic studied as part of aesthetics, culture, social psychology and sociology. Cosmetic science and technology aim at beauty and is a key part in our society.

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12 SEPTEMBER 2022

**SESSIONE PLENARIA 1 / PLENARY SESSION 1**

(AULA TORALDO)

**09:45, Invited Lecture**

**On different approaches to Environmental Colour Design.**

Verena M. Schindler

**Abstract:** In 2022, the Study Group on Environmental Colour Design (SG ECD) of the International Colour Association (Association Internationale de la Couleur, AIC) is celebrating its 40th anniversary! The main goal of the SG ECD is to disseminate knowledge about experience made in the process of integrating colour in the planning, design, and realization of the built environment, exterior and interior spaces. The activities and events of the SG ECD have opened up exchanges between experts working in diverse countries around the world. At present the SG ECD includes approximately 300 members from 43 countries. The means of exchange include meetings, a website, a mailing list, and publications as well as collaborations with other groups and organizations to stimulate research and teaching related to the members' key interests. An SG ECD report is published in the AIC Annual Report. The Study Group on Environmental Colour Design was consolidated the following year at the AIC Interim Meeting on Colour Dynamics, which was held 8–10 June 1982 in Budapest. Nemcsics believed that architectural colour had been applied in a more conscious way ever since World War II. As well, it seemed to him that many professionals such as physiologists, psychologists, anthropologists and sociologists were investigating the effects of environmental colour on humans. Further, in physics and aesthetics, the relationship between colour sensation and colour composition and harmony were being newly investigated. Nemcsics thought that this variety of points of view and heterogeneous research results should evolve into a new science that he suggested calling Colour Dynamics. The aim of this new science was to gather together insights from different disciplines to create a theoretical and practical basis for the study of the relationship between colour, the environment and human response. In essence, environmental colour design concerned any design of the physical setting for human habitation and activities. As well, it also used to refer to aims and results in the applied arts and sciences in the creation of immediate manmade environments, such as in interior design and lighting design. More recently, however, the term implies ecological and sustainable design efforts including the protection of the environment and nature-friendly strategies. And lately, in terms of developments in the field of colour, colour design is playing a key role in creating ambience or atmosphere in indoor and outdoor spaces. Here the aim is to improve a sense of well-being and comfort through the construction of aesthetically appealing and environmentally friendly urban spaces. This presentation aims to explore different approaches to environmental colour design and glean answers to the question as to what role is to be attributed to theory in environmental colour design and how theoretical concepts relate to colour practices and colour applications in urban design, architecture, exterior and interior spaces.

**10:30, Invited Lecture**

**Color = Shape = Space: Sol LeWitt's Wall Drawing #736 "Rectangles of color".**

Renata Pintus

**Abstract:** The wall drawings are among the most famous works of the American artist Sol Lewitt (1928-2007), considered one of the founding fathers of Conceptual Art. Over the course of about 38 years he made about 3500 of them, considering the different versions, in 1200 different places, 350 of which in Italy where he chose to reside almost permanently after buying a house in Spoleto in 1982; the first are executed directly on the wall by the artist, but above all what makes these creations peculiar is the fact that very soon he chooses to deal exclusively with the project, delegating the realization of the work to specialized operators, each of whom interprets the instructions in a personal way. It is therefore a question of variable and multiple works, based on a principle of collaboration. To define this relationship between ideation and execution Sol Lewitt often used the metaphor of the musical score: "I think of them [the wall drawings] as a musical score that has to be remade by someone or by some people. I like the idea that the same work can exist in two or more places at the same time". During 2021 the Wall Paintings and Stucco Department and the Contemporary Art Service of the Opificio delle Pietre Dure intervened for maintenance on the wall drawing # 736 Rectangles of colour of the Luigi Pecci Center for Contemporary Arts in Prato, created in 1993: it was the opportunity for a comparison with this category of works by the American artist that have almost become "school" when we intend to speak of the paradigm change that certain part of contemporary art requires from a conservative point of view, because it escapes a concept of authenticity intended as an autograph. It is a long geometric frieze (in this sense a unicum in the conspicuous corpus of wall drawings by the artist) of which the rectangle represents the

basic modular element, repeated in the variations of size and color, designed to dialogue with the space a circular plan and also with the furnishings that it should have housed, obtained through the use, very unusual for a wall painting, of Drawing Ink Z® by Pelikan, usually used in architectural drawing and in four-color heliographic printing, for years out of production, characterized by a high resistance to light and capable of giving the painted surface an extraordinary almost translucent brilliance, similar to that of a fresco, applied by successive glazes.

To continue with the musical metaphor, Lewitt orchestrates an extraordinary symphony of colors with his wall drawings, in which each color, while maintaining its own individuality, contributes to the overall result.

This study and restoration work will be briefly discuss.

**11:30 Invited Lecture**

**COLOURING IN ARCHITECTURE: problems involving nocturnal representation.**

Emanuela Chiavoni

**Abstract:** The visibility of an architecture changes enormously throughout the day depending on whether the light source is diurnal or nocturnal, natural, artificial or mixed. Since perception of the same building changes, it is always necessary to experiment with suitable representation systems in order to convey these changes in colour. Several methods can be used to understand these effects; they include photography and all kinds of drawings, be they analogical or digital. The big difference in architectural representations is the contrast between light and shadow, the absence of colour, in black and white, and the descriptions of the different colour intensities and tones. Since daytime representations have been studied the most, even by this author, the contribution will focus on the nocturnal representation of architecture, a topic that still needs to be examined in-depth by anyone involved with drawing. I have chosen several subjects which I will draw at a certain time of night: the castle on the island of Patmos (Greece), the castle in the city of Blanca (Mursia region, Spain), and the Cathedral in Orbetello (Tuscany). Instead to express colour differences during the night, I have chosen just one subject that I can access more easily: a farmhouse in the hamlet of Titignano (Orvieto, Umbria). The goal behind all these graphic experiments is to try and represent on paper the numerous phenomena of light and colour, aspects that are always a priority compared to the form and intangible narrative of the architecture.

**12:15, Premio Colore 2022**

**Grazia Varisco**

**SESSIONE ORALE 2 (ITA)**

Temi di interesse: 1, 7, 8, 10, 11, 12  
**(AULA TORALDO)**

**14:00, Paper n° 13**

**Applicazione di camera iperspettrale per misure spettroscopiche e colorimetriche su superfici policrome in esterno con luce naturale.**

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**Abstract**

Questo studio è finalizzato alla definizione dei parametri di accuratezza, ripetibilità e riproducibilità dei dati acquisiti con la camera iperspettrale Specim IQ in indagini finalizzate al calcolo colorimetrico di superfici policrome in ambito architettonico in esterno con luce naturale e, successivamente, al confronto di tali dati con quelli ottenuti da strumentazione a contatto, come lo spettrocolorimetro Konica-Minolta CM700d.

Le misure colorimetriche vengono generalmente effettuate con strumenti dedicati, come colorimetri e spettrofotometri, che richiedono il contatto con la superficie e aree di copertura dell'ordine di decine di mm<sup>2</sup>.

Queste due caratteristiche, il contatto e un'area di analisi molto piccola, possono limitare fortemente lo studio delle superfici policrome, in quanto non è sempre possibile toccare gli oggetti analizzati e le aree misurate non sono necessariamente rappresentative dell'intera superficie.

Una possibile alternativa per superare queste limitazioni è ricorrere a tecniche di imaging per acquisire le misure a distanza e, al tempo stesso, coprire superfici più ampie del manufatto analizzato. Per avere una informazione spettroscopica addizionale, invece di una comune camera digitale, è stato deciso di utilizzare la camera iperspettrale compatta, Specim IQ, che consente di acquisire nell'intervallo operativo, 400-1000 nm, 204 bande con una risoluzione spettrale di 7 nm e un passo di acquisizione di 3,5 nm [1-3].

Per meglio indirizzare questa ricerca sono stati acquisiti, in prima istanza, i dati colorimetrici su standard di colore (8 campioni colore diversi) e di due tavolozze colore appositamente realizzate mediante uso di uno spettrocolorimetro; successivamente sono stati eseguiti, sempre sui medesimi campioni, una serie di test in esterno con luce naturale utilizzando la camera iperspettrale Specim IQ.

In questo modo è stato possibile definire le caratteristiche operative della camera iperspettrale per misure in ambiente esterno finalizzato allo studio del colore delle superfici policrome.

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### 14:15, Paper n° 86

#### **La salvaguardia della testimonianza documentale, l'evoluzione delle tecniche di coloritura e la modellazione del cavo urbano nel trattamento delle facciate sull'antica via Magistrale in Benevento.**

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#### **Abstract**

Benevento, città sannitica, romana, longobarda e pontificia: una lunga storia che ne ha plasmato il volto ed il carattere, ma non i caratteri. Il lavoro condotto su alcuni palazzi storici dell'antica via Magistrale (oggi corso Garibaldi) impone una doverosa riflessione: come mai le ricerche storiche e le indagini stratigrafiche approfondite non sempre approdano a scelte e risultati soddisfacenti? Dopo i terremoti del 1688 e 1703, un forte impulso alla ricostruzione fu dato dall'arcivescovo V. M. Orsini che fece giungere in città maestranze da Roma e Napoli. Questo giustifica in parte la sensazione di già visto priva di carattere della storia locale. Complici i lavori di ampliamento che interessarono l'arteria tra il 1880 e i primi anni del 1900: gli immobili prospicienti sulla via subirono il taglio di una porzione con conseguente rifacimento delle facciate che assunsero l'aspetto dai connotati umbertini, con l'utilizzo di stucco ed intonaco, i surrogati economici del marmo. Le possibilità di colorazione delle facciate si limitano alle tonalità proprie dei materiali imitati: il giallo e l'arancione per suggerire l'arenaria, il bianco o il beige per imitare il marmo o il travertino, il rosso per richiamare il laterizio, il grigio a imitazione dei rivestimenti in pietra Serena, il rosa come richiamo di antiche stratificazioni. I colori si ottenevano da pigmenti di natura minerale, quasi sempre ossidi, conferendo alle superfici risultati chiaroscurali di grande effetto. I problemi di percezione dell'antico nascono con l'avvento dei nuovi materiali prodotti dall'industria: la loro perfezione cromatica finisce per appiattire il respiro vitale fra il costruito e la vita vissuta dal costruito nel costruito. Senza considerare il rischio per la salvaguardia del dato storico come testimonianza documentale. Se è

scontato in un progetto di restauro partire da ricerche storiche, passare per indagini diagnostiche e approdare alla riproposizione delle cromie originarie, non può essere altrettanto scontato trascurare il paradigma estetico della globalizzazione specialmente quando è la committenza a dettare tempi e costi. Nell'azione di manutenzione delle superfici ci si chiede quale sia la giusta misura tra evoluzione e conservazione anche in funzione della fruizione del bene. La giusta metodologia richiede un approccio multidisciplinare: architetti, restauratori, archeologi, storici dell'arte, teorici della conservazione, sociologi e psicologi che si occupano di Beni Culturali devono partire dalle conoscenze storico-artistiche ma anche considerare le dinamiche che hanno condotto allo status quo. Il difficile compito di lettura e di interpretazione dei valori e delle prestazioni e la definizione delle trasformazioni necessarie per dare risposte alle nuove esigenze è specifica responsabilità progettuale; tuttavia la pluralità dei valori del patrimonio necessita di una partecipazione degli abitanti al processo di conservazione, oltre a quella degli specialisti.

**Keywords:** Benevento, restauro, evoluzione

**14:30, Paper n° 9**

**Architettura, il colore della grande dimensione tra ritmo e paesaggio.**

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### **Abstract**

Il colore è da sempre un parametro progettuale dell'architettura, declinato nel tempo, – ad esempio a partire dal Partenone policromo immaginato da Gottfried Semper – secondo principi molteplici. Il colore è uno degli strumenti disciplinari per decorare, ovvero per conferire alla costruzione decoro, e renderla appropriata alla sua destinazione.

La decorazione tuttavia non si risolve nei valori visivi o tattili che acquista la superficie dell'architettura. Ripetizione, ritmo e respiro sono la chiave della decorazione: un movimento vitale, un principio compositivo originario. La ripetizione è l'operazione che sta alla base, modulando un frammento generatore, del motivo architettonico. Correlato indispensabile, è il vuoto, la pausa che separa e contribuisce attivamente alla costruzione del ritmo.

L'architettura moderna, solo superficialmente nemica della decorazione, non ha mai abbandonato questi principi, anzi molte ricerche architettoniche del Novecento hanno rafforzato l'uso del colore come elemento privilegiato della decorazione, basti pensare alle palette di Le Corbusier, alle vetrate di Wright, per arrivare a Barragan capace di colorare il vuoto attribuendogli valori plastici autonomi. Progressivamente, ma forse in maniera più marcata a partire dagli anni Settanta, si è manifestata una nuova condizione architettonica, quella della grande dimensione e di un suo rapporto sempre più controverso, con il contesto che la circonda da una parte, e le funzioni che accoglie al suo interno dall'altra. Nel momento in cui l'opera di architettura supera una certa scala in relazione al suo programma o in relazione al luogo in cui si colloca, si innescando di conseguenza nuove relazioni tra la dimensione dell'architettura e il suo colore e ne nascono nuovi esiti.

Prologo di questa condizione sono le esperienze avanguardistiche di camouflage della prima guerra mondiale: i motivi Dazzle che trasformano le rotte della marina britannica in una performance vorticista a scala oceanica e lo zébrage cubista, che attraverso la decorazione il colore si pongono l'obiettivo di costruire l'invisibile.

Il colore, qualità tipicamente bidimensionale della materia architettonica, infatti quando supera una certa scala dimensionale acquisisce la capacità di incidere, letteralmente, lo spazio tridimensionale conferendo valori e qualità ulteriori alla materia architettonica e alle sue forme.

Lo studio attraverso l'individuazione di tre opere ritenute esemplificative (M9 - il museo del Novecento come opera civile, il Cementificio Lafarge sul lago d'Iseo come manufatto industriale, e il Trieste Airport come infrastruttura) intende esplorare le potenzialità dell'uso del colore e della sua applicazione in termini ritmici, come elemento caratterizzante della forma architettonica e del suo inserimento nel contesto alla scala della città e del paesaggio, riconoscendo una relazione diretta, percettiva, formale, tra l'opera, l'essere umano e il contesto.

**Keywords:** architettura, grande dimensione, colore, ritmo, paesaggio

**14.45, Paper n° 80**  
**Emotional Color Design**

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**Abstract**

La nostra percezione del mondo è da sempre fondata su diversi sensi. Il colore, attraverso le sue informazioni visive, domina e fornisce le prime impressioni, mentre gli altri sensi (udito, gusto, olfatto e tatto) configurano l'esperienza complessiva. Il design sensoriale, grazie al colore, gioca un ruolo importante: fornisce funzionalità mentre crea carattere attraverso attributi estetici. Il colore diventa allora un linguaggio che non usa le parole per esprimersi - anche se, negli ultimi anni, tutte le aziende principali che trattano l'argomento - dagli istituti di ricerca ai produttori di pigmenti, inchiostri, vernici, tessuti e altro - cercano la giusta definizione che possa descrivere quella specifica sfumatura - per raggiungere i sensi e risvegliare emozioni lanciando il loro "colore dell'anno" al termine di ricerche che si basano sull'analisi di diversi fattori, storici, sociologici, culturali, di marketing e molto altro. Il *designing*, che permette di soddisfare i consumatori, richiede ulteriori informazioni attraverso i diversi sensi umani. L'articolo intende esplorare come il colore, attraverso esperienze multisensoriali nell'interazione uomo-computer, può essere un nuovo strumento proposto per la progettazione di prodotti emozionali. I designer possono esplorare il colore, la consistenza, la finitura e altre modalità sensoriali in diversi materiali e contesti nell'ambiente dello studio grazie ad alcune esperienze di percezione aptica attiva attraverso oggetti stampati in 3D tangibili con colori visivi ed emozionali.

**Keywords:** design, color, emotional, 3D print.

**15:00, Paper n° 84**  
**I colori del Giappone: gradazioni, accostamenti, sovrapposizioni**

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**Abstract**

La cultura giapponese è da sempre apprezzata per la sua produzione artistica, di design e architettura intrinsecamente connessa ai temi del colore e della luce e l'aspetto interessante è che si potrebbero individuare due vie quasi opposte e allo stesso tempo parallele d'espressione che hanno dato vita a prodotti completamente diversi ma di grande impatto internazionale: da una parte si percepisce una quasi negazione del colore, che si concretizza nella sintesi di tutti i colori nelle gradazioni del nero-grigio dell'inchiostro in pittura, o dell'ombra (vedi Tanizaki Junichirō, *In'ei raisan* (Libro d'ombra)) quando si tratta invece di un ambiente come ad esempio una stanza del tè; dall'altra si può individuare una tendenza verso l'esplosione del colore che gioca sugli accostamenti e le sovrapposizioni di toni (*kasane no irome*), e in questo senso aiuta l'immagine della silografia della "Grande Onda" di Hokusai, ma anche delle gradazioni di colore create dai multipli strati di kimono del vestiario tradizionale. Il presente paper intende dunque analizzare l'approccio peculiare della cultura giapponese verso l'uso e la ricezione del colore nella sua evoluzione, sottolineando da una parte le origini legate al rapporto con il mondo della natura e dall'altra la sua manifestazione nell'ambito delle arti e del design (Rossella Menegazzo, IRO. *The Essence of Colours in Japanese Design*).

**Keywords:** Giappone, colore, ombra, *kasane no irome*, design, *Iro*, inchiostro, Tanizaki Jun'ichiro

## 15:15, Paper n° 6

## Problemi aperti relativi all'uso dei colori nella didattica della matematica.

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**Abstract**

Sin dai primi anni di scolarizzazione, l'introduzione di nuovi oggetti di conoscenza è spesso accompagnata dall'accostamento degli stessi con colori: è frequente l'uso di colori per identificare lettere, numeri e figure (Suero et al., 2005). Nelle classi, è usuale notare cartelloni o altri materiali in cui i colori sono usati per distinguere le diverse parole in una frase o identificare il ruolo delle cifre in un numero.

Alcuni autori che sostengono che il daltonismo comporti difficoltà nel successo scolastico (e.g. Dannenmaier, 1972; Gordon, 1998; Harrington et al., 2021). Tuttavia, le strategie compensative sviluppate dai bambini possono essere sufficienti a colmare il gap (Lampe, 1973). Il fenomeno è diverso a seconda dell'età degli studenti e della disciplina d'insegnamento. Nella scuola dell'infanzia, Suero et al. (2005) notano che i bambini daltonici hanno prestazioni peggiori nella memorizzazione se i colori sono coinvolti. Grassivaro-Gallo et al. (1998; 2002) notano che tra gli studenti italiani tra i 10 e i 15 anni, le differenze di prestazione sono peggiori sia per protoanopi sia per deuteranopi nel caso della letteratura e della matematica. Nell'analizzare i libri rivolti ai bambini, Torrenz e colleghi (2011) notano che quelli di matematica presentano maggiori difficoltà per un daltonico.

A questo aggiungiamo che spesso un'anomalia nella percezione del colore è diagnosticata in età avanzata. Questo anche perché i risultati scolastici del bambino possono apparire comunque nella norma per via dei complessi meccanismi di compensazione messi in atto dal daltonico, meccanismi ancora lontani dall'essere compresi nella loro interezza (Scipioni et al. 2021).

Dato che, ad oggi, si hanno poche informazioni sulle azioni che i docenti intraprendono in favore degli studenti daltonici (Grassivaro-Gallo et al., 2002; Pinner, 2021), la ricerca intende studiare, con un approccio *mixed-method sequenziale*, la consapevolezza degli insegnanti rispetto al daltonismo. Le domande di ricerca sono: gli insegnanti di scuola primaria sono consapevoli delle difficoltà che gli studenti con discromatopsia affrontano nello studio della matematica? Quali strategie o materiali alternativi adottano? I dati sono analizzati per mezzo di software di analisi quanti-qualitativa. A seguito di un successivo intervento formativo, sarà chiesto ai docenti del campione – insegnanti volontari afferenti al progetto *Numeri e Pedine* ([www.numeriepedine.it](http://www.numeriepedine.it)) – di identificare strategie per proporre una didattica inclusiva anche degli studenti daltonici, anche non ancora diagnosticati.

A conclusione dello studio, sono proposte prime raccomandazioni sul tema della formazione e delle azioni che i docenti possono intraprendere in favore degli studenti con daltonismo. Tali indicazioni saranno considerate per la definizione di un disegno di ricerca-formazione che permetta di affrontare il tema della didattica inclusiva considerando anche la valutazione/autovalutazione come strumento di apprendimento.

**Keywords:** color and education, color and physiology, color blindness

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**15:30, Paper n° 74**

**I manifesti di Leonetto Cappiello e Jean d'Ylen: il colore diventa protagonista.**

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**Abstract**

Nell'ambito della moderna cartellonistica pubblicitaria è indubbio che a gettarne le basi furono i francesi Jules Cheret e Henri Toulouse Lautrec. Sul finire del XIX secolo i muri delle strade furono ricoperti di manifesti, vivaci, accattivanti, coloratissimi: il passante, frettoloso e distratto, va attratto da figure seducenti, dinamiche, dai colori sgargianti. Sono tanti i "poster-artist" o "affichist" che seguiranno questo solco, preferendolo all'altro, tracciato da autori quali Adolf Mucha o Henri Privat-Livemont che contrapponeva alla sinteticità del messaggio, il fascino della bellezza, la ricchezza della decorazione, i tenui colori pastello.

Ma queste differenti modalità espressive sono rese possibili solo grazie alle nuove tecniche di stampa, ad esempio la cromolitografia, che nella seconda metà del XIX secolo aprirono orizzonti sino ad allora inimmaginabili, permettendo di realizzare manifesti dai diversissimi tratti grafici e dalle illimitate gamme cromatiche.

Ad assicurare la diffusione del manifesto pubblicitario sono alcuni grossi stabilimenti tipografici, che agli inizi del XX secolo, ampliarono le loro competenze, dedicandosi, oltre alla stampa, al procacciamento di nuovi clienti, assicurando ai grafici continue committenze.

Tra queste a Parigi emersero l'*Imprimerie Établissements Vercasson* e la *Maison Devambez* di fatto tra le prime vere agenzie pubblicitarie, con diverse filiali dentro e fuori Europa.

Nella Vercasson nel 1900 fa il suo esordio come "*matre affichiste*" il livornese, naturalizzato francese, Leonetto Cappiello, per una collaborazione che si protrarrà sino all'avvento della I° Guerra Mondiale; il suo posto dal 1919 sarà preso da Jean d'Ylen (pseudonimo di Jean Paul Béguin) praticamente sconosciuto sino ad allora.

Sono certi il prestigio, la qualità e la competenza di Cappiello (di dieci anni maggiore rispetto d'Ylen), ma appaiono innegabili i numerosi aspetti che li accomunano. Entrambi disegnano i loro soggetti con una *verve* umoristica, quasi delle caricature, figure pieni di dinamismo, che ricordano le istantanee fotografiche, ma è soprattutto la scelta dei colori che li accosta.

È il colore che permea le loro pubblicità: dal fondo scuro della scena si stagliano i loro personaggi, dai fondali neri emergono figure dagli abiti coloratissimi, che giocano con i contrasti dei colori complementari. Il rosso e il verde, il blu con l'arancio, un bianco con pennellate di un giallo appena accennato risaltano dal nero di sfondo, come le scritte realizzate in un giallo che spazia tra il limone e il cromo intenso. Le loro scelte cromatiche sono libere ed estroverse, elefanti vermigli, cavalli rossi o verdi, animali, vegetali e oggetti dalle più svariate tonalità, quasi tutte non convenzionali: il colore diventa protagonista.

**Keywords:** Leonetto Cappiello, Jean d'Ylen, cartellonisti, manifesti pubblicitari

**15:45, Paper n° 27 (short presentation)**  
**IL COLORE DEL VASTU – Progettazione di un appartamento in India.**

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**Abstract**

Il presente lavoro affronta la ristrutturazione e l'arredamento interno di un appartamento per docenti nel Campus universitario del Thapar Institute of Engineering & Technology di Patiala, in India. Attualmente gli alloggi sono consegnati completamente vuoti ai futuri inquilini, che si trovano costretti a provvedere autonomamente al relativo allestimento, con la difficoltà di non conoscere la lingua né dove poter acquistare, essendo appena arrivati.

L'obiettivo è quello di creare un appartamento con una fornitura basilare, da riproporre successivamente in tutte le abitazioni del campus per facilitare il soggiorno dei docenti che giungono qui da tutto il mondo. Per rispettare la cultura e le tradizioni del luogo, molto forti in questo Paese, si è voluto progettare uno spazio abitativo in grado di coniugare al meglio la cultura indiana ospitante con le esigenze e le aspettative della vita occidentale.

La disposizione degli ambienti interni, i colori degli spazi e le relative luci sono stati studiati per rispettare i principi del Vastu, antica tecnica del costruire e dell'abitare che insegna come migliorare il flusso di energia positiva all'interno degli edifici e ridurre quella negativa. Secondo questa filosofia, ogni direzione cardinale è governata da un elemento, al quale stanze ed ambienti devono allinearsi. Il Vastu Shastra ha origini antichissime, risalenti ad almeno 5.000 anni, e si basa su precetti nati da una visione tradizionale del mondo ove le leggi della natura influenzano le abitazioni umane attraverso modelli impostati sugli allineamenti direzionali. Tale dottrina fornisce indicazioni precise riguardo sia l'ubicazione delle destinazioni d'uso dei locali sia il colore degli stessi, tutto in base all'orientamento cardinale. Ad esempio la cucina si trova a sud-est mentre la sala da pranzo va posizionata a nord-ovest, le camere da letto si possono collocare sul lato nord o sud oppure ovest, la stanza di meditazione è sempre a nord-est. Ad est si prediligono colori caldi come oro rosso e giallo mentre ad ovest sono indicati il blu e tutte le sue sfumature, il marrone o il grigio; a sud si può optare per i colori del fuoco come il rosso ma anche il nero o il verde, al contrario a nord è possibile scegliere tra le tonalità marroni o gialle oppure verde o grigio.

Utilizzare la tecnica del Vastu in un immobile precedentemente costruito non è facile, ma per fortuna gli alloggi in esame già soddisfano abbastanza i criteri del Vastu.

Il progetto ha incluso anche la scelta e la disposizione degli arredi, ricercati di forme semplici e pulite, dalle linee squadrate come richiede il Vastu; si è preferito optare per aziende italiane per rappresentare la collaborazione e la connessione tra i due Paesi.

Infine, la proposta prevede di occuparsi anche dell'illuminazione funzionale e decorativa degli ambienti con lo scopo di soddisfare i principi di confort visivo e di rispetto delle funzioni circadiane dell'uomo.

**Keywords:** Vastu, India, abitazione, colore ambienti, cultura indiana



## **ORAL SESSION 3 (ENG)**

Topic of interest: 8  
(AULA FERMI)

**14:00, Paper n° 10**  
**Colors in Architecture: matter and communication tool.**

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### **Abstract**

The architect Rem Koolhaas recognizes two types of colors in architecture; ones that are linked to the raw materials and their natural physical appearance, and the ones that are layered on and have the ability to change appearance. Naturally the use of one or the other involves a different design approach.

In the first case, the search of the architect is based on a material choice, on the specific qualities needed to bring out certain aspects of the architectural project. In the case of Frank Gehry for example, the priority is the plasticity aspect along with the idea of movement through the use of convex, concave and angular shapes. The materials change depending on the project, each material is chosen to emphasize the complexity of the shapes for his buildings.

Mario Botta favors almost exclusively the use of visible natural materials like stone and bricks, in order to enhance form. His choice in material is linked to the search for depth and thickness of the wall. The wall is for Botta an important element, not only static and technical but a spatial entity. For this reason, his works convey feelings of durability and solidity, only achievable through the textures of such materials.

Tadao Ando focuses his architectural design efforts on light and matter. Ando is a master in the technique of the reinforced concrete, and it is a way for him to connect back to traditional Japanese architecture, monochromatic with an infinite variation of shades and tones.

Jean Nouvel, differently, prefers the use of the applied color. The design strategy changes drastically as it becomes an additional part of the architectural project. In each work Nouvel investigates ways to emphasize the genius loci, coming up with concepts that are able to evoke emotions through the poetic of color that "is either intensified, the monumentality of black heightened by the stark introduction of red, or else tends towards an immateriality".

For Will Alsop, the use of color is strongly linked to his design process, developed over the years but that almost always includes collaboration with artists. His view on architecture is similar to that of a sculptor, colors are a way to express irony and cheerfulness.

When imagining the work of Norman Foster, color might come as an afterthought but, in his book Norman Foster: 30 colours, one is perhaps surprised to find that the previous statement is not entirely true. Foster's use of color is definitely moderate and sparks an interest for where and how it will be used. Perhaps Paul Overy best describes Foster's use of color as the human component, the element of nature, opposed to the culture of materials and structure.

By comparing these two uses of color it is clear to see how one is more intentional than the other but the results of both, for different reasons, still resonate with the observer as they both achieve the architect's wish to communicate emotions.

**Keywords:** architecture, materials, communication, design process, form, color

**14:15, Paper n° 41**

**Eidomatic experimentations on alteration of spatial perception by using colours.**

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**Abstract**

Several contemporary architectural manuals contemplate the manipulation, through chromatic solutions, of volumetric and spatial perception of buildings and locations: these include the famous example of E. Neufert's 'Bauproduktionslehre'. In fact, right after covering geometric and biodynamic relationships between humans and edifices, Neufert deals with the topic of visual perception. On the one hand, he revisits the practical rules of optical corrections by contrast between foreground and background elements: these are techniques already adopted by the Ancient Greeks in the construction of temples and observed by architectural historians such as B. Fletcher. On the other, he takes up the Theory of Colours, articulating it succinctly between the models of J. W. von Goethe and J. Itten. Also in the course of the 20th century, the rise of Gestalttheorie and Abstract Art led to a redefinition of the influence of colour on perception of space and movement: this was in fact an analytical parameter of the critical vision proposed by R. Arnheim, as well as one of the central themes of J. Albers' artistic and theoretical activity. As an example of this interpretation, it is sufficient to think of the impact between adjacent colours and its resulting perspective effects: just as relatively warm colours compared to their context give the impression of expanding or advancing towards the observer, relatively cold colours appear to shrink or recede. In the second half of the 20th century, advances in photometry, medicine, psychiatry and psychology made it possible to investigate these phenomena further, even analysing them from an ophthalmological and neurological perspective. The results of these recent studies, which are obviously characterised by a strong scientific imprint, are new chromatic effects and new classifications of optical illusions. In particular, the work of psychologist A. Kitaoka is based on a precise cataloguing of colour illusions which, starting from two-dimensionality, alludes to spatial building of solids: it therefore consists in a full-fledged Gestalt reading and interpretation of colour. Similar examples can be found in the artistic production of G. Sarcone, which is ludically marked by Op-Art and recreational mathematics, but for this very reason also characterised by a greater propensity for spatiality and design. The aim of this paper is therefore to study potential applications of these optical chromatic effects in Architecture, evaluating their influence on volumetric and spatial perception of the user. Therefore, in addition to a review of existing literature, the authors set themselves the following objective: constructing virtual graphic models that will allow the transposition of such optical illusions and perspective effects from a two-dimensional space to a three-dimensional space, especially in relation to architectural scale and functionality.

**Keywords:** representation of architecture, visual perception, colour perception, optical illusions, eidomatics

**14:30, Paper n° 49****Felting wool dyed with natural dyes.**Ana Sutlović<sup>1</sup>, Martinia Ira Glogar<sup>1</sup>, Vedrana Gašpić<sup>1</sup><sup>1</sup>University of Zagreb Faculty of Textile Technology, Prilaz baruna Filipovća 28a,  
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**Abstract**

Starting from the basic idea of ecologically safe production, the possibilities of using natural materials to create aesthetic and useful handmade eco-products are explored. Thus, natural dyes were the logical choice for dyeing natural protein fiber - wool. The wool of Croatian Pramenka sheep from the island of Cres was used, and plants that thrive in Croatia served as the source of natural dyes. The problem of wool as unwanted waste, which exists today on our islands, was an even greater motivation to use the wool from Cres. Considering its alleged poor quality, i.e. a fineness that does not meet the requirements of the textile industry (because it is coarse and full of dirt), the wool from Cres is not very interesting, so after shearing it is scattered on the pastures of the islands. This is very harmful to the environment, because the wool does not completely decompose in nature and hinders the growth of vegetation in the place where it is scattered. Plants characteristic of traditional Croatian handicrafts were used for dyeing: walnut shells (*Juglans regia* L.), oak bark (*Quercus robur* L.), yarrow leaves and flowers (*Achillea millefolium* L.), nettle leaves (*Urtica dioica* L.), chamomile flowers (*Chamaemelum recutita* L.), marigold flowers (*Calendula officinalis* L.) and flowers and leaves of St. John's wort (*Hypericum perforatum* L.). Pre-treatment of wool with metal salts was carried out at 100 °C for 60 minutes with the addition of 2% metal salts (mordants) and 5 g/l tartaric acid (pH 4.5). The following metal salts were used as mordants: copper(II) sulphate pentahydrate p.a. (Cu ion), potassium aluminium sulphate dodecahydrate p.a. (Al ion), and iron(II) sulphate heptahydrate p.a. (Fe ion). The wool, which took on a whole range of pleasant earth tones as a result of dyeing, was transformed into a work of art by the felting technique. The felting was performed by wet and dry felting. The motifs of the individual felt works tell the magical story of the island of Cres. The images created by felting waste wool dyed with vegetable dyes are an example of good practise of the circular economy.

**Keywords:** natural dyes, wool, felt, circular economy**14:45, Paper n° 56****UrbanCroma, Chromatic Methodology, the results of a post-Doctoral research.**Margarida Gamito<sup>1-2</sup>, Fernando Moreira da Silva<sup>1-2</sup><sup>1</sup> CIAUD, Research Centre for Architecture, Urbanism and Design, Lisbon School of Architecture,  
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**Abstract**

This paper presents UrbanCroma, a chromatic methodology implemented during a post-Doctoral theoretical-practical work. This methodology was firstly developed during a PhD. The main aim of the post-Doctoral applied investigation was to test and validate this new methodology. With this purpose it was used in urban furniture chromatic plannings for two Municipalities in the Lisbon surroundings: Oeiras and Loures. UrbanCroma mainly intention is to be applied in the elaboration of chromatic plans for urban furniture, whose needs do not completely correspond to those proposed by other existing methodologies, destined almost exclusively to be applied to the built environment. Therefore, its chromatic plans allow the full performance of Urban Furniture functions, improving its use and transforming it in a factor of inclusivity, as its elements will become more visible and legible. Simultaneously, this methodology works as a factor of identification and orientation, since its elements will constitute harmonic chromatic sets that, although establishing a strong contrast with

the surrounding environment, identify the neighborhoods or urban areas and, by their variation, constitute orientation landmarks throughout the city. In the research process, were chosen three different localities in each one of the Municipalities which constituted the case studies, where the UrbanCroma application starts by choosing samples areas, which will encompass the case studies most representative zones, applying there the new methodology to all furniture elements, in order to increase their potentiality as relevant issues for city color planning. In all these intervention areas, all the colors present in the environment are recorded, being it built or landscape, taking in account all the changes due to climatic variations and the non-permanent colors, whose presence has enough importance to be considered as environmental colors. All these colors were, then, registered in files and maps, in order to create a data-base allowing the identification of all environmental colors. The set of these colors permitted the establishment of the local dominant colors and, these ones, along with the contribute of the local history and culture, constitute the scientific basis upon which, it was established a very comprehensive urban furniture chromatic plans for both case studies. In complement, as each locality had a correspondent in the other municipality, it was also possible to compare the different urban plans included in the research.

**Keywords:** color, methodology, urban furniture, inclusivity

### 15:00, Paper n° 65

#### **Plants out of place? A design-driven investigation of colours and material possibilities within the group of “alien invasive plants” in a Norwegian context.**

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#### **Abstract**

How do we plan and facilitate the production of goods and services for a growing human population, living on an altered and depleted globe? The climate crisis and biological mass extinction, the global pandemic and the unstable political landscape all indicate an urgent need to re-think production and consumption. Although this may seem like an overwhelmingly complex task, we are witnessing a positive trend towards innovative and visionary thinking across disciplines. Design is a discipline that bridges industry, crafts and science. Through its functionality, creativity, and storytelling, design has the potential – and responsibility – to be an engine for transformation. As an industrial designer and researcher, my focus and area of investigation and specialization has evolved towards concepts and visions for regenerating, reconnecting and rebuilding. One method I have chosen for approaching these complex issues has been to start digging in my own backyard, both literally and metaphorically. In my ongoing, practice-led, PhD project “The Settlers – towards new territories in design” I am investigating the handling of so-called “alien invasive plants” in Norway, and whether a reverse perspective can trigger new knowledge and actions. “Weed” is not a scientific term, but can be used to describe any plant growing in a place where it is not wanted – any plant that is considered out of place. “Alien Invasive species” are defined as non-native organisms that have become overpopulated and that adversely impact their new environments. Even a hundred years after their arrival, such species are still perceived as strangers. Their presence becomes challenging for native species, farmers or landowners, and their removal is time-consuming and expensive. Yet, rather than attempting to eradicate such species entirely, could a focus on their positive idiosyncratic qualities bring stimulating possibilities for future coexistence, local production prospects, or foraging for food, crafts and other applications? During the first half of the project, plants ranked with the highest risk assessment have been mapped and ordered using new and alternative parameters: edibility, health benefits, pigment, fibre or wood applications, and potential environmental benefits. This paper will focus on the preliminary results regarding possible colour applications represented by this group of plants. Along with the mapping, observations and experiments have been carried out in order to gather in-depth insight. Examples of textile dyeing with various mordants, and pigment-extractions serve to materialize and validate the collected data, and present the beautiful colour varieties of these plants.

**Keywords:** design research, ecology, alien invasive plants, colour applications, zero waste, coexistence

**15:15, Paper n° 66**

**Colour Composition and Visual Tectonics in Facades; Adapting Colour Teaching to Current Architectural Practice.**

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**Abstract**

In Norway, this last decade has seen a steadily increasing demand for knowledge of how to use colour in an architectural context, and this paper will focus on the application of colour theory in building façade design.

In architecture, colour theory is a body of practical guidance to the visual effects of a specific colour combination creating a logical structure for colour, how we can organize them, and how colours can be used to enhance architectonic intent.

Tectonics in architecture is defined as “the science or art of construction, both in relation to use and artistic design”. It refers not just to the “activity of making the materially requisite construction that answers certain needs, but rather to the activity that raises this construction to an art form.” Current architectural education largely focusses on the tectonic, as in relating to building and construction, and on the formal aspects of the visual tectonic, but until very recently, the teaching has devoted little focus to the visual tectonics of colour. As research estimates that approximately eighty percent of our perception, learning, cognition, and activities are mediated through vision, with form and colour being a key feature, it could be argued that we should put more emphasis on the visual qualities of colour of architecture, i.e., inherent or applied.

This paper will discuss how developing an understanding of colour theory and implementation relevant to architectural education and practice in Norway is changing both students and professional practitioners’ attitudes towards the use of colour in architectural projects, giving examples from the recent years colour teaching at NTNU and professional implementation by the authors.

**Keywords:** colour in architecture, colour theory, façade design, visual tectonics, advancing and receding colours

**15:30, Paper n° 77**

**The Face of Molde High Street.**

Mette L’Orange, KHIO

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*Research conducted in connection with the restoration of architectural polychromy in Norwegian cities rebuilt after the 2. World War, with focus on the Main Street of Molde.*

The main street, with its tight composition and clearly defined building volumes and urban spaces, forms the core of the reconstruction of Molde. It was planned by architect and professor Sverre Pedersen in the late 1930s, and a revised version was therefore quickly adopted by “Burnt Cities Regulation” after the bombing of Molde in 1940. The modern street was built with sober mineralite plastered volumes or facades painted in rich traditional hues, now listed as a protected zones by the Norwegian Directorate for Cultural Heritage

Over the years, many of the buildings have acquired seemingly random, and sometimes unfortunate, gloomy colours and surface structures.

In 2017 the Municipality decided to raise the quality and uniqueness of the centre of Molde. One of the initiatives was to produce (reproduce) a colour palette for the facades of the Main Street, accompanied by an additional guide for materiality, secondary colours, and other building elements, such as canopies, window frames, railings, signage, etc.

The project was led by the Planning Department, with architect Lone Kjersheim (project manager), in collaboration, (also financially) with the Department of Building Protection in Møre og Romsdal County and the Norwegian Directorate for Cultural Heritage.

The actual plan was developed by the authors of this paper, artist Bent Erik Myrvoll and artist/architect and professor of colour Mette L'Orange.

The colour plan is based on a cultural-historical analysis. Uncovering historical colour layers in most of the buildings has revealed a unique platform for both restoring and developing the architectural polychromy of the street. Existing palette was mapped accordingly. The results of the analysis were matched against texts and images from the post-war years (though hand coloured), as well as paintings by local artists, more as inspiration than as verification.

A synthesis of all information has produced the final result.

The technical methods used gave us the physical structure of the colours, the thickness of the layers/the mineralite as well the plasters, the sand curves / lime / cement etc.

The hues, the binders, the pigments, and the granular qualities of the particles in the coatings have been considered.

With this broad information we discuss how to describe the colours and coloured plasters and transform the information into appropriate contemporary materiality for the homeowners. Is it possible in a largescale project to avoid the conventional way of matching the findings to existing references in colour notation systems? This reduces and disembodies colour, and represses information necessary to restore and understand the full effects of the original palette. We are discussing other ways of conveying and using historical polychromy.

**Keywords:** colour plan, historic colours, restoration, transformation

**ORAL SESSION 4 (ENG)**

Topic of interest: 1, 4  
(AULA TORALDO)

**16:10, Paper n° 48**  
**Simultaneous contrast in screen printed patterns.**

Marijana Tkalec<sup>1</sup>, Martinia Glogar<sup>1</sup>, Ana Sutlović<sup>1</sup>

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**Abstract**

The paper investigates the phenomenon of visual color change that occurs on a sample of printed printing paste of identical composition containing pigment CHT Colormatch 740 Schwarz in the mass of 30 g of pigment per 100 g of basic, industrially prepared printing paste for coverage pigment printing. The basic printing paste intended for pigment printing on darker colored substrates contains in its composition the white pigment titanium dioxide TiO<sub>2</sub>, which makes it impossible to achieve a black achromatic hue, but the visual impression of dark gray is achieved. After applying the same printing paste (prepared as mentioned) on substrates of black and magenta color hues, a strong simultaneous contrast occurs and visually completely changes the appearance of the printed color in the context of lightness. While on a magenta background the print looks completely black, on a black background the visual appearance of the color is much lighter. Simultaneous contrast is one of the basic properties of human visual perception and can manifest as a visual change in the hue, lightness or saturation (chroma) of colors that stand next to each other or are combined in a relationship of background and dominant color. One of the characteristic phenomena of simultaneous contrast is the illusion of a complementary color relationship. But simultaneous contrast is also manifested through the phenomena of induction and assimilation of color. Color induction implies the effect of enhancing color brilliance depending on the influence of the background, without visual changes in the color hue, while color assimilation implies a visual change in color hue from the aspect of analogous relationship. Printing in this paper was carried out for the purpose of patterning materials for the collection of backpacks, and a similar effect occurs when applying printing pastes in a hue of magenta. In addition to visual analysis, color objectification was performed on the samples based on spectrophotometric measurement and presentation of results according to the CIELAB evaluation system and through the values of color depth K/S. Microscopic imaging of the surface was performed to assess surface coverage and layer uniformity, and in the process of visual analysis, not only the impact of the substrate was assessed, but also the surrounding colors (contours) surrounding the main print.

**Keywords:** simultaneous contrast, screen printing, pigments, color evaluation

**16:25, Paper n° 76**

**Effects of tinted lenses on chromatic sensitivity: changes in colour vision assessed with the CAD test, a preliminary study.**

Lucia Natali<sup>1</sup>, Alessandro Farini<sup>1,2,3</sup>, Elisabetta Baldanzi<sup>2,3</sup>, John Barbur<sup>4</sup>

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**Abstract**

The aim of this study was to assess the extreme effects of tinted lenses on colour vision by examining changes in chromatic sensitivity when viewing visual displays through a slightly tinted ('blue-blocking') filter and through a heavily tinted, 'orange' coloured filter. The CAD test was used to measure both red / green (RG) and yellow / blue (YB) chromatic sensitivity in ten subjects when viewing visual displays through each of the two filters. The measured RG and YB colour thresholds were then compared with similar measurements made without coloured filters in front of the eye. The blue-blocking filter absorbs only a small amount of short-wavelength light whilst the 'orange' filter attenuates preferentially shorter wavelength and some middle-wavelength light. The results show that the blue-blocking filter does not affect significantly either RG or YB colour vision. The orange filter, on the other hand, causes large changes in colour discrimination. The results were analysed statistically by comparing results obtained with the coloured filters with those measured without any filters in front of the eye. More experimental work is now needed to establish how much short wavelength light can be removed without affecting significantly the subject's colour discrimination performance.

**Keywords:** anomalies of colour vision, filtering lenses.

**16:40, Paper n° 11**

**The gray side of Ishihara bubbles.**

Reiner Eschbach<sup>1</sup>, Alice Plutino<sup>1</sup>, Luca Armellin<sup>1</sup>, Alessandro Rizzi<sup>1</sup>

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**Abstract**

In this paper, we present a novel experiment on a modified Ishihara-like series of plates for color deficiency screening. This is a further experiment in the direction of exploring the spatial modifications of this classic test so to explore the role of visual spatial arrangement in the assessment of normal and color deficient observers. In this work, we present the test setup with some preliminary results on normal color vision observers.

**Keywords:** color deficiency, color blindness, Ishihara plates



**16:55, Paper n° 25**

**Online games for colour deficiency data collection.**

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**Abstract**

Trying to investigate the role of edges in the color perception of color vision deficient people requires complex unstandardized setups, possibly leading to longer and more challenging tests. Besides the fact that only less than a tenth of the western population shows some form of color blindness, adding inherent complexity to test setups may likely worsen the scenario and further reduce the availability of test subjects. A possible solution might come from the development of web-based tests, which on the one hand makes it easier for a subject to be enrolled in a study, on the other introduces variability in the form of different devices, environmental and viewing conditions. Not being able to directly monitor a subject also makes it impossible to evaluate its attention and motivation, which likely have a role in the accuracy of the responses given.

In this study, we are investigating the usage of a specifically designed web-based game as a source for larger amounts of data related to color perception; the idea is to exploit the potential of games to become viral and collect large amounts of data with little effort while at the same time addressing variability by means of averaging the outcomes over a large set of test subjects. Developing simple and engaging games might also solve the issue of low motivation and attention, giving to the test subject a reward in the form of entertainment and progress in the game.

**Keywords:** color deficiency, color blindness, color perception.

**17:10, Paper n° 37**

**Loss of colour and flicker sensitivity in subjects at risk of developing diabetes.**

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**Abstract**

The primary purpose of this study was to investigate whether clinically normal subjects, but at risk of developing diabetes, show significant loss of colour vision or / and rapid flicker sensitivity with either rod- or cone-enhanced stimuli. Previous studies carried out in diabetic patients with no retinopathy revealed significant loss of chromatic sensitivity ranging from just below normal limits to complete absence of both Yellow/Blue (YB) and Red/Green (RG) chromatic sensitivity (Andrade et al., 2014, Gella et al., 2015, Gualtieri et al., 2013, Shoji et al., 2011). This study examined whether subjects who are simply at risk of developing diabetes exhibit any significant losses of either colour vision, rapid flicker sensitivity of spatial vision when compared to age-matched controls.

**Keywords:** acquired color vision loss, diabetes, color vision deficiency, color assessment

**17:25, Paper n° 50****Foveal cone structure in patients with blue cone monochromacy.**

Emily Patterson\*<sup>1</sup>, Angelos Kalitzeos<sup>1</sup>, Thomas Kane<sup>1</sup>, Navjit Singh<sup>1</sup>, Mark Pennesi<sup>2</sup>, Alison Hardcastle<sup>1</sup>, Jay Neitz<sup>3</sup>, Maureen Neitz<sup>3</sup>, Michel Michaelides\*<sup>1</sup> and Joseph Carroll\*<sup>4</sup>

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**Abstract**

**Purpose:** Blue cone monochromacy (BCM) is a rare inherited cone disorder in which both long- (L-) and middle- (M-) wavelength sensitive cone classes are either impaired or non-functional. Assessing genotype-phenotype relationships in BCM can improve our understanding of retinal development in the absence of functional L- and M-cones. Here we examined foveal cone structure in patients with genetically-confirmed BCM, using adaptive optics scanning light ophthalmoscopy (AOSLO). **Methods:** Twenty-three male patients (aged 6 – 75 years) with genetically-confirmed BCM were recruited for high-resolution imaging. Eight patients had a deletion of the locus control region (LCR) and 15 had a missense mutation, Cys203Arg, affecting the first two genes in the opsin gene array. Foveal cone structure was assessed using confocal and non-confocal split-detection AOSLO. Axial eye length was measured and used to scale all images.

**Results:** Only 1/8 patients with LCR deletions and 10/15 patients with Cys203Arg mutations had analyzable images. Mean total cone density for Cys203Arg patients was  $16,609 \pm 11,162$  cones/mm<sup>2</sup> (n = 10), which is, on average, around 40% of normal. Waveguiding cone density was  $1,814 \pm 981$  cones/mm<sup>2</sup> (n = 9), which was consistent with published histological estimates of S-cone density in the normal eye. The one patient with an LCR deletion had a total cone density of 9,834 cones/mm<sup>2</sup> and waveguiding density of 968 cones/mm<sup>2</sup>.

**Conclusions:** Our results show that BCM patients with LCR deletions and Cys203Arg mutations have a population of non-waveguiding photoreceptors, although the spectral identity and level of function remain unknown.

**Keywords:** colour vision, retina, cones, X-linked, blue cone monochromacy, adaptive optics, retinal imaging, genotype, phenotype

**17:40, Paper n° 58****Changes in the 'conspicuity' of coloured objects caused by coloured lenses and / or pre-receptor filters in the eye.**

John L. Barbur<sup>a</sup>, Benjamin EW Evans<sup>a</sup>, Marisa Rodriguez-Carmona<sup>a</sup>, Elisabetta Baldanzi<sup>b</sup>, Regina Comparetto<sup>b</sup>, Alessia Fava<sup>b</sup> and Alessandro Farini<sup>b</sup>

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**Abstract**

When the visual world surrounding us is imaged on the retina by the optics of the eye, all available information is encoded in this image as spatial and temporal variations in intensity and / or spectral content. Of particular interest are edges and boundaries which help define objects and areas of interest. The perceived 'conspicuity' of coloured objects, a quantity that relates directly to visual performance, is often determined by a combination of colour and luminance contrast signals<sup>1,2</sup>. When coloured objects are involved, the wavelength composition of the ambient light, the spectral

absorption of any coloured filters external to the eye and / or pre-receptor filters within the eye can cause significant changes to luminance and colour contrast signals and hence to the visual appearance of the objects we see. The expression of variant cone-pigment genes in some subjects, large differences in L/M cone ratio or the absence of either L or M cones in red / green dichromats can produce large deviations in both luminance and colour contrast signals with inevitable consequences on visual performance<sup>3</sup>. The purpose of this study is to explore how changes in these parameters can enhance or diminish colour appearance and the conspicuity of coloured objects.

**Keywords:** colour vision, cone contrasts, blue light, macular pigment, effective contrast, contrast enhancement, CAD test

**17:55, Paper n° 75**

**The value of colour in clinical diagnostic dilemmas.**

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**Abstract**

**Background.** The primary goal of clinical visual assessment is to obtain data to effectively guide management decisions. It may therefore be surprising that the assessment of colour discrimination, arguably the most sensitive attribute of vision, is often used and thought of as a secondary measure, particularly in difficult diagnostic dilemmas that do not fit into neat clinical boxes. We present a case involving localised retinal dysfunction that is not fully consistent with signs of either autoimmune retinopathy or occult maculopathy, highlighting the potential value of colour vision assessment when used in conjunction with standard diagnosis algorithms.

**Methods.** Central and peripheral red / green (RG) and yellow / blue (YB) colour vision were assessed in a 32-year-old with suspected central retinal dysfunction using the Colour Assessment and Diagnosis (CAD) test. Additional testing was carried out to assess and quantify mesopic visual acuity (VA), functional contrast sensitivity (FCS), rod- and cone-mediated flicker sensitivity, and pupil responses measured using both rod- and cone-enhanced stimuli.

**Results.** The results revealed a loss of VA and FCS in the central 10 degree field, although both VA and FCS were less affected with negative contrast stimuli and depended strongly on light level. Central colour vision assessment using the CAD test showed severe RG and YB loss, however outside the central 10 degree field the patient had almost normal colour and spatial vision. Rod- and cone-mediated, flicker thresholds were elevated, with cone thresholds 10-fold higher than normal. Pre-stimulus pupil size, constriction amplitudes and latencies were normal with both centrally presented and peripheral stimuli.

**Conclusions.** Colour discrimination can provide unique and valuable clinical data, particularly when used in conjunction with a standard array of diagnostic tests. The use of colour vision assessment and its potential role in guiding patient management decisions is an exciting area that has yet to be fully utilised.

**Keywords:** case study, colour vision assessment, CAD test, visual function loss, retinal dysfunction, pupillometry, contrast sensitivity

**ORAL SESSION 5 (ENG)**

Topic of interest: 3, 7, 10, 11

**(AULA FERMI)****16:10, Paper n° 83****Colorimetric analysis and color rendering performance of a small-scale glazing system with thin monolithic aerogel in the interspace.**Costanza Vittoria Fiorini\*<sup>1</sup>, Francesca Merli\*<sup>2</sup>, Elisa Belloni<sup>2</sup>, Cinzia Buratti<sup>2</sup>, Ann M. Anderson<sup>3</sup> and Mary K. Carroll<sup>4</sup>Università di Roma-Sapienza<sup>1</sup>, University of Perugia, Department of Engineering<sup>2</sup>, Union College, Mechanical Engineering Department<sup>3</sup>, Union College, Chemistry Department<sup>4</sup>  
costanzavittoria.fiorini@uniroma1.it\*<sup>1</sup>, merli@crbnet.it\*<sup>2</sup>, cinzia.buratti@unipg.it\*<sup>2</sup>**Abstract**

Transparent surfaces are largely employed in buildings, ensuring the natural light into indoor spaces. They allow to get interesting contributions both on energy saving, reducing consumptions related to the use of artificial light, and on the occupants' psychophysical well-being. For this reason, color rendering in environments lit by the natural light that enters the windows or of the objects seen through them is a major concern. However glazing surfaces represent a weak point for the building envelope, due to poor thermal and acoustic performance. Monolithic aerogel constitutes a promising transparent solution, able to guarantee excellent thermal and acoustic properties, together with remarkable optical performance. In the perspective, this paper focuses on the analysis of the optical properties and the color rendering performance of a small-scale prototype consisting of float glass-monolithic aerogel-float glass. The aerogel inner pane, 3-mm-thick, was prepared using a rapid supercritical extraction method developed at the Union College Aerogel Lab. Optical measurements carried out using a conventional spectrophotometer with a small integrating sphere in the 250-2500 nm wavelength range, indicate high transmittance in the visible part of the spectrum, with peaks shifted on the high wavelengths. As concerns color rendering, the metric widely adopted in many standards including EN 410 for the color rendering evaluation of glazing systems, is the general color rendering index parameter ( $R_a$ ). However,  $R_a$  is not accurate in its intended role as a color fidelity index, as well as not being representative of perception-related chromatic effects beyond color fidelity. In this context, an original measurement methodology for color rendering based on material transmission spectra was developed through the use of chromatic distortions verified on an experimental basis. Although the traditional calculation procedure for transparent components considers the color rendering of the object illuminated by the light transmitted through the element, the explained one involves the evaluation of the color observed through the transparent material. The effect of the glazing system with aerogel on color rendering was assessed by means of a dome-shape illuminator, a chromameter, and a color-checker as a reference for the colors. The RGB and CIE Lab coordinates of the test color samples of the color-checker with and without the aerogel, were determined and based on that the color shift was calculated. The results showed that the glazing system tends to make the colors brighter and to move them towards blue hues. Then the new color rendering index, identified as  $R_{(a,p)}$  (proposed Color Rendering Index), was calculated. Finally for the innovative glazing system also the Color Rendering Index  $R_a$  in accordance to EN ISO 410 was evaluated, to compare the results of the two procedures.

**Keywords:** colour rendering, monolithic aerogel, CIE Lab coordinates

## 16:25, Paper n° 46

**Colorimetric and spectroscopic analysis of a 19th-century impressionist painting with reflectance hyperspectral imaging.**Alice Pertica<sup>1</sup>, Andrea Casini<sup>1</sup>, Costanza Cucci<sup>1</sup>, Marcello Picollo<sup>1</sup>, Lorenzo Stefani<sup>1</sup>, Muriel Vervat<sup>2</sup><sup>1</sup> IFAC-CNR, Via Madonna del Piano 10, 50019 Sesto Fiorentino (FI), Italy<sup>2</sup> Studio Muriel Vervat, Via dei Velluti 29r, 50125 Firenze, ItalyCorresponding author: Alice Pertica, [alicepertica@gmail.com](mailto:alicepertica@gmail.com)**Abstract**

Reflectance hyperspectral imaging (HSI) is a diagnostic technique used for the study of cultural heritage objects. This technique allows the acquisition of hundreds of images in narrow contiguous spectral bands - in the visible (400-750 nm) and near infrared (750-2500 nm) regions - resulting in a data set called "cube-file" (also "image cube file"). These data provide different types of information: two dimensions of the cube-file contain the spatial information, while the third dimension contains the spectral ones. This allows each pixel of the image to be associated with a reflectance spectrum. Therefore, it is possible to identify artists' materials and their distribution in a work of art. Furthermore, it is possible to obtain colorimetric data from these spectra using the calculation procedures defined by the International Commission on Illumination (CIE) if the HSI data were acquired with measurement geometries recommended by the CIE.

This contribution focuses on the analysis of hyperspectral data acquired with the system designed at the "Nello Carrara" Institute of Applied Physics of a 19th century painting signed by Édouard Manet. Starting from the acquired cube-file, the aim of this work is to highlight the connection between the colors and their different shades used by the artist and their colorimetric values calculated from their reflectance spectra. The final focus of this research activity is to connect the materials used by the artist to the shades of hues in the painting.

**Keywords:** hyperspectral imaging, colorimetry, reflectance imaging spectroscopy, easel painting

## 16:40, Paper n° 68

**Colors in computer heritage: investigation of "Graphite" and "Indigo" Apple iBooks from the Deutsches Museum.**Eva Mariasole Angelin<sup>\*1</sup>, Marisa Pamplona<sup>1</sup><sup>1</sup> Conservation Science Department, Deutsches Museum, Munich<sup>\*</sup>[e.angelin@deutsches-museum.de](mailto:e.angelin@deutsches-museum.de)**Abstract**

Laptops iBook G3 produced by the technology company Apple Inc. are part of numerous private and museum collections. They represent milestones in computer science and information technology. Their impact on industrial design is also acknowledged, being iconic design objects with an unmistakable layout. Many technical features and design ideas first adopted in the iBooks G3 are nowadays standard in laptop computers as the multiple color options for the shell. The Apple team looked for a personal computer that could satisfy in the first place the consumers' needs in terms of features, performance, and aesthetics. The curved-round shape of the white housing and bright colors of the soft plastic around the rim would have sounded attractive to students and ordinary users. The portable computer line - also known as "clamshell" - was a great commercial success that rescued Apple from bankruptcy. The laptops were released in several bright colors between 1999 and 2000, starting with "Blueberry" and "Tangerine", later adding "Indigo", "Graphite" and "Key Lime".

The Deutsches Museum (DM) (Munich, Germany) is one of the largest science & technology museums worldwide, and two iBook examples, respectively "Indigo" and "Graphite", are part of its informatics collection. While the "Graphite" iBook G3 has been permanently exhibited since 2012 and it features today evident signs of discoloration of the soft plastic, the "Indigo" laptop has always been kept in storage and shows no evident signs of color alteration to the naked eye. The dramatic change of the original color on the upper side compared to the bottom side of the "Graphite" iBook can be symptomatic of light-induced damage. The color gradient can support this hypothesis observed alongside the rim corresponding to the areas less or more exposed to direct light.

As color is an integral part of the aesthetic, historical and material authenticity of the iBooks, its investigation and assessment is key for their proper conservation. In this work, the results of color analysis of the “Indigo” and “Graphite” laptops are presented. Colorimetry was applied to measure the color of both iBooks of preserved (at the naked eye) and discolored areas. The results were compared to better understand the identity of color change and reveal incipient color alteration not yet visually evident. Discoloration of colored plastics can be due to the alteration of the colorants, i.e. fading, leading to the loss of the color sensation. However, also the polymer part of the plastic formulation can degrade – most commonly yellowing – and play a role in the discoloration. In this study, attenuated total reflectance Fourier transform infrared spectroscopy (ATR-FTIR) was used to confirm the contribution of the polymer in the discoloration through the identification of markers of its alteration. Both case studies serve as good examples to highlight the challenge of studying color and its possible alteration in plastic-based objects.

**Keywords:** computer heritage, plastics, museum collections, discoloration

**16:55, Paper n° 19**

**Serial architecture and geopoetic of the territory, indexed color at the service of enhancing a vernacular heritage.**

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**Abstract**

Through several distinct examples, from the working-class architecture of northern France to the seaside architecture of the northwest, we will question the place of color in the neighborhoods of serial architecture and the way in which the chromatic index takes all its meaning in the singularity of the buildings in relation to each other. The inhabitant appropriation by the patterns and the color brings poetry and enhances the streets while playing with this unique seriality with often asserted styles. The proposed trip through France will pass by Tourcoing, the city of a thousand chimneys and Saint-Valéry-sur-Somme, the beauty of the north. Inviting to a poetic reflection on the place of color as an interstice, as an index, as a punctum in the sense of Roland Barthes, will be the heart of the talk.

**Keywords:** color plan, serial architecture, color appropriation, social uses.

**17:10, Paper n° 85**

**Compound words with colour terms in Albanian.**

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The aim of the present paper is to analyse adjectives with binary structure in Albanian that contain chromonyms. In these compounds colour is a “distinguishing marker” (Wylter 1992: 38), namely it assumes a “significant and classificatory function” (Agnello 2013: 13) creating pairs of adjectives with opposed figurative meaning (opposite connotations). So, the union/link of [word x] + [colour term] generates new lexemes endowed with figurative meaning (idiomatized).

Consequently, colours in pairs of opposite adjectives acquire a semiotic quality (Wylter 1992: 42). In fact, in Albanian adjectives with colour terms, such as faqezi [[faqe] + [zi]] (black-(painted) cheek / blackfaced) – faqebardhë [[faqe] + [bardhë]] (white-(painted) cheek / whitefaced), refer to persons or entities with opposite attributes: on one hand positive qualities and on the other hand negative qualities. Dealing with questions of compositional morphology by analysing complex lexical units (Schlücker 2019), the article aims to present and discuss the following aspects: colour symbolism (Dobrovolskij, Piirainen 2002) and linguo-cultural specificities. In addition, with regard to Albanian corpora, that are quite limited, the article gives examples of colour compounds of use in context with the objective to add and describe new attestations too.

**Keywords:** Albanian, colour, colour symbolism, compound words

**17:25, Paper n° 8**  
**When a student asks: Was ist Black auf Deutsch?**

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**Abstract**

I saw a hand fly up in my German language course. I love raised hands. They indicate thinking, questioning, and curiosity. I nodded towards my student; she asked, “Was ist Black auf Deutsch?” She was looking at a photograph of a protester with a sign stating: Black Lives Matter. I let her continue, answering her own question. “Isn’t it schwarz? Why isn’t that on this sign?”

It was Fall 2021 and I was teaching a third-semester second language German course at the Pennsylvania State University, integrating a Communicative Language Teaching approach and Social Justice Pedagogy. The course was divided into units, each contextualized within a city in the German-speaking world. In learning about Leipzig, our textbook thematized the experience of living in East Germany and taking part in the Montagsdemonstrationen of 1989. Hoping to foster deeper engagement with the material, we were using photographs to compare these demonstrations of Leipzig past to the social justice protests of Leipzig present. The older photographs were in black and white. The newer ones were about Black and White, with “BLACK” appearing in many of them. What began as a simple vocabulary question grew into a difficult conversation about language and thought, history and narrative, local and global, and race and reality.

In short, something happens when a student asks: Was ist Black auf Deutsch? My students had entered that class period with diverse understandings of black and Black and then I failed to situate the color translations of schwarz, Schwarz, Afro-Deutsch, Ethnische Minderheit, and Black within their own semantic spaces. In this paper, I discuss how requesting a translation for a fundamental color prompted a conversation that has yet to be finished (Piotti, 2022). Thus, this paper complements my previous work in active color (active colour; Piotti, 2022), which I describe as the constantly developing natural and constituted paradox at the intersection of color and language. Reflecting on this lesson and explorations into the literature since then, I problematize teaching one-to-one translations of color terminology in language classrooms and propose how teachers might critically adopt LangCrit practices and attend to multiplicity and context in their instruction—ultimately resisting certainty and opening the door for partiality and perspective.

**Keywords:** second language, vocabulary learning, active colour, Black Lives Matter, LangCrit

13 SEPTEMBER 2022

**SPECIAL ONLINE SESSION 6 (ENG)**

Topic of interest: Color for beauty, cosmetic and hairstyle  
(AULA TORALDO)

09:00, Paper n° 4

**Mineral pigments in make-up products: classification, formulation and sensorial properties.**

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**Abstract**

In make-up products, pigments are used to bring color. They are also found in soaps, toothpastes, high Sun Protector Factor (SPF) sunscreen products to create a physical screen... Two categories of pigments coexist: mineral (or inorganics) pigments and organic pigments. In many cosmetic products, only mineral pigments are tolerated if we consider all international regulations. This is the case for eye products and foundations. Mineral pigments have many advantages: beyond their claim of naturalness on which they surf excessively, they are remarkably stable in formulations with a few exceptions. In addition, their opacity gives them an important coloring power much appreciated by formulators. In this article, we will see how mineral pigments work, the cosmetic regulations that govern their use, their classification, their physical principle to appear colorful. A presentation of the properties of each of them in formulation will be made. Finally, each of these pigments has a variable chemical composition and physico-chemical characteristics and we will see how each of them impacts the sensorial properties of the make-up textures into which they are introduced.

**Keywords:** mineral pigments, inorganic pigments, cosmetics, make-up, sensoriality

09:15, Paper n° 17

**Assessment of base color influence on the chromatic appearance of hair colorants.**

Simone Liberini<sup>1</sup>, Roberta Suardi<sup>2</sup>, Alessandro Rizzi<sup>1</sup>, and Giannantonio Negretti<sup>3</sup>

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**Abstract**

Hair colorants of the so-called 'series of naturals', a scale of ten colors ranging from deep black to light blonde, are universally recognized as a reference basis for hair coloring procedures. However, it is frequently observed that application results are heavily dependent both in tone and in nuance on the underlying hair pigmentation. We hereby assess the chromatic appearance of a selection of globally marketed series of naturals, both on animal fur and on human dyed hair. Notably, the latter are chosen so to span a consistent range of melanin base, with a varying degree of interlaced depigmented strands. The analysis is carried out by means of a perceptual test based on the Munsell Book of Color, aimed at assessing the perceived tone and nuance with a special focus on the linearity of the scaling.

**Keywords:** hair coloring; cosmetic; color appearance; Munsell Book of Color.



**09:30, Paper n° 44**

**Hair-dye experience at home using a customer journey map.**

Sumin Park 1, Boram Kim<sup>2</sup>, Hyun Choi<sup>3</sup>, Moonha Kim<sup>4</sup>, Hyeon-Jeong Suk\*

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**Abstract**

The hair-dye market is growing rapidly. Due to Covid-19 and the boom of personal care in the beauty industry, dyeing hair at home became a fashion led by young females. This study observed customer experience while using at-home hair-dye kits through video observation and in-depth interviews. Adapting the user journey map, we tried to diagnose the pain points of the current hair-dye experience at home. As a result, we prototyped the package and screens of the digital service. It is meaningful that this study designed a new customer experience at home, by applying video ethnography and a user journey map.

**Keywords:** hair dye, customer journey map, meta-verse, package design, at-home

**09:45, Paper n° 45**

**The method and analysis of color changes of facial skin after a skin makeup.**

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**Abstract**

This study proposes a deep-learning-based skin color extraction and color analysis to examine the color changes of facial skin after the skin makeup. We devised a photo gauge with a pair of color checkers and photographed a total of 516 Chinese females in Shanghai before and after the skin makeup. Based on the facial photos, we calibrated the images and then extracted the pixel colors of cheek regions in L, a, and b of CIE1976L\*a\*b\*. The results showed that the facial colors of the Chinese females became brighter, less reddish, and less yellowish after the makeup, thereby resulting in a paler skin undertone. During the experiment, we provided five kinds of liquid foundations from Estée Lauder's Futurist line for the subjects to choose one product, which should fit them best. Differently from our anticipation, we found no relationship of color characteristics between the individual's facial skin and the liquid foundation. In addition, according to their makeup frequency and skills, we distinguished the 55 subjects to compare the difference between makeup results. However, the color changes between the two groups were not significant.

**Keywords:** facial skin color, Chinese females, skin makeup, liquid foundation

**10:00, Paper n° 57**  
**Course of Color Technician in the Cosmetic Industry.**

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**Abstract**

In order to meet the requirements of the enterprises among the cosmetic and wellness industries, for which the training of specialised experts in the knowledge of color is a crucial need, Poliestetico di Milano has devised, in collaboration with a group of important partners, a course of HIGHER TECHNICAL EDUCATION AND TRAINING, aimed at creating a "new" specialised technical profile as COLOR TECHNICIAN IN THE COSMETIC INDUSTRY. The course will take a total of 1000 hours to be completed, of which 500 hours will be for lectures and laboratory plus 500 hours of training in the company.

The project has been developed in agreement with the IT department of the University of Milan, represented by Professor Rizzi, Universal beauty Products and also involves two important secondary education institutions within the chemical field, such as the Henseberger Institute of Monza and the Molinari of Milan. This article presents the course description of this new professional program developed by Poliestetico di Milano. This IFTS (HIGHER TECHNICAL EDUCATION AND TRAINING) course of Color Specialist, has been approved and financed by the Lombardy Region, aims to fill the lack of advanced education and training in the Beauty Industry.

**Keywords:** beauty, color education

## **ONLINE ORAL SESSION 7 (ENG)**

Topic of interest: 4, 7, 9  
(AULA FERMI)

### **09:00, Paper n° 20 Can "blue blocking" eye glasses be clinically really effective?**

Kazim Hilmi Or  
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#### **Abstract**

Background and method: The technologic knowledge is, that about 30-50 % of the certain blue light wavelengths passing glasses are reduced with blue blocking glasses. If the clinical effect is to expected to reduce the amount of blue light, the effect is not enough to reduce the potential hazardeous effect of blue light wavelenths , because in daylight the light amount is about 100.000 lux. Indoors it is mostly only 100-500 lux when iluminated enough. As second ophthalmological knowledge there is no scientifically proven hazardeous effect of the blue light wavelengths.

Results: In daylight conditions the effect of all wavelengths including blue light is so high, that a reduction of 30 % is not effective enough. Additionally there should be scientifically significant evidence for every wavelength.

Conclusion: There is no scientifically significant evidence for prescribing blue blocking eye glasses.

**Key words:** blue light blocking, eye glasses, prescription, clinical effectivity

### **09:15, Paper n° 42 A piece of New Zealand Heritage: Colour Design and Conservation of Grey Lynn Library.**

Julian Rennie<sup>1</sup>, Alessandro Premier<sup>2</sup>  
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#### **Abstract**

Architect William Gummer (1884-1966) was born in Auckland, New Zealand. He left for the United Kingdom in 1908, studying at the Royal Academy of Arts in London, and qualified as an associate of the Royal Institute of British Architects. He notably worked for Sir Edwin Lutyens (and Daniel Burnham of Chicago). Upon his return home, he set up the architectural practice "Gummer Ford" in 1923, (with Englishman C.R. Ford, who had travelled as the youngest member of Scott's Antarctica 1901-04 expedition). The practice produced notable buildings in Auckland, firstly in the Beaux-Arts and later Modernist idioms. One small treasure is the Grey Lynn Library (opened in 1924) with its high gracious steel-framed windows that activate two reading spaces, although the building is currently a little faded in terms of surface decoration the building retains fabulous volumes entirely suited for browsing and reading library books.

The goal of this research is to reveal the significance of this small architectural gem within the 'minor' heritage of New Zealand and to outline a proposal for the conservation of its colours in the near future. The methodology of the study involves literature review and archival research (historic photos and drawings) as well as on-site analyses. The latter involves the identification of the building colour palette (façade and interiors). Colour codes will be represented following the NCS 1950 chart and equivalent Hex-RGB values. The colours identified will be compared with archive material (photos and drawings) to understand the modifications that occurred over the years. The final colour palette will be useful to practitioners for any future conservation of this small gem of early New Zealand 20th Century architecture. Expected results include the identification of brief

guidelines for the colour conservation of the building.

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**Keywords:** New Zealand heritage, colour conservation, cultural heritage

**09:30, Paper n° 64**

**Veiling under the magnifying glass: observation of historical pigments by surface microscopy.**

Leticia Díaz Mata<sup>1</sup>, Miquel Àngel Herrero-Cortell<sup>2</sup>, M. Antonia Zalbidea-Muñoz<sup>1</sup>,

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**Abstract**

The perception of painted color is not always the result of observing a flat hue, but is achieved by the superimposition of translucent tones. Pigments have a variable ability to cover the underlying layers depending on their opacity. Some pigments have the quality of being agglutinated in some binders in such a way that they take on a gradation to veil the base tints. All these resources, in essence, allow these materials to be used to make glazes. These impart a different shade of color to the pictorial film to which they are applied, affecting its perception.

For all these reasons, it can be said that the effect of superimposing particles of one pigment on another produces an optical chromatic mixture in which effect can be observed well with a magnifying glass. This perspective implies giving attention to a phenomenon that, although belonging to the visible, occurs outside the physiological reach of our eye.

The present work shows the chromatic result obtained by laying down glazes produced with inorganic pigments used in the Middle Ages and the modern age, known for their poor covering capacity. The following pigments were selected among them: white lead, lead-tin yellow, minimum, chrysocolla, malachite, verdigris, azurite, enamel, bice blue and natural ultramarine, bound with linseed oil and mastic resin. These were laid on nine chromatic grisailles, produced with some pigments and linseed oil, where scales of five chromatic tones were generated starting from pure pigment and moving to lighter tints by the addition of white lead. The pigments used were natural Sienna, yellow ochre, red earth, vermilion, green earth, azurite and lampblack. To observe the glazes, a polarized microscope-magnifier was used, which puts the focus between 50X and 200X. Such an instrument facilitates the correct observation at the macroscopic level of the above phenomenon, taking into account the particularities that each pigment-sheen may have, in terms of morphology, appearance and arrangement of the particles. In this way, it was possible to better understand how the color change caused by veiling on the respective base pigments occurs.

**Keywords:** historical pigments, microscopy, veiling

09:45, Paper n° 73

**Between West and East: a non-invasive study of colourants on Syriac manuscripts.**Maurizio Aceto<sup>1</sup>, Angelo Agostino<sup>2</sup>, Maria Labate<sup>2</sup>, François Pacha-Miran<sup>3</sup><sup>1</sup> Università degli Studi del Piemonte Orientale, Dipartimento per lo Sviluppo Sostenibile e la Transizione Ecologica, piazza S. Eusebio, 5 – 13100 Vercelli (Italy)<sup>2</sup> Università degli Studi di Torino, Dipartimento di Chimica, via P. Giuria, 7 - 10125 Torino (Italy)<sup>3</sup> École Pratique des Hautes Études, Labex ResMed - PSL Research University, 4-14, rue Ferrus - 75014 Paris (France)**Abstract**

Syriac manuscripts represent an important treasure as they document the spread of early Christian iconography throughout the Eastern Mediterranean. While they are well-known from the historical, artistic and religious literary points of view, the knowledge of the pictorial materials with which they were produced is only in its infancy. Few of them have been subjected to diagnostic analysis, the most important being the 6th century *Rabbula Gospels* kept in Florence at Biblioteca Medicea Laurenziana (cod. Plut. I, 56).

The present contribution reports on the results obtained from the identification of colourants in two important groups of Syriac manuscripts, the first one kept in Paris at Bibliothèque nationale de France (BnF) and the second one kept in Rome at Biblioteca Apostolica Vaticana (BAV). As a whole set, the manuscripts date from the 6th to the 14th century.

The diagnostic study has been carried out in totally non-invasive way. The techniques used were UV-visible diffuse reflectance spectrophotometry with optic fibres (FORS), X-ray Fluorescence Spectrometry (XRF), Fibre Optic Molecular Fluorimetry (FOMF) and Optical Microscopy (OM). The FORS technique was systematically applied to have a preliminary identification of the colourants and in most of the cases allowed having a reliable identification. FOMF analysis was used to confirm some uncertain results. XRF spectrometry was used to support FORS identification and to have information on the metal pigments. Optical microscopy, finally, was used to have a view under the micro scale, useful to aid the identification obtained by the spectroscopic techniques.

The results obtained show that precious colourants, such as lapis lazuli, cinnabar and insect dyes, were widely used, apart from the oldest manuscript (ms. Syriaque 33 - BnF). One remarkable group of manuscripts is the one formed by the 12th-13th century manuscripts Syriaque 30, 40, 41, 54, 355, 356 (BnF) and Vat. Sir. 559 (BAV): these manuscripts contain miniatures decorated with lapis lazuli, pararealgar (an unusual yellow pigment, possibly produced by alteration of realgar), iron gall ink (a pigment of Western tradition, very unusual in Asian countries) and an insect dye, most probably derived from the Indian scale insect *Kerria lacca*. This set of colourants appears to be a synthesis between Asian and European cultures and it is quite different from the palette used in the oldest manuscripts.

Despite being only a small fraction of the existing Syriac manuscripts, the results here presented can be considered a preliminary view of the colourants used by the early and late medieval artists of this cultural area. It is advisable that further analyses will be carried out to have a more complete view of the Syriac miniature painting art.

This contribution is in loving memory of Prof. Guido Frison, colleague and friend as well as a source of inspiration for this and a thousand other projects.

**Keywords:** Syriac manuscripts, FORS, XRF, non-invasive analysis

10:00, Paper n° 55

**The colours of sustainability: how materials cmf design can guide sustainable perceptions and behaviour.**

Sossini Lia<sup>1</sup>, Santi Romina<sup>1</sup>, Del Curto Barbara<sup>1,2</sup>

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**Abstract**

The growing interest in sustainable production is a trend driven by increased awareness of the need for a change in today's way of designing, producing, consuming, and living. Thanks to renovated attention, different materials have been developed from a sustainable perspective, from natural to recycled, compostable and recyclable resources. The material's origin, intrinsic qualities and the processes used often give them unique sensory attributes but with aesthetic identities not always coherent about their sustainability implications. In designing their functional, sensory, and aesthetic characteristics, sustainable products and materials must find their own identity according to their potential life cycle.

As a multidisciplinary mediator, the designer can evaluate materials and product optimal life cycle, set functional and aesthetical criteria, select materials and suppliers, optimize processes, and keep attention to design materials aspects as a means of communication. CMF design can support aesthetic-sensorial thinking to model sustainable products in the materials and design sector. Colour represents a key element: together with material and finish can lead to defining the aesthetic and sensory qualities supporting a sustainable identity, perceptions, and behaviours. This paper will explore CMF as a tool for "materials design" with a close look at the colour and how it can drive sustainable perception in today's heterogeneous and complex emerging materials context. Boundaries and guidelines for the use of colour will be applied according to materials' life cycle (source, processes, user and context, end of life) to generate greater awareness for designers wishing to select, design or apply sustainable materials in design projects.

**Keywords:** CMF design, sustainable colors, sustainable design, aesthetic, perception, behavioral design.

**SHORT SESSION 8 (ENG)**

Topic of interest: 4, 7, 8,10, 12

**(AULA TORALDO)****10:15, Paper n° 47****Subclinical changes detected in diabetes mellitus using high resolution retinal imaging and colour vision assessment.**

Megan Vaughan<sup>1,2\*</sup>, Nicole Tay<sup>1</sup>, Thomas Kane<sup>1,2</sup>, Angelos Kalitzeos<sup>1,2</sup>, Nav Singh<sup>1,2</sup>, Adrian Zheng<sup>1,2</sup>, Bishwanath Pal<sup>2</sup>, Ranjan Rajendram<sup>1,2</sup>, Konstantinos Balaskas<sup>2</sup>, M. Pilar Martin Gutierrez, Jose Carlo Artiaga<sup>2</sup>, Hanan Nussinovitch<sup>2</sup>, Khadra Adan<sup>2</sup>, Marisa Rodriguez-Carmona<sup>3</sup>, John L. Barbur<sup>3</sup>, Michel Michaelides<sup>1,2</sup>, Emily J. Patterson<sup>1,2</sup>

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**Abstract**

Diabetes Mellitus (DM) affects approximately 415 million people worldwide (Ogurtsova *et al.*, 2017), and it has been postulated that this will increase to 700 million people by the year 2045 (Amoaku *et al.*, 2020). Almost all patients with Type I (T1) and at least 60% of patients with Type II (T2) DM will develop diabetic retinopathy (DR) after 20 years (Fong *et al.*, 2004).

Once the features associated with DR (i.e., microaneurysms, haemorrhages, cotton wool spots, exudates, oedema or venous abnormalities (Ghanchi, 2013)) are detected clinically, irreversible damage has often already occurred (Bhatwadekar *et al.*, 2021). Highly sensitive measures of both structure and function are therefore needed to detect DR in its earliest stages.

Here we use two highly sensitive measurement tools to determine whether early loss of colour sensitivity in DM is also accompanied by decreased cone density: 1) Adaptive optics scanning light ophthalmoscopy (AOSLO), which enables high resolution imaging of the retinal photoreceptors in vivo; and 2) the Colour Assessment and Diagnosis (CAD) test, which enables accurate diagnosis of both the type and severity of colour vision loss.

**Keywords:** Diabetic retinopathy, colour vision, adaptive optics

**10:20, Paper n° 72****Do colour and light affect physiology and psychology in proportional ways?**

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**Abstract**

The application of the studies on light and colour for the wellness of human beings is relatively recent. For decades, the design field's primary concern has been to ensure an optimal level of illuminance for workers, passers-by, or tourists, paying attention, where possible, to energy saving. This fact is even odder when we consider that light and colour have been studied since the fifth century BC. Even if the emotional impact of light and colour on emotions has never been a mystery, the studies

on their interaction with the human circadian rhythms found no relevant, productive application since the early 90s. This is one more reason to emphasize the differences between physiology and psychology when humans interact with light and colour.

The relationship between these stimuli and human physiology has been carefully investigated. As a result, many discoveries have been made, like the existence of specific structures in the retina called ipRGCs (Intrinsically Photoreceptive Retinal Ganglion Cells) have been identified, containing a photosensitive protein called Melanopsin, capable of carrying out the phenomenon of phototransduction (such as the other photoreceptors, cones and rods). The difference is that the electrical impulse created by these cells follows a different path from that of vision and is conveyed through the retina-hypothalamus tract, where it will affect the pineal gland by suppressing melatonin. This hormone is essential in the regulation of the human circadian cycle.

These notions highlight a fundamental aspect: the influence of light and colour on human physiology does not follow the exact mechanisms of the one of vision. Instead, and as far as we know, the emotional reaction results from the brain elaboration after a lighting stimulus is conveyed through the visual system channels.

This difference is also evident in human sensitivity to the different wavelengths of light (various colours). For example, in the spectral sensitivity curve (which colours we see better), the maximum response coincides with 555 nm (yellow-green). In contrast, in the sensitivity curve concerning the circadian cycle, i.e. which wavelength affects the most, the maximum sensitivity corresponds to 460 nm (blue).

In a nutshell, the differences between these two mechanisms are reflected in human beings' perception of colour. For example, it is not uncommon for an individual to associate the term "activating" with warm and bright colours such as yellow and red, while, physiologically speaking, activating colours are at the opposite end of the spectrum (blue). The doubt arising from these observations is that a complex system like the one of human perception does not possess some form of convergence between these two mechanisms.

In this paper, we will discuss the early stages of research that aims to understand if it's possible to find a proportion between the emotions and moods aroused by colours and their influence on our physiology.

**Keywords:** light, colour, physiology, psychology, design

### 10:25, Paper n° 12

#### Exploring the colors used in renovation of interior space: a survey on post-use of higher educational classrooms.

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#### Abstract

As the previous study shows, the colours of architectural environments have physiological, emotional, and cognitive impacts on students. Mounting evidence indicates that the color of classroom influences students' performance. When it comes to the renovation of educational interior space, colors should be taken into consideration. This article focused on two built higher educational inner space: the architectural college of University of Florence and the smart classrooms in Tongji University. The history of Santa Teresa (Universita di Firenze) dates back to the year 1620 and was donated to Paris by M Francesca Guardi in memory of St Teresa. It was not until 1984/85 that there was a proper oversight of the campus renovated from a prison. As for the history of South building in Tongji university, it is one of the first teaching buildings on campus, built in the year 1953. The educational interior space in both two cases are renovated for new requirements and designed with different colors.

The design team also made a survey on collecting the post-use feedbacks within students in Tongji University, which gave us an objective view of the effect. The main methods are literature study, field



research and questionnaire. By reviewing the related studies and reports, how the colors impact students are summarized. The whole effect of the teaching environment can be shown in field research. At last, combined with the post-use information, the final conclusion contains four main points: Bright and lively colors can improve attention and concentration of young people; Colors can be used to compare old and new in the renovation of historical environment; Colors can be used as the logo color of each space; Choosing the appropriate color block size according to the teaching content can create different spatial effects. The purpose of exploring the colors used in renovation of interior space is to give some inspiration from an architectural angle to designers and artists, and also whom interested in colors and environment in eastern and western countries.

**Keywords:** colors, educational space, interior environment, renovation, historical buildings.

**10:30, Paper n° 79**

**Colours of a Northern city in past and present - tradition and current practices of facade colour in the historical architecture of Trondheim, Norway.**

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The city of Trondheim today has remnants of buildings from most decades of its thousand-year history. Of the medieval city structure only monumental stone architecture and archaeological material has survived, whereas the city's traditional wooden vernacular from the 17th century and onwards still lines the streets and constitutes much of the city's image and character. In the fabric of historic facades, as well in the display of both old and new architecture there is also a rich color history, characterized by warm pigments set against the cold northern light, with variation in composition and enhancement of architectural detail. A current tendency is that international trends in color and house painting are challenging what is considered typical and traditional color schemes. Today both historic and new wooden buildings are increasingly painted white or grey, or clad with wood which is untreated or treated with other remedies than paint.

In considering the historical city and what is perceived as traditional coloring of buildings, and new trends in building which affect the image of the city, raises questions both concerning our knowledge and our actions in relation to colors in historic architecture, preservation and the urban environment. Is the color tradition of Trondheims buildings what we see, or do color excavations reveal a different historical approach to historical color scheming of houses than what is visible today? What are the specifics of painting the wooden vernacular, before and now, and why do so few use traditional paints on traditional buildings? And is there a specific «Trondheim palette» to painting buildings which can be locally defined?

This paper will explore the color history of Trondheims buildings in its regional and national context, and discuss some of the measures taken to maintain a historical color tradition, and preserve the city's historical colors as well as its historical buildings.

**Keywords:** architecture, color and restoration, enhancement of cultural heritage

10:35, Paper n° 22

**Quantifying colors in culture: color trends in Italy (1960 to 2020) through album covers.**

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**Abstract**

Color trends are commonly discussed qualitatively and argued inductively: supporting evidence is selected by writers, then expanded into a universal theory ("*these [objects] are why [name] is the color of the season*"). The pervasiveness of color and the writer's arbitrariness of choice make it difficult to scientifically prove these claims. This paper offers an alternative solution by quantitatively mapping out color usage through archival analysis. Yearly time series data, mapping color usage over time, was produced by analyzing album covers released in Italy from 1960 to 2020.

Five trends were identified: (1) colors commonly found in nature exhibit stabler usage over time compared to infrequent colors; (2) the increase or decrease of certain colors directly impact the usage of others; (3) orange-brown and red were the most popular colors of the late 1960s and early 2000s; (4) light blue emerged significantly in the early 1980s, to then decline in the late 1990s; (5) ultramarine blue and purple surged in popularity in the late 1990s, then faded rapidly in the early 2000s;

Our study is significant for multiple reasons: our methodology provides new ways to understand color using existing digital archives; qualitative statements on color can be revised and supported quantitatively; comparisons between archival analyses can lead to sociological understandings of color beyond traditional literature; academics and artists can better understand color using data-driven research.

**Keywords:** color analysis, data science, color trends, album covers.

10:40, Paper n° 78

**Colours and Daguerreotypes: how to forget colours? «La couleur y est traduite avec tant de vérité qu'on oublie son absence.»**

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**Abstract**

« La couleur y est traduite avec tant de vérité qu'on oublie son absence. »

Is it possible to forget the colours of the nature? And so, how?

When in 1839, Arago presented the new image, the photography, the Daguerreotype, he wanted to promote it... but this image is achrome! No lines, no colours!

But it is new, so he could not say: «there is no colour». He suggested that you can imagine the colours because of the shades of gray...But during these years, in 1839, there is a new method for graving, with colours: the lithography. So how useful the new image, with colours in the eyes! Is not it to affirm that photography is not so objectivity you can read everywhere? ...

Which colours for daguerreotype?

We propose to search for this question:

The articles about the new image in this year 1839, during so few people could look by themselves this image, described the first images they have seen. How? using the words "tons", teintes, "rapports", "la tranquillité des masses". Looking for them: which colours can you see? It is a mirror so you are but dazzled!

Therefore, how the daguerreotypists could give colours on these plates? During the laboratory manipulations, blue can be present? Fortunately? Girault de Prangey in Greece did all the skies

blue!

Furthermore, too, little hands could bring colours on each image, each unicum! For portraits there are a lot of manuals to do that! So, these coloured pictures are not well considered: too easy for a painter: a so coloured picture can it be done but by a bad painter?! New image is not quite a photography yet...So a good new picture is exact, with details, nothing for colours...

But for instance, there is an extraordinary daguerreotype in colours, in wonderful colours...the collections of the Museum Ingres in Montauban have this one: is it with the Ingres's pencil? It is so rare! Why?

But too, daguerreotype may be a matrix for mechanical illustrations... another thing?

So, we propose to study the vocabulary used in descriptions of daguerreotypes during the three years between 1839 and 1841 first. After this point we shall look for coloured daguerreotypes. Which colours are brought? How? For which uses?

**Keywords:** photography, daguerréotypes, colour

### 10:45, Paper n° 2

#### The psychological association between product's color and consumer's color preference in marketing.

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#### Abstract

In our daily lives, we are constantly exposed to many stimuli, some of which influence our behavior without our full awareness. One of these stimuli is color, which interact with our individual color preference. Color preference influences us in various daily tasks. For example, people make decisions within 90 seconds of their first interaction with products, and approximately 60-90% of a product's evaluation is based solely on its color characteristics. At this point, it is necessary to put color preference at the center of marketing strategies. However, there are few attempts to unify the literature on the contribution of different color characteristics and the role of consumer attributes. This paper is aimed at reviewing contributions that focus on the use of color in marketing and identifying key features and limitations. Practical implications and future directions of this research area are outlined. The results obtained are useful both for basic research and for companies that want to take an informed approach to the use of color.

**Keywords:** psychology, culture, color preference, color perception, marketing

**SESSIONE ORALE ONLINE 9 (ITA)**

Temi di interesse: 7, 9, 11, 12

(AULA TORALDO)

**11:10, Paper n° 63****Trasparenze naturali. Velature storiche prodotte con pigmenti-lacca e coloranti organici.**Aránzazu Llácer-Peiró<sup>1</sup>, Miquel Àngel Herrero-Cortell<sup>2</sup>,  
M. Antonia Zalbidea-Muñoz<sup>3</sup>, Laura Fuster-López<sup>1</sup><sup>1</sup>Instituto Universitario de Restauración del Patrimonio<sup>2</sup>Departamento de Comunicación Audiovisual, Documentación e Historia del Arte, UPV<sup>3</sup>Departamento de Conservación y Restauración de Bienes Culturales, UPV.

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**Abstract**

Dai primi tempi della pittura a olio, le velature (intese come stesure trasparenti e colorate) hanno costituito una delle principali tecniche usate dai pittori nella realizzazione dei dipinti. Tuttavia, spesso, questo tipo di tecnica è stata molto sottovalutata dagli studiosi poiché oggi questi strati si trovano spesso molto deteriorati / alterati e quindi sono difficilmente percettibili o pure vengono percepiti come applicazioni di vernici che appaiono deteriorate e quindi spesso sono rimossi durante gli interventi di restauro.

Il testo presenta gli aspetti fondamentali di una ricerca dedicata all'uso di velature organiche nella pittura a olio, basata sullo studio della documentazione (trattati ed altre fonti storiche) raccolta relativamente alle velature storiche, alla loro riproduzione e alla loro documentazione attraverso tecniche non invasive.

Si propone di approfondire lo studio visivo di velature storiche realizzate con pigmenti lacca e coloranti organici, su grisaglie di colori documentati nella pittura tra il XV e il XVII secolo. La riproduzione pittorica dei colori di base e delle velature storiche si è condotta utilizzando materiali e metodologie ormai in disuso, cercando modalità di riproduzione quanto più vicina ai processi di pittura utilizzati tra il XV e il XVII secolo. Ciò ha permesso di valutare da un punto di vista visivo ed empirico i diversi risultati offerti dalle velature. Per questo studio sono stati realizzati diversi *mock-up* impiegando nove pigmenti: vari tipi di terre (ocra, Siena naturale, Siena bruciata, rosso ferrico e terra verde), bianco di piombo, nero carbone, azzurrite e vermiglione. Essi sono stati usati come stesure di base su cui sono state applicate le velature in diversi strati sovrapposti. Per confezionare le velature sono stati usati diversi tipi di lacche e coloranti: cocciniglia, robbia (in distinte tonalità ottenute con diversi mordenti usati nella sintesi), reseda, zafferano, stil de grain, aloe, indaco, guado verde *vessie*, *atramentum* e seppia, tutte quante usate con diverse concentrazioni / spessori (da una a quattro stesure). Con esse si sono ottenute delle diverse sfumature cromatiche che consentono di valutare aspetti materici, visivi o percettivi, evidenziando quanto le velature siano in grado di alterare, sfumare o accentuare il colore sottostante. Tali dati sono stati quantificati e valutati utilizzando coefficienti d'omogeneità, di forza tingente, di potere coprente e di visibilità della particella di ciascuna velatura.

**Keywords:** velature, pigmenti-lacca, coloranti, trasparenze

**11:25, Paper n° 70**

**Allestimenti immersivi: quando la sinergia tra suono e colore contribuisce a potenziare l'esperienza di visita.**

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**Abstract**

Con la diffusione delle tecnologie digitali la componente esperienziale del progetto diventa sempre più un requisito in ambito museografico-espositivo. L'allestimento si dota di dispositivi reagenti alla presenza e al comportamento dell'individuo dando luogo a inaspettate "interferenze" e a nuovi linguaggi comunicativi.

Negli ultimi anni l'interaction design è entrata a tutti gli effetti nel progetto allestitivo abilitando lo spazio e il visitatore attraverso dispositivi interattivi e reagenti che si servono di semplici modalità comunicative, tradizionali e 'umane'. Invitano al tocco e allo sfioro, rispondono al suono della voce, reagiscono al gesto, si muovono con il corpo, si nascondono in oggetti di uso comune. Questo approccio è riscontrabile in diverse soluzioni allestitivo di studi quali ad esempio NEO, CamerAnebbia e – pioniere su questo fronte – Studio Azzurro. Le tecnologie digitali diventano un medium per esperire contenuti, generare narrazioni performative, stimolare interazione. In quest'ottica giocano un ruolo fondamentale l'interaction design e la user experience design, entrambe discipline che si occupano di progettare e verificare la relazione tra utente e dispositivi con i quali esso interagisce con tutte le implicazioni psicologiche, percettive, sensoriali, cognitive che questo approccio comporta. Il progetto museografico-allestitivo diventa ora più che mai un contesto tanto complesso quanto sfidante per la messa in scena di narrazioni culturali di tipo esperienziale e performativo. In particolare l'esperienza sonora e cromatica assumono un ruolo fondamentale nella veicolazione dei contenuti e nella caratterizzazione dello spazio allestitivo. Tale ruolo non è solo significativo in sé, ma in quanto approccio sinestetico e sinergico in grado di potenziare l'esperienza del visitatore. La componente percettiva nella fruizione culturale è fortemente segnata da aspetti sensoriali visivi (colore) e uditivi (suono).

Il paper si propone quindi di mettere a fuoco la potenzialità fruitiva derivata dalla sinergia tra suono e colore nel progetto allestitivo.

Verranno individuati diversi casi studio relativi ad allestimenti museali e mostre temporanee in cui la sinergia tra progetto sonoro e cromatico risulta particolarmente efficace nella narrazione e messa in scena dei contenuti.

Tali casi studio verranno sistematizzati in categorie interpretative che terranno conto dell'impiego di suono e colore sia a livello spaziale (suoni puntuali, suoni diffusi, colori d'accento, colori diffusi) sia a livello funzionale (suoni evocativi, suoni narrativi, suoni descrittivi, colori simbolici, colori allusivi). Verranno utilizzati gli strumenti metodologici della "partitura narrativa" (omissis 2014) e della "partitura emotivo-cognitiva" (omissis, Bollati, Borney 2021) per analizzare l'esperienza di visita nello spazio.

**Keywords:** exhibit design, sound design, cultural experience

**11:40, Paper n° 69**

**Verso un modello di progettazione didattica STEM/STEAM al confine tra Didattica generale e disciplinare.**

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**Abstract**

In un nostro precedente articolo (Martini et al., Teaching and learning color. An insight into STEM/STEAM approach, 2021), abbiamo cercato di definire operativamente l'approccio STEM/STEAM alla Color education attraverso l'identificazione di alcuni principi procedurali che

possano supportare gli insegnanti nella trasposizione didattica del colore, fonte di molteplici misconcezioni (Feher, *Children's conceptions of color*, 1992). Questi principi, concepiti come schemi pragmatici di comportamento (Stenhouse, *An introduction to curriculum research and development*, 1975), sono stati formulati combinando variabili epistemiche (relative alla conoscenza da apprendere) e variabili di apprendimento (relative al soggetto che apprende), individuate in relazione a quattro distinte direzioni di integrazione che abbiamo definito come invarianti dell'approccio STEM/STEAM (integrazione tra diverse discipline di insegnamento; integrazione tra teoria e pratica; integrazione tra conoscenza disciplinare e contesti reali; integrazione delle tecnologie nella didattica). In questo contributo riferiremo della fase successiva della ricerca, tuttora in corso, consistente in una prima validazione del modello teorico condotta attraverso un'analisi comparativa tra il modello e alcune unità didattiche STEM. In particolare, l'analisi comparativa riguarderà un'unità di apprendimento su "natura della luce e del colore", progettata per una classe IV di liceo scientifico nell'ambito dell'insegnamento di fisica. La docente, co-autrice del contributo, è stata coinvolta per l'ampia esperienza di insegnamento, nonché per la sua competenza in ambito di STEM/STEAM education, sviluppata in particolare durante la frequentazione della scuola di Fisica "Luce e Ottica" organizzata nel 2020 dall'Università di Udine. In questo contesto è infatti maturata, da parte della docente, l'esigenza didattica di approfondire l'evoluzione storica della teoria della luce, dagli iniziali contributi di Newton e Huygens fino alla contemporaneità, per consentire agli studenti di comprendere le basi concettuali ed epistemologiche della teoria della Relatività Ristretta e della Meccanica Quantistica, adottando un approccio di tipo interdisciplinare (fisica, matematica, tecnologia, biologia). L'obiettivo di questa fase della ricerca, oggetto del presente lavoro, consiste nell'aggiornamento e nel perfezionamento del modello teorico, elaborato da una prospettiva didattico-generale, attraverso il confronto con il concreto lavoro di progettazione didattico-disciplinare, a vantaggio della produzione di uno strumento operativo per la trasposizione della conoscenza esperta in conoscenza da insegnare capace di integrare strutturalmente entrambe le prospettive.

**Keywords:** STEM, STEAM, apprendimento del colore, progettazione didattica, principi procedurali per l'approccio STEM/STEAM

**11:55, Paper n° 71**

**Il colore, un alleato delle sezioni educative museali. Un viaggio tra casi, tecniche e approcci.**

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**Abstract**

Fin dall'apertura al pubblico scolare dei primi laboratori educativi negli spazi museali, la tematica del colore ha avuto un ruolo significativo nei diversi percorsi volti a valorizzare i patrimoni esposti. Fra i casi più emblematici citiamo, a titolo esemplificativo, i laboratori ideati da Bruno Munari per la Pinacoteca di Brera nel 1977.

Da allora le diverse sezioni didattiche, hanno continuamente rinnovato la loro offerta riservando a questa tematica un posto significativo nelle loro programmazioni. Che si tratti di musei scientifici, dedicati all'arte antica, moderna o contemporanea, di musei etnografici o di parchi tematici, il colore è un argomento utile per osservare, approfondire o semplicemente iniziare ad approcciarsi al patrimonio musealizzato, alle mostre ed eventi temporanei o straordinari, come ad esempio il restauro di un'opera. Lo scopo del presente contributo consiste nell'riportare una panoramica delle diverse proposte messe in campo dai musei allo scopo di implementare il lavoro di ricerca, pubblicato in occasione della XIV conferenza sul colore del 2020: "Giocare ed educare al colore rosso attraverso azioni esplorative e didattiche". In questo caso, il contributo procederà ad una disamina aperta a tutte le tinte, con l'obiettivo di rintracciare una varietà di obiettivi pedagogici che oltre ad affrontare aspetti relativi all'educazione al patrimonio culturale, indagherà gli elementi dell'educazione alla comunicazione visiva e alla percezione, esplorando le differenti possibilità di

conoscenza del significato del colore in termini culturali, linguistici, scientifici ed emotivi.

**Keywords:** heritage education, didactics of color, visual studies

**12:10, Paper n° 34**

**Gli effetti 3D nella cartografia di Leonardo da Vinci. Dal chiaroscuro al colore.**

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**Abstract**

Facendo riferimento al Trattato della pittura, opera in cui sono stati raccolti nel 1540 gli scritti di Leonardo da Vinci probabilmente dal suo allievo Francesco Melzi, il contributo si propone di analizzare alcuni esempi di rappresentazioni cartografiche di Leonardo a scala urbana e territoriale, mettendo in evidenza l'innovazione che l'artista fiorentino apportò alla tecnica cartografica, anticipando quella che sarà poi la rappresentazione orografica a tinte ipsometriche adottata nei secoli successivi e tutt'oggi ancora adoperata nella rappresentazione digitale e nei sistemi informativi geografici. Studiando gli effetti della luce e del colore, alle forme geografiche Leonardo conferisce, attraverso l'ombreggiatura, un effetto tridimensionale accentuato dall'intensità di colore che aumenta non solo nelle zone di ombra ma anche per rappresentare, ad esempio, le cime più alte dei rilievi montuosi o le acque più profonde dei fiumi o dei laghi.

Al chiaroscuro Leonardo attribuisce una grande importanza, perché rappresentava il punto di partenza per la realizzazione di un'opera pittorica. La prima operazione per la realizzazione di una pittura era, infatti, disegnare l'oggetto e poi tracciare il chiaroscuro con un colore bruno. Si iniziava così un primo studio sui rapporti tonali della rappresentazione, realizzando il cosiddetto "mezzo tono di base", su cui i colori stesi successivamente avevano una resa migliore.

Nel trattato numerosi sono gli stimoli, i suggerimenti, gli insegnamenti che si possono trarre soprattutto mettendo a confronto le regole e i principi descritti da Leonardo con la sua produzione cartografica. Ripercorrendo i principi teorici e pratici enunciati nel Trattato, su cui ancora oggi si basa la teoria della rappresentazione, il contributo si propone di sperimentare, sulla base di alcuni esempi, una metodologia di indagine del colore cartografico utilizzato da Leonardo al fine di elaborare una sorta di *legenda digitale relazionale* che contenga notizie non solo sulla scelta cromatica, ma anche sul percorso di conoscenza della realtà che Leonardo compie attraverso la pittura intesa come scienza basata sulla logica, matematica e geometria.

**Keywords:** Leonardo da Vinci, rappresentazione 3D, cartografia storica, tecnica grafica, chiaroscuro e colore.

**12:25, Paper n° 61 (online short presentation)**

**Luce e colore come elementi narrativi nei Cultural Games.**

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**Abstract**

Il presente contributo indaga alcuni videogiochi culturali prodotti, negli ultimi anni, da musei artistici e archeologici, al fine di comprendere come il colore possa divenire uno strumento visivo in grado di supportare il gioco e la narrazione culturale. Le metodologie tradizionali di analisi del linguaggio visivo sono adattate ai due caratteri peculiari del nuovo medium: l'interattività e la navigabilità degli spazi virtuali di gioco. Scopo della ricerca, infatti, è riconoscere il colore sia come strumento

adoperato dal game designer nell'organizzazione della struttura narrativa sia come elemento visivo percepito e interpretato dal giocatore nello sviluppo delle azioni di gioco.

**Keywords:** colore narrativo, videogiochi, patrimonio culturale, colore interattivo.

**12:30, Paper n° 29 (online short presentation)**

**“Armonizzare il nuovo con l’antico”: toni chiari e toni scuri sulle superfici lapidee di restauro a Venezia.**

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**Abstract**

A partire dalla metà del XIX secolo, in seguito allo sviluppo di una nuova consapevolezza e una attenzione operativa rivolte alla conservazione delle testimonianze materiali e cromatiche delle superfici lapidee dell'edilizia storica, si sono determinate delle esperienze di cantiere che testimoniano alcuni percorsi di ricerca cresciuti in particolare nel centro storico di Venezia. Questi percorsi possono essere letti in relazione al contesto socio-culturale di periodo con impostazioni che variano dalla sostituzione di parti, al completamento di mancanze, dalla velatura delle parti aggiunte alla pulitura differenziata di porzioni diverse originali. Attraverso alcuni casi di cantieri importanti, distribuiti temporalmente tra la metà dell'Ottocento ed oggi, è possibile tracciare una lettura che permette di comprendere le modalità di approccio al restauro delle superfici lapidee soprattutto in riferimento alla bianca pietra d'Istria, che costituisce il litotipo più utilizzato a Venezia dal XIV secolo. L'idea principale, che viene enunciata e si diffonde con accezioni diverse, mira ad armonizzare le parti sia a livello di micro-contesto di porzioni dell'edificio sia nella lettura dell'insieme dello spazio urbano dove l'edificio si colloca. I dibattiti, anche aperti ad un pubblico fruitore, e le sperimentazioni sui modi di percepire le superfici, in relazione ai depositi, alle alterazioni, alle sottili sovrapposizioni intenzionali, alle parziali sostituzioni, anche con materiali diversi, o aggiunte, mettono in luce come diversi sono i toni di chiaroscuro che si possono ottenere a seconda dei fattori di scelta progettuale e degli attori in gioco: dal colore nero di un deposito, definito anche crosta nera, al bianco candido della pietra eccessivamente pulita vi è un mondo di tonalità che vanno scoperte nelle loro componenti materiche, nelle loro origini, naturali o artificiali, e nelle forme di intervento, dal semplice lavaggio, alla mezza pulitura, alla pulitura sbiancante ottenuta con tecniche diverse. In questa lettura delle possibilità che si possono presentare si intende richiamare l'attenzione e l'esperienza che richiede una superficie lapidea, pur considerando un singolo litotipo come la pietra d'Istria.

**Keywords:** restauro lapideo, pietra d'Istria, patinatura, velatura, pulitura, nuovo-antico, tonalità pietra

**12:35, Paper n° 30 (online short presentation)**

**La riproduzione su intonaco del paramento lapideo: variazioni e tecniche tra monocromie e pentacromie.**

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**Abstract**

Sulla base di un approfondito studio delle testimonianze materiche storiche persistenti sulle superfici murarie esterne dell'edilizia di molti centri urbani del Nord-est è possibile evidenziare i caratteri e i significati della rappresentazione di un paramento lapideo ottenuta con materiali più poveri. Il rivestimento ad intonaco si presta, infatti, ad accogliere diverse forme di simulazione di altri materiali, e nel caso della pietra permette di ottenere sia le varietà cromatiche dei litotipi che le forme di lucidatura che simulano la levigatura dei marmi, sia le lavorazioni in rilievo delle superfici che la definizione costruttiva in elementi di dimensioni diverse.



La distinzione principale nelle composizioni di finte forme lapidee deve partire dalla caratterizzazione delle zone estese di campitura rispetto agli elementi di disegno architettonico. Le campiture, prevalentemente planari, sono ottenute con materiali aggregati o con pigmenti in affresco riferiti a specifici litopiti, associati in molti casi a lavorazioni e additivi che ne accentuano gli effetti di levigatezza e lucentezza.

Tra le rappresentazioni delle forme lapidee che partecipano al disegno architettonico dei fronti si identificano le fasce orizzontali, le angolate e i contorni delle aperture, ciascun tipo ottenuto con modalità legate a variazioni cromatiche, e/o a modellazione del rilievo della superficie. Tra i temi principali di simulazioni di tessiture lapidee si riconoscono, in particolare, le differenti forme di bugnato: nelle varietà di profilo da quello gentile a quello a punta di diamante ottenute soprattutto con finte ombre portate, nei tipi di lavorazione da quello rustico a quello levigato, e nelle variazioni di colore da quello monocromo a quello policromo.

Rispetto alle testimonianze materiche persistenti collocabili tra XIV e XX secolo è possibile tracciare una lettura delle tendenze tecniche e cromatiche prevalenti nei vari periodi storici, che sono in relazione con i relativi stili architettonici. Nei secoli del Medioevo e del primo Cinquecento la rappresentazione avviene tramite superfici planari con ampio impiego di colori, mentre nei secoli successivi prevalgono le monocromie e si accentua la superficie lavorata con diversi gradi di rilievo. Lo studio costituisce un diverso approccio alla lettura delle superfici rivestite con intonaco che permette di comprendere le evoluzioni dei gusti, le migrazioni nel tempo di linguaggi dalla pietra all'intonaco, e le intenzioni celate dei costruttori e degli artisti decoratori.

**Keywords:** finto paramento lapideo, finto bugnato, decorazione su intonaco, finto marmo venato, marmorino

**12:40, Paper n° 31 (online short presentation)**

**Trattamenti policromi su pietra tra Medioevo e Rinascimento: una componente, quasi, perduta dell'immagine di Venezia.**

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**Abstract**

Nell'immagine storicizzata di Venezia vi è sempre stato un forte legame con la vivacità dei colori dei materiali, declinati soprattutto come sottili rivestimenti policromi delle superfici murarie, laterizie e lapidee, soprattutto dei secoli medievali della trazione romanica e gotica e del primo Rinascimento cinquecentesco. Questo legame con il colore viene fatto risalire al mondo tardo-antico e bizantino la cui ricchezza di cromatica diventa un riferimento, in area lagunare, anche per altri tipi di rivestimenti basati sulla luminosità dei materiali, come le tessiture a mosaico.

La varietà cromatica è espressione di leggerezza, smaterializza le superfici, e costituisce un'esibizione di ricchezza di una città che cresce nei secoli del medioevo. Queste caratteristiche si associano alla prevalenza di superfici piane con pareti relativamente sottili, senza profondità materiche, che determinano articolazioni con lievi incisioni dei rivestimenti e superfici delle facciate dell'edilizia civile scavate dalle ombre, dai contrasti di pieni e vuoti, dai chiari-scuri delle aperture. Le superfici piene erano concepite, quindi, come luogo del colore vivo che nonostante le tonalità proprie dei materiali, come il laterizio e le pietre colorate, venivano accentuate da applicazioni di strati pittorici spesso per differenziare ed evidenziare elementi architettonici principali.

Nella visione attuale le superfici spogliate di queste finiture dal tempo ci appaiono troppo omogenee e lontane da quelle diversità concepite inizialmente. Gli strati di finitura apposti anche sulle superfici lapidee esterne hanno svolto, comunque, un doppio ruolo, da un lato di arricchimento cromatico delle forme scolpite e dall'altro di protezione rispetto alle forme di aggressione ambientale del sito lagunare.

Attraverso lo studio delle tracce materiche e delle testimonianze pittoriche, che permettono di rileggere molte superfici lapidee esterne in chiave policroma, in questo contributo si propone un tentativo di definire l'estensione della policromia su pietra, che pur di grande presenza nel medioevo

tende poi a svanire nel corso della prima metà del Cinquecento. Nel corso degli ultimi decenni, infatti, molti casi di restauro di superfici lapidee, accompagnati da analisi diagnostiche delle stratigrafie e dei materiali sussistenti, hanno permesso di individuare la presenza di lacerti di policromie stese con tecniche e materie diverse, come pigmenti minerali, lamine dorate, velature con sostanze organiche. Un esempio significativo è rappresentato da tutti gli elementi lapidei che formano la struttura portante o i rivestimenti dei diversi fronti di palazzo Ducale dove, nel corso dei cantieri di restauro, si sono potute disvelare presenze di strati pittorici su quasi tutte le superfici. I molteplici dati oggi disponibili diventano quindi un riferimento fondamentale per comprendere le diverse facies che ha assunto la Venezia storica.

**Keywords:** strati pittorici su pietra, policromia su pietra, pietre di Venezia, tecniche pittoriche, immagine di Venezia

**12:45, Paper n° 16**  
**Colore per una fortezza dalla guerra alla Pace.**

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**Abstract**

Voluta da Vittorio Emanuele II di Savoia dal 1732, e progettata da Ignazio Bertola, primo ingegnere del Re, la Cittadella di Alessandria (di forma regolare, esagonale, "alla moderna") si configura, ancor oggi (su un'area di 60 ettari) come "antologia dei tipi della difesa" nell'Alessandrino e nella rete europea, per i suoi caratteri formali e strutturali, ispirati ai modi "all'olandese" di Minno di Coehorn e "alla francese", di Sebastien Le Prestre di Vauban, ingegnere del Re Sole. In tempi molto recenti, per valorizzare al massimo questo complesso bene culturale - nelle componenti materiali e immateriali - ho potuto proporre il progetto (ora accettato e validato) di "Comunità Patrimoniale", secondo la Convenzione Unesco di Faro (2005) grazie al fattivo sostegno e supporto del Consiglio d'Europa (Pavan-Woolfe, Pinton, 2019), del prof. Calzolaio, Coordinatore di Faro Italia Platform, del Politecnico di Torino, del FAI, della Municipalità (e con i soggetti e associazioni alessandrine interessati). Il titolo del progetto (la "Cittadella di Alessandria Faro di Pace in Europa") è stato ispirato (Marotta, Di Stefano 2014) dallo stesso nome (Bergoglio) del quartiere sul quale la Fortezza è stata edificata, in omaggio a Papa Francesco, figura di pace: un tema oggi confermato in tutta la sua drammatica attualità, e da estendere (quando possibile) alle altre Cittadelle in Europa (Marotta, Netti 2022). Fra i tanti obiettivi (che il logo dovrà veicolare), c'è la programmazione, la valorizzazione e la gestione dell'offerta di turismo culturale sostenibile, dal livello locale all'internazionale, per "fare rete", anche con iniziative su temi etici, comprese quelle di assistenza e beneficenza, soprattutto per le vittime della guerra (massime i bambini) verso la Pace: con una funzione, dunque, altamente simbolica.

**Keywords:** Colori per la Pace, disegni infantili nella guerra, marketing e turismo culturale, psicoterapia

**ONLINE ORAL SESSION 10 (ENG)**

Topic of interest: 1, 3, 10

(AULA FERMI)

**11:10, Paper n° 39**

**Evaluation of chromatic alterations due to Ag-functionalized nanocrystalline cellulose on Whatman and Amalfi paper.**

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**Abstract**

Great part of the History of mankind is registered in form of work of art on paper support. Paper can be deteriorated due to physical, chemical, and biological agents. Among these latter, fungi represent the major paper biodeteriogens. Several methods have been used to control or stop fungal deterioration on paper-based materials, but their use can in turn induce color variations on paper. In this work a treatment for preservation and consolidation, based on nanocrystalline cellulose and silver nanoparticles (CNC/Ag) is analyzed. Two different types of paper (Whatman #1 and Amalfi) are treated by means of the suspension. Then spectral reflectance measurements are performed to infer CIELAB color coordinates of treated and not treated paper, in order to study the differences. It has been found that the use of CNC/Ag induces a pink coloration in the paper (reducing its hue), determines a darkening effect (reducing its lightness) and increases the saturation. Moreover, these alterations get more significant on time varying.

**Keywords:** color analysis, color alterations of paper, CIELAB color space, paper damages, antifungal methods.

**11:25, Paper n° 21**

**A possible new method for Forensic Document examination: Plasmonic colors.**

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**Abstract**

**Introduction-Purpose:** In the examination of forensic documents, it may be necessary to examine the document by various methods. It is one of the important methods to reveal the features that exist in the document but are not visible enough or not at all in visible light with various optical methods. Conventionally, the light falling on the document from a light source or the filtering of the available light are used singly or in combination. Another conventional method for the perception of colors is pigments. They create a color perception according to the light that is absorbed and reflected according to the incident light.

**Materials-Methods:** Plasmonic colors are associated with surface plasmon resonance. Surface plasmon resonance is the resonance oscillation that occurs at the interface between the negative and positive permeability material, which is caused by the excitation of transmission light electrons in metals or photonic crystals with incident light. Thus, colors can be created without pigment and without the need for an additional light source. In recent decades, it has been used industrially with the development of nanotechnology and software technology. The possible use of this method in

Forensic Document review is examined.

Results: The formation of plasmonic colors with liquid crystals can cause rapid color changes in the skin of some animals in nature. Thanks to nanotechnology and software technology, similar liquid crystals can be created artificially. Since only ambient light is used in the formation of liquid crystals and plasmonic color, additional light sources are not required for pigments or light color vision. These features can become a significant advantage during forensic document review. A nanotechnological liquid crystal layer to be applied on the document or a liquid crystal layer that will only be leaned against the document can create different and various colors depending on the characteristics of the document surface and substrates. Optional adjustable changing of perimeter beams can also be used as a separate parameter in forensic document examination.

Discussion-Conclusion: The fact that no pigment is required in plasmonic color rendering ensures that the originality of the document is not damaged. Using only ambient light also reduces possible radial damage to the forensic document. With the plasmonic color technology, document structure information that could not be obtained until now can be accessed with the least damage to the document.

**Keywords:** forensic document, light source, liquid crystal, nanotechnology, plasmonic colors

**11:40, Paper n° 32**  
**Twilight | Spatial Experiments.**

Dr. Birgit Schulz

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**Abstract**

Twilight is a term that immediately evokes images and atmospheres of those lighting situations that occur naturally in the morning and evening during dusk or dawn, or they are artificially created through art projects. Sometimes these dramatic situations of divided light threshold experiences are connected to light and darkness, waking and sleeping or even life and death. There is no clear line of demarcation to be drawn, one way or the other, as the twilight is neither immediate nor abrupt in its ending. Bernhard Waldenfels speaks of a "dividing zone" with a certain extent, which one can hesitantly enter and linger waiting before entering another space or condition. It is a certain waiting status that spreads between a no longer and a not yet (Waldenfels, 2013).

The LightLab at the Institute for Spatial Design at Graz University of Technology deals to sensitize students in the field of light and space in architectural education. During winter semester 2019/20 the LightLab established a cooperation with the association mehr licht. Within this context of collaboration, we established a four-day workshop dealing with the subject of twilight for TU Graz students attending the course Spatial Experiments. During the short but intensive work phase, the students created drafts for spatial installations and their concrete implementation inside the castle-hill Schlossberg Graz. The castle hill Schlossberg is a hill in the middle of the historic center of Graz and the city's landmark. We concentrated with our students of the interior path through the Schlossberg and its caves inside, which is a former air raid shelter from the times of the second world war. The students developed interventions in the tunnels using sources from the institute, set pieces such as color filters, various materials, fabrics, strips of paper, etc.

**Keywords:** color, light, material, spatial perception, space

**11:55, Paper n° 1**

**Colour Harmony in Design and Architecture: theory, practice education.**

Larissa Noury

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**Abstract**

The harmony of colour is a universal, transcultural phenomenon. Whether the creation of images, the invention of drawings for the design industry or the construction of urban spaces, it represents a system of coded messages of the visual world that helps us to apprehend, evaluate and act in different contexts. Through the prism of historical and intercultural approach, our study shows the evolution of colour harmony and invites you to an imaginary journey into the infinite universe of colour harmony in different cities of the world. Throughout space and time, it shows us how the phenomenon of colour and its symbolic language have evolved alongside the civilizations.

**Keywords:** colour harmony, evolution, art, fashion, design, architecture, environment, education, artistic movements, architectural styles, cultural identity

**12:10, Paper n° 3**

**The "Pink Mask Affair": Why did Italian police refuse to wear pink FFP2 masks?**

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**Abstract**

On 13th January 2022, some Italian police stations received stocks of pink FFP2 masks to protect them from covid 19. Many officers thus refused to wear it because the colour would not be appropriate for a police officer, alerting the Sindacato Autonomo di Polizia – SAP. This article aims to revisit the "Pink Mask Affair", to identify and detail the reasons that could or might have led police officers to refuse to wear pink masks. It proposes two hypotheses: 1) the association of pink with feminine and femininity could have led male officers to refuse to wear pink mask for fear of being perceived feminine; 2) bright and pastel colours are not appropriate for police officers because they are also associate with femininity.

**Keywords:** pink, masculinity, history of colour, Covid-19 pandemic, Italian police

**12:25, Paper n° 5**

**Grey Zones: On Photography & Progress.**

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**Abstract**

In discussing the speed and instantaneity of today's world, particularly as wrought by globalization and technological advancement, Paul Virilio holds that we live in a grey ecology, or "an ecology of the acceleration of reality," marked by the pollution of distance, in part due to the trajectory of optical technologies for capitalist-driven warfare. Grey, however, is also a color of possibility. For Vilem Flusser, it is "the color of theory," resistant to black-and-white renderings of the world given its complexity. László Moholy-Nagy's photographic practice literalizes Flusser's grey, as the artist praises the manifold gradation of value in photographic images, which themselves, as works of art, may lead to new productive relationships for the betterment of humanity. Yet, drawing from the idea that a grey zone is a liminal space, a twilight, Cohen writes, "[a] sensual grey ecology is inhuman,"

and grey is “a process more than a color.” How do we reconcile the inhumanity of grey with the liminal possibilities it offers us? What does a grey aesthetics reveal, and what does it obfuscate? This presentation compares characterizations of photography in relation to social and technological progress from the early 20th century to the early 21st century. Drawing especially on the writings of Moholy-Nagy, Flusser, Virilio, and Cohen, and analyzing the greyness inherent to modern visuality in their writings, I argue that photography and progress, each informing the other, create grey zones, liminalities, mired in complex socio-political and spatial-temporal arrangements, muddying perceptions of distance through aesthetics of speed and the immaterial.

**Keywords:** photography, modernity, technology

**12:40, Paper n° 7**

**Reversal film transparencies and their colours: examining the medium of an era.**

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**Abstract**

Colour reversal film transparencies (slides) are a medium that seems to have, almost, disappeared. They gained their prominence mostly between the 1950s to 1970s, as a preferable photographic choice, since their vibrant colours gave them an edge over negative film photographs, not only as a professional option but also as a means of recording family moments. Slide showing became a social activity. The gathering of people, cinema-like conditions and interaction made them quite popular. The question which we will concentrate on is about their colours and how this is consistent with the colour palette of their era. In the current study source material, from a family collection, is utilised and an empirical approach and analysis is applied. The study concludes that the medium employs the colours of their times, and how this helps with the preservation of these items, not only as family archives but as cultural objects enriched with semiotic elements.

**Keywords:** slides, transparencies, colour, images, semiotics, social interaction

**ORAL SESSION 11 (ENG)**

Topic of interest: 9, 12

(AULA TORALDO)

**14:00, Paper n° 24**

**Fly in color. A chromatic “model” for the cabin of a commercial aircraft.**

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**Abstract**

The European research CASTLE (Cabin System Design Towards Passenger Wellbeing) puts the passenger's perception of well-being at the center of a prototype commercial aeronautics project. From this point of view, the evaluation of ergonomics and the travel experience become the objectives of an analysis of the space/context in which color, integrated with the functional components, of the shape and materials, becomes a tool for the concept design of the cabin space. The methodological approach developed therefore entrusts color to a primary role in defining the state of well-being and identity of the cabin space, through a "color model" that can be scaled in relation to the colors that each company will choose for its own color image.

**Keywords:** CMF design (colors, materials, finishes), UXD user experience design, HCD human centered design

**14:15, Paper n° 28**

**Chromatic identity of the urban tile panels: the scenario of Lisbon subway stations.**

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**Abstract**

The city is a living organism characterized by its economic, social and cultural dynamics. Metropolitan cities are becoming smart environments and this concept strongly relates to the cultural identity of the place and the mechanisms that improve user interactions throughout the delight of the experience. Colour is a significant element of the identity of the place, contributing significantly to qualify the users' experience of the place.

The diversified users' experiences, supported by human daily routines and interactions are significant components of the place's identity. The plenitude of users' experiences in a particular place is granted by built environ, geographical location and orientation, the shape of buildings and equipment (as well as the finishing materials identifiers of constructive processes and / or traditional materials), cultures and contemporaneous trends.

With the city of Lisbon as a backdrop scenario, it is possible to explore its urban tissue and identify the different cultures or the sequential gentrification processes that Lisbon suffered from the first millennium, with particular emphasis on the Arab occupation and its tiling mode – adding a new skin to the facades - featured by its geometric and chromatic patterns.

In spite of such cultural heritage, the last decades witnessed a proliferation of achromatic palettes to respond to modernism architectural movement requirements and trends that go along with acknowledged names of Portuguese architecture.

Therefore, the tile panels were relegated to mural panels on city crossing points and subway stations, acting like a tattoo on the built skin, with monochromatic and / or polychromatic graphics pattern, contributing to a figurative and symbolic image of the place.

Smart cities aim to develop new ways of transportation, and the public ones, such as the subway, emphasizes their importance. Subway stations are places where a considerable number of individuals interact with the space and with each other while waiting for transport. The ambience provided is of major importance to ease waiting times as well as overcrowding at peak times. More than the finishing of the building, the wall and / or the object, tiles panels are constituents of semiotics and Lisbon's imagery, and subway stations are one active part of the city. This paper aims to create a deeper understanding of the influence of the tile's panels to the image (graphic and symbolic) of the Lisbon subway stations, and their input to qualify users' experience. For that, 3 case studies (representative of the chronological age of the subway stations) will be analysed (focused on defining and registering the predominant colours, on the message associated with the graphics represented, the reason beyond their choice and application, as well as their contribute to the feeling of security, visual comfort, orientation and aesthetic pleasure of the user) to a broader understanding and further discussion.

**Keywords:** tiles chromaticity and patterns, smart cities, semiotics, imagery, subway stations of Lisbon

**14:30, Paper n° 51**

**Research on Colour in Industrial Design: Brief History, Overview of Methods and Stories of Successful Products.**

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**Abstract**

Colour in industrial design is a subject that has been considered from both scientific and artistic positions, but has primarily been the domain of practitioners making choices for technological, functional and marketing reasons. The development of design education, whose milestone was the Bauhaus, based colour design on scientific theories, created by artists and art theorists, in which aspects of visual perception and subjective experience of colour were the most important. The creators of industrial colour systems tried to find a formula for harmonious colour combinations, written in an objectivised way so that it could also be applied by engineers who were not necessarily gifted with an innate talent for colour. In turn, predicting and steering the choice of colours by the public became the domain of many national and international trend forecasting organisations, resulting in the development of an international calendar, generating successive life cycles of individual colours and colour combinations. In industries where trends are not as important, the choice of product colours is linked to factors such as brand identity, functional requirements, technology and project budget. However, always one of the important factors in colour selection was the designer's style and colour preferences, which could significantly influence the product's visual identity.

The paper analyses 8 famous projects from the years 1950-2006 whose colours introduced significant changes in the approach to product colour design. An attempt is made to indicate the design methods and basic design criteria that influenced the choice of product colours from an aesthetic, semantic and functional point of view. The author will discuss the colour design process for the following products:

Moulded Fiberglass Chairs - Charles and Ray Eames for Henry Miller, 1950 - 1953

Cadillac Coupe de Ville - Harley Earl for GM, 1959

Valentine Portable Typewriter - Ettore Sottsass, 1969

Black Cube 12 - Richard Sapper and Marco Zanuso, 1970

Tahiti Table Lamp - Ettore Sottsass, Memphis, 1981

Nokia 5110 - Frank Nuovo for Nokia, 1998

iMac G3 - Jony Ive for Apple, 1998

Polder Sofa - Hella Jongerius for Vitra, 2005

The analysis was based on press articles, company materials, designer statements and literature on industrial design and colour theory.

**Keywords:** colour design, industrial design, design education



14:45, Paper n° 67

**Chromatic Vocabulary: the colour design research according to Gianfranco Ferré.**

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**Abstract**

The study of color in the fashion design field has been much debated. From being a source of inspiration for designers, the use of color acquired an evident relevance as an element capable of defining the perceptive variations and intrinsic meanings established in the dialogic relationship between the material and its cultural dimension. Consequently, it becomes a communicative and visual vehicle of great impact, defining personal and social identities and conveying messages that address today to a larger audience.

In its relationship with matter, we can notice that color takes on a stronger semantic connotation. It is a linguistic element that, particularly in fashion, contributes to the overall narrative of creation that finds the codes of its language in the identity of the individual but also in the socio-cultural context in which it is immersed. Fashion and cultural studies have now shown that if fashion is an expression of the self, color is actually a tool for constructing a personal statement and expressing it. Therefore, color - as an expressive code and bearer of shared socio-cultural values - strongly influences the value, design and identity construction of fashion itself.

One fashion designer who has always distinguished himself for his rigorous and complex creative process in the use of color was Gianfranco Ferré. His teaching and design method was expressed through the contamination of three variables – color, shape and matter – declined in a plurality of models and formats that express desire, dream and luxury, without losing any connection with the real and material world.

For Ferré, the use of color plays a primary role, in realizing unique and irreproducible combinations of form and substance, for conveying precise feelings and emotions, enhancing the body of the wearer. For this reason, Ferré considers the choice of colors and their shades an “intentional” act born at the same time as the idea of the dress itself and that guarantees coherence and identity among seasons and collections. Due to the uniqueness of his creative process, which represents still nowadays a multifaceted material of study, this paper aims to analyze and investigate the role of color in Gianfranco Ferré’s method and how it became effectively part of his lexicon. Case studies, practical examples and lectures held by the designer will show the relevance of the color and its articulation in his production, from the influence of his sources of inspiration to his iconic “white shirt” whose color justifies the existence itself of the shirt as a universal piece where tradition and innovation meet.

**Keywords:** color design research, Gianfranco Ferré, fashion design

**15:00, Paper n° 40**

**Go Somewhere Glossies: Experiential Color in Magazine Design.**

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**Abstract**

Color-laden, imagery-driven magazines—otherwise known as “glossies”—have seen dramatic increases and decreases in readership in our digital age. In many markets, the global pandemic caused a spike in magazine shopping and consumption, and bookazines as typology—“single-topic deep dive magazines”—trended (Topic: Magazine Industry, 2022) (The Magazines People Have Been Reading During the Pandemic – WWD, 2022). This paper provides an in-depth examination of the design process of creation of a two-volume travel magazine publication designed to convey the haptic experience of color.

**Keywords:** color and publication design, color and material, color and culture, color and environment, haptic color, magazine design.

**ONLINE ORAL SESSION 12 (ENG)**

Topic of interest: 2, 3, 4, 6, 8, 9, 10, 11, 12  
(AULA TORALDO)

**15:35, Paper n° 43**

**A New Paradigm for the Definition and Universe of Static Colors and Dynamic Colors.**

Rui Pessoa Vaz de Figueiredo Vasques, António José Macedo Coutinho da Cruz Rodrigues,  
Diamantino Abreu  
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**Abstract**

This article presents a new paradigm, for the definition and universe of *Static Colors* and *Dynamic Colors*. As the central issue, and the main innovation in the theoretical study of The PhD research in Design by Rui Pessoa Vaz de Figueiredo Vasques, this new paradigm is presented, from the perspective of the study on the colors and natural pigments of the Serras do Socorro and Archeira, and its use by the Association Live With Earth - ECO CAMPUS, Torres Vedras.

The author considers the current definition in force to be small and incomplete, which tells us that "*static colors* are cold colors associated with terrestrial poles, and *dynamic colors* are warm colors associated with equatorial regions." On the contrary, it defends and proposes a new paradigm and definition, in which "*static colors* are the colors that come from the human being, and *dynamic colors* are the colors that come from nature." Is a new way of seeing the colors, and understanding from a wider overview, how the colors co-exist and how they communicate.

This new paradigm essentially contemplates one of the triangulations resulting from the *Advanced Methodology in Design of Divergence-Convergence*, which groups five works by different authors, transposing for each triangulation a "project track"/keyword, in a very concrete idea: The Order of Group as the pigment and the isolated color and the Order of Symmetry as the junction of pigments and the colors in metamorphoses (Gevin Giorbran, *Everything Is Forever*); The Rainbow and Halos as *dynamic colors*, the reproduction of colors of photography, film and television as *static colors* (Luis Bernardo, *Histórias da Luz e das Cores*); The causes that originate the colors of the soils and the understanding of color in Geology (*Caracterização e Constituição do Solo*, Joaquim Costa); The rationalization of colors and the creation of definitions and color codes in various fields, as part of the birth of static colors (Goethe, *Doutrina das Cores*); The holistic view of the world and education for sustainability through natural pigments (Gaia Education, *Education for Eco-Village Design*).

In order to understand these concepts, the author explains us in this article the difference between *static colors* and *dynamic colors*, and how this can be compared for example with music, which is a human interpretation of the sounds of nature, choosing 7 main notes, between an almost infinite number of sounds. The same happens with the *static colors*, which are the human interpretations of colors and creations through colors. Colors that come from nature, from the source, the *dynamic colors*. With the objective of adding value and knowledge, about the colors and natural pigments in the universe and discipline of Design, this investigation starts with this proposed new paradigm and definition, and culminates in a set of recipes and eco-products, generated from the results of various practical experiences and prototypes.

**Keywords:** static colors, dynamic colors, colors in humans, colors in nature, communication, design

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**15:50, Paper n° 62 (online short presentation)**

**Color consistency in BIM systems and in the visualization of the project in Real Time - An overview of possible solutions.**

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**Abstract**

In today's panorama of tools available to the professional dedicated to architectural design, the BIM methodology has recently spread more and more widely than in the past. This is also thanks to an increasingly stringent regulatory imposition in public procurement, especially concerning the estimated amount of the works in question.

Furthermore, in the 2000s the visualization of the project was mainly linked to photorealistic static renderings or popular films obtained from sequences of static images. Nowadays, the computing power of the available hardware and the evolution of the rendering engines raytrace type have led to increasingly frequent use of virtual reality and augmented reality, which therefore become renewed tools available to the designer to visualize and make the works better understood by the client and other professional actors involved in the design.

In both cases, once the color of a finish has been acquired through correctly calibrated devices and standardized procedures, the problem of its correct representation arises here. The theme appears complex and needs to be explored carefully. This text is therefore intended to be an overview of the solutions currently available, thus analyzing how the currently available applications address the issue of color consistency in the context of BIM and virtual reality.

**Keywords:** colormangement, colorconstancy, virtualreality, BIM

**15:55, Paper n° 59 (online short presentation)**

**The open issue of color management in circadian interior design between the practice of lighting and color design.**

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**Abstract**

In the interiors, the light and colors of the perceived image are entirely different from the open-air ones, in which we have evolved for millions of years. We have gone from a life spent in the open air, working in the countryside, to one mainly indoor in a few generations. From this point of view, the change in the environments in which we live and our exposure to artificial lighting are both factors that have been introduced very recently[1]. With the 2017 Nobel Prize in Medicine awarded to Hall, Rosbash, and Young, the issue of circadian effects on people's well-being in interiors has been brought to the attention of industry manufacturers and innovation-minded designers. The word "circadian", composed of the Latin words circa and diem, describes a periodic biological cycle that lasts roughly one day[2]. In the human organism, there is a timed system that lasts about 24 hours, managed by the suprachiasmatic nucleus in the innermost and primitive part of the brain, through which all the physiological processes are managed[3]. The human body is made to function and synchronize according to the rhythm of the continuous variations of natural light[4]. Our physiology would require us to be exposed to natural light during the day and complete darkness at night, promote sleep, a fundamental function for health, and ensure the proper phasing of our circadian rhythm[5]. Some lighting designers try to mimic the behavior of natural lighting with indoor artificial lighting. While the idea may seem valid and healthy in the first instance, the design approach is often wrong. A single product or lighting design is not enough to properly stimulate the circadian system. It is the design of the environment as a whole that must be circadian because we always instinctively avoid looking directly at light sources because of glare. Instead, we are constantly observing the surfaces of the environment around us. The light that our eyes receive, and which contributes to the

visual system as well as the circadian system, is almost always diffused light from the surfaces of the environment, which in turn have physical characteristics that reflect to our eyes light generally modified by the light coming out of the luminaires. This paper presents state-of-the-art for bridging the gap between lighting and color design, trying to enter partly into the field of a new interior circadian design.

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5. Wright et al 2003. Entrainment of the human circadian clock to the natural light-dark cycle. Current biology

**Keywords:** interior design, lighting, color, circadian

**16:00, Paper n° 60 (online short presentation)**

**A leap in the dark! How understanding horses' color perception improves their performance and welfare in show jumping.**

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### Abstract

Collecting information about the surrounding environment is crucial for survival and most animals process that information primarily through the visual system. Ecology and life conditions shaped animal visual abilities and stimuli perception leading to a wide inter-species and inter-individual variability. This mostly occurs in color discrimination, which varies based on the number and type of photopigments located in the eye cones. Knowing how animals perceive colors becomes essential to design products or environments for domestic species or in those activities involving human-animal coordination. Show jumping is one of the most popular equestrian disciplines, attracting increasing attention on horses' welfare and safety. The probability of falls or injuries at jumps also depends on the capacity of the horse to see and respond to obstacles. The contrasting colors of obstacles with surrounding has been found to be decisive in perceiving the presence, the distance, and the size of the hurdle. Horses (*Equus caballus*) are dichromats, with two eye cone types, sensitive to short and medium wavelengths. They can see blue and yellow, while they are not able to distinguish red, orange, and green, unless brightness, shade, texture, and other features are well integrated.

The analyses of jump faults (obstacle knock-down or run-out) reported in literature confirm the correlation between obstacle colors and performance, highlighting the relevance of background colors, hurdle color schemes (monochromatic or polychromatic) and Light Reflectance Value (LRV) contrasts. However, most of the results can be hardly tested and/or compared, because the colors used are not characterized in terms of a standard color system (i.e., the Natural Color System or the Munsell Color system). Also, the models used to predict the horse color vision are, in most cases, not specified, so that visual predictions of similar colors shown in different studies look significantly different. Finally, the chromatic vision of riders could have a role in the jumping performance; nonetheless, this aspect has received little attention by researchers.

This paper initially introduces the main features of the horse visual system. A literature revision on the impact of color on the horse jumping performance is then reported, highlighting inconsistencies and problems that can be ascribed to a lack of familiarity with color science. Examples of obstacle color schemes (acquired by means of instrumental measurements) commonly used in jumping competitions or during training are analyzed, and the problem of instrumentally measuring background colors is considered. Finally, the paper proposes a framework with few procedural rules that can help in the design of obstacles for competitions and training. The results reported in this paper can represent a starting point to define a systematic approach in the color design of jumping obstacles in horse competitions.

**Keywords:** horse vision, horse-rider synergy, contrast measure

**16:05, Paper n° 53 (online short presentation)**  
**Colour fading of aged knitted materials for swimsuits.**

Katarina Krstović<sup>1</sup>, Martinia Ira Glogar<sup>1</sup>, Veronika Lovreškov<sup>1</sup>, Vesna Marija Potočić Matković<sup>1</sup>  
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**Abstract**

Textile materials for production of swimsuits are knitted. The characteristics of this type of fabric are durability, chlorine resistance, and comfort. In this paper, the properties of knitted fabrics from well-known manufacturers are examined. Nine different knitted fabrics intended for the production of swimwear are exposed to aging in seawater and chlorinated water, and the influence of the sun for 100 hours. The tested materials are made in a blend of polyamide and elastane fibers in different percentages. Change in color after aging was observed, and the results are presented as differences in CIELAB color parameters and total color differences. After exposure to aging conditions, it is observed that samples exposed to aging in the sea have a greater or approximately equal total difference in color from samples exposed to the same number of hours in chlorinated water. The average dE for samples aged 100 hours in the sun, in seawater, is 2,212, while the dE for samples aged the same number of hours, in the sun, in chlorinated water is 1,374.

**Keywords:** knitted fabric, swimsuits, polyamide, colour fading, outdoor weathering.

**16:10, Paper n° 14**  
**Experience of place: colour and lighting design methods in the process of inclusive housing projects.**

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**Abstract**

The periods of confinement that we have experienced have highlighted the proven impact of the quality of living spaces on their occupants. While the health crisis has been at the heart of many debates in recent years, it has only served to highlight the issues at stake and to accelerate research into the quality of life in collective housing. The notion of quality of life often translates into the ambition to build responsible buildings, responding to issues of air quality, water quality, energy saving (etc.), however, the design of visual environments must be considered in the same way as the other intrinsic characteristics of the dwelling as elements contributing to meeting the expectations of inhabitants in terms of health and quality of life for all.

**Keywords:** light design, colour design, visual comfort, property developer, collective housing.

**16:15, Paper n° 52 (online short presentation).  
Color Communication in Home Interior Design: An Analysis of Architectural Digest  
Covers from the 1980s, 1990s, and 2020s.**

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**Abstract**

This article intends to analyze how colors were communicated, within domestic interior design, through the covers of Architectural Digest publications, in the United States, aiming to understand the parameters that affect color, such as its hue, luminosity and saturation, in a way that conquers a deeper analysis of such characteristics. The analysis was made through the covers of magazines from the 1980s, 1990s and 2000s and made it possible to observe how this visual communication was carried out and implemented within the concept of interior design. A review of the literature was carried out, understanding of fundamental concepts and, finally, the experiment, thus generating a new knowledge of the application of colors in domestic interiors, in the context of worldwide magazines.

**Keywords:** light and color and its applications, interior design, color communication in interior design, architectural digest

**16:20, Paper n° 54 (online short presentation).  
Color and light in the photography of contemporary architecture.**

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**Abstract**

This paper studied color and their distribution through a series of photography of projects designed by the most influential and contemporary architects of lighting design. The main objective is to demonstrate the role of color and light as the most enduring symbols of change and innovation that can reveals the contemporary design and aesthetic principals. The methodology of this research was conducted by three complementary steps: firstly, the choice of representative projects designed with light as principal design element; the chosen projects are contained in the book by Peter HYATT entitled Masters of Light; it includes 55 projects spread over 8 different countries and designed by 14 internationally renowned architects. Second step was the data collection; by visiting the official website of each architect to obtain the photos published for each project. Third step was the evaluation of total color difference by computer simulation using specific software of color-coding to obtain matrix-images of each photo; the objective is to identify the dominant color for every photography. The results allow the elaboration of mapping of architectural photography and are expected to be adopted to create a recommended color range map for architectural photography which can be adopted during the early steps of lighting design. This study shows that an exhaustive research applied to a limited number of projects provided enough information to identify and select robust design solutions using light and color.

**16:25, Paper n° 33 (online short presentation)  
Book of Patterns - an ongoing project.**

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## **Abstract**

The idea for this project arose in discussions around housing spaces and their importance during the COVID-19 pandemic. The association Schablone works around these topics in an artistic-theoretical manner working on the design of the “own four walls”, by producing an artist’s book (sample book of rolling patterns), conceived as a limited edition with unique sample sheets.

In the context of craft, art, and space, this project pursues the reappraisal of old craftsmanship in Austria using the example of the almost forgotten technique of the historical rolling pattern. This technique was developed around the turn of the century and was initially not completely appreciated in painter circles, but was then used in all areas of the personal spaces in all strata of society until the appearance of the wallpaper, which became socially acceptable in the 70s or 80s due to its price. Almost everyone still knows the traditional rolled pattern from childhood, such as grandmother’s kitchen.

In a mixture of personal memories and experiences, this project explores contemporary ideas and old techniques in a new methodical way. This is accompanied by a collection of samples sheets of rollers from the company Painting Schulz, Melk, and partners.

The project shows the reappraisal of the history of the roller pattern by means of narratives and photographic documentation. The working method on the ‘pattern book’ started with found objects and parted from the traditional and historical pattern books.

**Keywords:** pattern, color, material, spatial perception, arts and crafts, cultural heritage

### **16:30, Paper n° 15 (online short presentation) Cultural-aesthetic parameters of colour in advertising communication.**

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## **Abstract**

Since ancient times colour has been a symbol, decor, and a means of information. The colours of nature are inexhaustible sources of inspiration for artists and designers.

There are three levels of colour perception: 1. Sensing colour can be understood as the simplest understanding of physiology; 2. Perception is a more complex process due to a number of laws of psychological nature; 3. Sense of colour belongs to the emotional-aesthetic sphere.

This research on the cultural component of colour in advertisements aims at systematizing visual means and defining their complex functional and graphic features in communication space. The methodological vector of this research is based on a multimodal approach: sociocultural, axiological and comparative. The main goal is thus to analyze colour using the example of graphic design in advertising.

The visual language of advertising design is represented by logical reflection on the sociocultural state of a society during definite periods. The aim is to characterize the problems of advertising communication in a cultural context such as visualization, stylistic aspects, and development tendencies. Originality includes the scientific study of possible synergistic solutions in advertising communication, using associative connotations of artistic images and creative rhetoric figures (e.g., hyperbole, metaphor, allegory, association, and metonymy) impacting the complexity and leading to an overall effect which is much greater than the sum of each.

Colour harmony in advertising is interpreted as a dynamic balance of contrasting elements of the visual information media. As an alternative to globalization processes with an aspiration to standardization and assimilation of cultural peculiarities, the process of a nation’s self-identification is actualized in advertising. One of the approaches to design research is examining the influence of Ethno-Art traditions on modern cultural projects. The balance of national and international features in advertisement are relevant. This research paper examines the advertising industry not from the viewpoints of economics, marketing and management, but in terms of its artistic expression in the global crisis of consumerism at end of the 20<sup>th</sup> and early 21<sup>st</sup> centuries.



The functions of colour in advertisements are here considered, e.g., expressive, physiological, emotional, informative, and aesthetic. Research on colour in advertising design in a vast cultural context pays special attention to artistic and aesthetic problems concluding that the use of visual means in advertising is orientated to a target audience with aesthetic ideals and national colour characteristics. Colour contributes to the national identification and image creation of countries, producers, goods, and services. The practical value of the obtained results lies in the application of this integrated approach to colour education and colour design in the advertisement.

**Keywords:** colour semantics, visual aesthetics, advertising, cultural context.

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