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MULTI-DISCIPLINARY RESEARCH IN DESIGN

Colour in Design: Discovering the Functional Approaches

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ABSTRACT

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This paper aims at presenting an overview of the need, function and objective aspects of the existing colour related decision-making in design education, approaches and solutions. It seeks to identify and point out relevance to appropriate colour theories focusing on the functional approach to colour.

*The reliability on the colour recommendation process is questionable in the volatile and fast changing world of today where decisions are no more dictated by the design, product or service providers. The paper tries to establish the role of various **factors** – factual, process oriented or behavioural - which are responsible for choices made about colours by people. It tries to relate with the **human response** to colour through **smaller segments** – everyday communication, usable products and technical as well as social responses - that are part of day-to-day life, focusing on the various aspects of the process – the perception of value and choice making in product or service selection. The **influencing factors** such as **environment, socio-political, cultural, economy, mass-media, promotions, psychological etc.** and the **decision making** methods applied in selecting goods, response or service, the **ambiguity of trust or reliability**, and the **timeline** considered or taken in each aspects of **value judgements** of those decisions, all are active parts of the process. There can be undesirable consequences if wrong decisions about colour come into practice while designing a communication, product or service.*

*The method applied for establishing this research topic is based on secondary resource, where the focus upon **cross checking existing methods** as well as the established **theoretical constructs** that support the idea fully or partially, are enquired. As its main content and context, this paper aims to help in seeking approaches that can support effective and relevant decision-making about colour by developing a deeper **multi-disciplinary understanding** of it to contribute to processes of design service involved.*

*Such a research area and topic can help in approaches to develop and apply a **more strategic method by design professionals for initiating and managing colour choices and colour selection** processes of people. A variety of multi-disciplinary research are considering the importance of colour valuable to relate to and address people. This kind of understanding about colour is established as the 'function of colour', against light and spectrum science and can help an effective design process. J. W. Von Goethe (Feisner. 14)¹ first took attention away from colour as light and focused on physical response. What we notice being argued in discussions lately, like one by Pantou (1997)² that "choosing colour should be a conscious decision, colours have a meaning and a function". The same idea has been supported with the views of Jacquie W., L. Benson, M. Bruce, Oulton and Hogg (1999)³. The paper further discusses 'factors that influence the colour related decisions. However, any single factor is not stressed upon and a **mixed, multi-disciplinary approach** is proposed.*

KEYWORDS

Colour, perception, culture, design education

PAPER LENGTH

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Approaches to study colour

In our environment, 'colour' is mostly seen together, as a part of a complex whole, of the environment or the cosmos and is not seen as an individual entity, application or character. Henerich Zollinger⁴ rightly mentions that "Colour is a highly multi-faceted phenomenon in nature, biology and culture." (par.1). he further states that "yet 'colour' is also used in the context of many phenomena bearing no relationship to physics of colour, primary for perceptual effects of other senses in non-visual human cultural activities such as music, poetry and fiction." (Zollinger. 1)⁴

But interestingly even today, pedagogy in art or design education introduces theories on colour from the 20th century, that have been focused upon separating each colour from the complex whole and giving it an individual identity separate from each other. This supports a human orientation to keep separating colours from the environment so that it can be considered a more 'scientific' study in approach with a focus on:

Optical science – to separate lights

Material science - to accentuate, regenerate or apply colours from material sources

Physical science – to understand physical reaction to colour perception and

Psychology – to understand behavioural relations of human beings and colour

Colour theories – 19th century, emerged with the Bauhaus teaching as a method

The question that emerges strongly is how colour is seen or perceived as a whole or part of a whole by people of different social groups or cultures. As stated by James Gibson (1968), "the meaning of the term colour is one of the worst muddles in the history of science." (Zollinger. 1)⁴. Does it follow the scientific approaches mentioned earlier and remain common across all human beings? Does it differ among people from different locations, different environments, different social groups and different cultural set ups? The answer to these questions lies in the local or indigenous knowledge of each specific community or social group residing in a specific environment where it shares its environmental evolution and cultural history with a common understanding and common interpretation of the meaning of colour with each of the members of the community. These are the local knowledge traditions and associations with colour that have evolved as a part of the natural processing of that environment and the members of the society share an integral part of it. If we enquire further, a series of questions start emerging about the understanding of colour which have an important space in human life but have not been addressed through pedagogy in design education offered in India. These would be:

The most important question of them all is how humankind perceives colour? Is it only through physical stimulation or does it also involve emotional experience with it to interpret the perception, association and meaning making? Is meaning making dependent on natural science or does it need to dwell deeper into the culture of colour too? To throw light on this, it is worthwhile to mention a study carried out recently by cognitive scientist Edward Gibson (Zorich)⁵ on a hunter-gatherer community called Tsimane' from Amazonia. The study reveals that 'the community does not perceive or describe the colours similar to the way it is done by most people in general'. The study also concludes that the ability to describe colour is not rooted in our biological system. The study, therefore, emphasizes that the development of language is more deeply rooted in human culture than it is on literally seeing the world. Other interesting findings of this study reveal that Tsimane' hunter-gatherers have more associations and names for 'warm colours' and they strongly associate themselves with the colour red. They do not have names for black and white, and instead, they consider and call these colours, dark and light. Linguistic studies fuel a few more important queries in colour choice of people and this can be seen as a debate about whether it is a natural process or an imposed process. In the words of Debi Roberson (Zorich)², a cognitive psychologist at the University of Essex in the United Kingdom who has studied colour vocabulary among the indigenous people of Namibia and Papua New Guinea.:

"Another reason that people in industrialized cultures have a more developed language for color has to do with the ability to make choices. We live in a manufactured environment where we can choose what color our clothes, or anything else, are" she says. "If you live in a natural environment, you have absolutely no control over color whatsoever." (Zach Zorich, as Posted in Brain and Behaviour, Sociology)⁵

The questions unanswered in existing approaches

If we try to go through a series of approaches to understand, study, apply or teach colour, several questions arise at this point to create doubts and confuse the researcher. These questions are related to the prescription, use, nomenclature and choice related to colour. In ancient history, the colour substances, pigments and dyes were obtained from natural resources and in such cases environmental availability or biodiversity of a location controlled the skill, use and choice of colour. For example, the colour 'Tyrian purple' was distinct as royal, majestic or for piety as obtaining it was a very expensive process as it was produced from a rare species, the 'spiny dye Murex snail'⁶. Similarly, yellow is considered as the centre of all, the *yin* and *yang* and as the colour of heroic that belonged to the emperor in China⁷. But in today's world, it is interesting to look into what is controlling our colour choice. Do we choose colours that are placed forward by a manufacturing lobby, like that of dye manufacturers or the material or product makers with their own limitation to use certain class of colours that makes us depend upon the available shade choices into a chip or a palette format irrespective of the use of its scale or feel. A theoretical investigation in this also leads to question whether the use of colour and the influence on its choice that moved from theories of dark to light and also from to material science to physical science and psychology, its evolution has happened from a scientific objectivity by Newton to a functional subjectivity by Gothe (Gage. 43-46)⁸. With later emerging colour systems and Bauhaus's movements, non-theoretical approaches less affected by past established scientific theories emerged and introduced 'empiricism' in

understanding or applying colour and 'neo-constructivism' of Joseph Albers and Gene Davis (Gage. 264-266)⁹ even claimed that they could separate 'colour from form'. We do need to notice whether any of these approaches have a scope to study colour from a cultural perspective in its real context or it can help building such approaches to establish cultural relevance of colour to address the need of cultural diversity in choice too. If this is not looked upon, the learning methods on colour in design education cannot be called sufficient and actually needs a retrospection. Most of the supports for making a choice of colour is in the form of flat, two-dimensional chips or swatches and the choices are controlled by commerce and market. At the same time, the 'empiricism' approach of Bauhaus's teachings (Gage)⁸ has become a 'ready to apply' system of teaching colour in design school in a way that it supports colour learning curriculum in design education with that of commercial market. The aspects of 'empiricism' need to be established again in today's context, to address the diverse choices and observed with actual applications. With a learning curriculum focusing only on flat, two-dimensional chips, it limits the learner to apply colour with all its nuances, meaning or sensorial connotations that can help the user group to experience or connect with colour in a more holistic way.

Instead of simplifying the process, keep increasing the number of shade cards or nomenclatures are not a very helpful approach. Maybe it needs a two-way-approach to have basic and theatrical learning in place to understand how colour behaves and there should be an additional scope to be created that helps the learner to apply the learning to a context and create actual knowledge and learning. A system needs to be developed that can be adaptive to diversity. The proposed scope should further strengthen the functional approach to colour from individual to groups or communities. This will also help to address colour issues in societies and communities where colour are not mere nomenclature or material, they are also 'synesthetic' (Gage. 261)⁸ or where two sensations are simultaneously triggered by a stimulus does not reduce the complexities and the confusion about appropriateness in selection persists about colour. Does a colour need a name to be identified with or are there other existing ways to relate to it. To become inclusive in addressing the challenge and to make the colour choice more democratic, it is important to also understand colour as a social or cultural phenomena. This approach combined with the understanding of colour can provide a more holistic application where participants can also have the role in decision making.

The introduction of existing theories on colour will require to be re-examined to discover design thinking and teaching in today's diverse contexts which can help in creating a balance between two different outlooks on teaching colour:

1. **Colour Theory Approach** – focus more on introducing existing theories, their importance and role in a historical perspective.
2. **Colour Experimentation Approach** – an open approach to allow students to experiment with cultural perspective on colour, get creative in understanding approaches from real life experience and develop their own creative analytical tools to propose a creative theory.

Design and colour theories

An 'industrial design influence' on design education has been stronger later than 20th century. Because of its practice-based knowledge approach, it has been interpreted that design education lacks empiricism. Instead, it has depended a lot on a hermeneutic approach.

The 20th Century theories of modernism and minimalism largely influenced the Bauhaus theories on colour in design education. If we look at modernism theories, they are mainly a result of the industrial revolution that suddenly allowed humankind to multiply material colouring methods and ingredients. As a result, the palette increased its shades to become applicable to a large scale production industry. Modernism was seen as a disciplined approach in design, which was intended to give solutions. It can be seen as an additional ability or power to read or interpret colours individually or in interaction, a privilege for designers in the form of 'forbidden knowledge' that allowed them to dictate or take a decision on behalf of people without any actual interaction with them. The modernist approach about colour in design education and design profession can be seen as a 'trickle down approach' (Veblen 1889)¹⁰. 'Trickle down' is not a democratic approach and leaves a lot to be still explored as a 'trickle across' (Robinson 1958 & King 1963)¹⁰ and 'trickle up' (John Maynard Keynes. 1883–1946)¹¹ approaches.

On the contrary, post-modernism approaches were not as disciplined as modernism approaches and did not stress upon giving a solution, supporting an 'inter-utopia' philosophy of Jacques Derrida (1930-2004)¹² that there are 'multiple sources of reality'. If we see it through a post-modernism approach, then the openness and opportunities to explore colour multiplies and becomes exploratory, which is the key of an innovative approach. But at the same time, it has the fear of going directionless, purposeless and infinite, failing to address time in a context.

Both, modernism and post-modernism approaches leave sufficient scope still remaining unexplored about colour in relation to:

- Names of colours and its associations in actual memory of people.
- Actual ability to differentiate colours.
- Orientation towards colour classifications.
 - Towards warm, towards cool
 - As per hue – towards pure primary
 - As per intensity – towards intense or dull.
 - As per value –towards brights, towards mid-tones

If we look at existing colour theories further, it has two aspects:

- a. That, **it enriches and multiplies the details, interactions and visibility of each colour** to understand their science better.
- b. All that is said under point 'a' is true **only if it talks of colours considering it as a 'visual phenomena'**. Hence, it supports the idea 'you believe in only what you see'.

Considering the case of the second aspect mentioned under point 'b', which has been the key in teaching colour in design, the largely missed analysis are those of the narratives that interpret colour with a semiotic approach. Also, the emergence of studies on synaesthesia has a drastically new approach to the way things are sensed. This furthers the question, 'can a colour be only seen, or it can be sensed too?' If both are possible then, the 'sensing' of colour has been missed out from a formal approach. It exists more as dependent to a creative person's individual understanding of this particular 'sense'. If we take an example of the indigenous communities, such as the Dani from Indonesia, their understanding of colour is limited to a few colours, light and dark, just like the Tsimane' hunter-gatherers mentioned earlier in this paper. These unique cultural perceptions could become visible after some linguistic studies focusing on colour. Berlin and Kay have a major contribution in the study of colour with a linguistic approach. They proposed that black, white, brown, and red— the basic colour terms in a culture are predictable by the number of colour terms that the culture has (Zollinger. 128)⁴. My interest lies in such examples and this leads to the encouragement to critically discuss the sense of colour and its local and cultural intent. Such an understanding requires a normative approach to create meanings and will lead to a theory or pedagogy of colour which can have four different perspectives:

- a. Understanding the scientific theory and approach about colour.
- b. Opening up, unleashing a creative approach to analyse colour for its cultural codes, messages, narratives, artefacts and semiotics. What can be considered the 'text' and its 'context' of colour?
- c. The way 'light' is perceived in a culture. Also, all its variations, weather conditions, interior, exterior, light and emotion in shared spaces or personal space is worth looking at.
- d. Understanding and analysing the 'idea' of colour in different cultures. What are the sources of these ideas?

As a different approach to that of scientific approaches, German poet and artist Johann Wolfgang Von Goethe (1749-1832) had made his very first attempt to understand colour perception from colour psychology point of view but was highly criticised by scientific theorists and his theory was not accepted. Being a poet and artist, Goethe was first modern thinker who investigated the function of eye and its interpretation of colour unlike the light-based properties. He tried to bring out the qualitative aspects of colour in his book 'Theory of Colour' in 1810. (Feisner. 14)¹

Design pedagogy covers different aspects of knowledge in an applied form – science, material, manufacturing, aesthetics etc. When it comes to colour, the pedagogies are more of the processes that can help to control the craft of colour and its application. It does not help the learner understand the philosophy and approach to colour that exists differently in different contexts, social set-ups and situations.

A new approach, requiring a combination of understanding and methods is needed that can help create options of approaches to apply the appropriate to the context. If we see from the perspective of 'inclusive design', then it becomes even more imperative to come up with design education approaches of colour that apply to such an 'inclusive design approach'.

Emerging ideas

Design, not being a purely theatrical discipline – nourishes itself with the outcomes of all the other disciplines. It is multidisciplinary in approach. Analysing colours differently will help lead to an idea based approach to meaning-making and its application in design or design teaching rather than proposing a fixed and singular approach. “There is no singular truth”, as Michel Foucault tried to establish through his work ‘Order of Things’ (1966)¹³ appropriately. This also supports a notion of creativity as looking forward not to a textual approach, but rather a contextual approach whereby all the sources, that can support or create a text, become equally important. As a result, a large number of sources be they image, iconography, narratives, drama, play, song, dance, fiction, craft all of these become important to decipher meaning. While semiotics can help in analysing both the approaches, it will also help in categorizing the denotative approach – ‘the meaning as it is’ vis-à-vis a **connotative approach** – where one starts adding meaning. Wisdom lies in the use of an appropriate approach in relation to a context and is not the same for different contexts.

In an anthropological approach to research, ethical researchers demand strongly for an unbiased approach where one’s observation and recording of the social group does not get biased with one’s own knowledge, perception and pre-assumptions about things. Thus, it becomes more important to critically examine a single-headed approach of colour teaching in design only on the basis of existing theories of experts. Instead, one needs to develop abilities to dwell deeper into:

- a. Contextual associations: the cosmos of colour
- b. Cultural associations: local associations, meaning, usage and symbolism of colour
- c. Behavioural associations: the attitude, identity and communication of colour

Hester du Plasis¹⁴, the then Senior Research Fellow from University of Johannesburg, South Africa has clearly indicated in her paper presented during the international conference ‘Design Education: Tradition and Modernity 2005’ at NID, Ahmedabad that there is a need to develop a ‘new design epistemology’ for the design discipline which can become an ‘inclusive approach to research in design practice, product design and the global design discourse’. She heavily advocates the integration of ‘diversity’ as a part of design epistemology creating scope to consider ‘indigenous knowledge system (IKS)’ of a community and extend the outcome of research to civil society.

A paper on ‘Colour - A Programmatic Factor: Colour Competence in Design Process through Consideration at Multidisciplinary Levels’ (2005)¹⁵ by Gunnar Spell Meyer and Birgit Weller from University of Applied Science, Fachhochschule, Hanover has tried to articulate the limitation of approaches in teaching colour and have called it ‘**antidisciplinary**’. The paper was published as a part of the international conference ‘Design Education: Tradition and Modernity 2005’ at NID. They have tried to establish the need to study colour not only from two dimensional theories or perception of contrast on a flat surface but to handle the colour in design in both, two and three dimensions. They even introduced some early models that were experimented on students in their classroom assignments. Another paper from the same conference ‘Cultural Approaches to Design Education’ (2005)¹⁶ by Maristela Mitsuko Ono from Federal Centre of Technological Education-Parana’, Curitiba, Brazil stressed upon interpretive approach to culture by Geertz (1989) and emphasis was on design for cultural diversity that can be ‘non-reductionist’ and ‘non-determinist’

that can consider 'plurality' and 'variability' of society. A newer approach that needs to be backed up by theory, research and practice, were discussed through case studies

A paper by independent researcher Veronica L. Zammitto¹⁷, who conducts research on digital games, suggests to discuss the importance and role of user's cultural perception and symbolism related to colour interaction in a digital game. The author discusses how digital games provide an environmental as well as character oriented experience which are designed by a selection of palettes decided by designers and completely lacks perspectives of users or their own cultural symbolism and meaning making. The researcher further analyses how such an approach can help game designers to use colours as a communication media that allows user's intuitive and sensory approaches and possible behaviours during their interaction with a game. The article critically discusses awareness among designers, developers from the world of digital games about the importance in use of graphics as an expressive media by concentrating on 'colour use and its cultural symbolism'.

The article suggests of human colour space (internal categorization of colours) to be understood by acknowledging three backgrounds. These are:

- Innate – which includes anthropological and behavioural aspects.
- Personal – is based on personal experience of the individual aspects.
- Cultural – is culturally shaped or coded within community.

New introduction to pedagogy on colour studies in design institutes should incorporate interactive methods to understand the cultural perspective from the people's and cultural point of view. Surveys or personal interviews related to the basic colour understanding of viewers at a beginner's level can ask the following questions:

- a. How many colours can you name within a minute in your own language?
- b. How will you place them in a hierarchy with the most favourite colour being on top?
- c. What colours do you associate with a festival of colours? Which festivals do you connect them with most?
- d. What are the most prevalent colours in your everyday life? Place them in the order of exposure between the most encountered one on top to the least encountered one at the bottom.

CONCLUSION

Thus, colour study and teaching in design needs to move further from existing education methodologies and needs to be restructured and re introduced with a strong multi-disciplinary approach and focus. Identification, understanding, perceptions and usage of colour clearly indicate that a new, multidisciplinary theory to be incorporated which should be culturally contextual or routed.

My whole argument is that colour should be studied, defined and interpreted with culture as its core rather than adopting the understanding of colour as the theories propounded by industrial designers, physical scientists, material scientists, optical scientists alone from time to time.

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