Computer-Assisted Colour Aesthetics Education

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ABSTRACT

This paper discusses strategies that use computer-aided techniques to experiment with fundamental principles of colour design. A software was developed to facilitate the production of colour studies that were initially based on the teaching philosophy of Johannes Itten. This paper provides a description of the software, an overview of the methodology and its conceptual framework.

1. CONCEPTUAL FRAMEWORK

Aesthetics is a branch of philosophy that deals with the nature of "art and the criteria of artistic judgment (…) attempting to outline (…) means of communication and expression and to explain how art is understood and appreciated—through informed opinion, taste, and emotional response" (p.7).[1] However, the term aesthetics has been described as elusive due the fact that basic aesthetics rules can be, and are very broadly interpreted.[2] Aesthetics in this paper is viewed as a "compass" rather than a measurement device, a "ruler." Therefore, it is this "very broadly interpreted" notion of aesthetics that this paper embraces.

A look at the history of colour education in art and design programs reveals the impact that Munsell, Itten and Albers have had on teaching methodology. Munsell helped us to look at colour properties systematically. Itten favored a method that capitalized on perception experimentation using a grid system as a way to isolate colour effects from other design variables, such as composition. Itten's diagrammatic approach to colour design was basically a method from which colour relationships could be developed, observed, and analyzed. Albers developed a teaching method based on coloured paper that allowed students to instantly observe colour interaction effects.

Even though Itten's methods used paint to articulate and experiment with aspects of colour design, their foundation was based on fostering the comprehension of colour relationships (harmonies and contrasts) based on principles that could be observed. Similarly, Albers was also interested in comprehension and discovery. The innovative approach to colour teaching by Albers positions his work as an historical turning point regarding methodological approaches to colour teaching.

Computer technology has introduced new opportunities and challenges to the development and implementation of computer-based colour design teaching and learning. Driscoll[3] argues that an important aspect of media selection is directly related to the instructional objectives and types of learning outcomes (e.g., technical versus cognitive development skills). Driscoll found out that cognitive skills are well suited for certain computer-based delivery methods, such as web-based education. Because problem solving and the application of systematic colour design knowledge are some of the skills students have to develop in colour design courses, her advocacy is carried on in this and other projects[4] that I have developed.

2. SOFTWARE DESIGN AND RESULTS

Commercial colour systems have been developed to provide guidance to artists and designers in making better colour choices, even though those systems do not claim to have all possible available colours (p.5).[5] In the computer screen colour may be selected based on predefined colour palettes (e.g., colour swatches) and methods to access colour models (e.g., HSV system). In order to be fully explored as a tool that facilitates the colour selection process based on principles of colour design, the RGB Colour Model needs to suffer perceptual restructuring from a Graphical User Interface (GUI) standpoint. This is clear in the many ways that the RGB cube has been organized and presented via

colour palettes in GUIs produced commercially, such as the Visibone color palette[6] and Weinman's hue and value color palettes.[7]

Appropriate media selection is an important issue to fulfill teaching and learning objectives. Seels and Glasgow emphasize that "because media and delivery systems require materials, [the instructional designer] must determine whether commercial material are available, if so, whether they need revising" (p.123).[8] Prior to developing this application, it was found that most of the computer-aided colour instruction reviewed dealt with behaviorist teaching methods and did not foster experimentation, self-discovery, and higher order, problem-solving learning opportunities. One of the exceptions was an interactive CD dealing with Albers' teaching methods.[9]

The proposed software (See Figure 1) was designed to function as a computer-based learning "environment" and, as such, does not provide templates or customized solutions. Instead, it is a tool to conduct colour studies to foster understanding and creativity. The software has been used to experiment with the concepts, principles and ideas of Chevreul, Itten, Birren, Albers, and Kobayashi, among others. The experiments that have been carried out with this tool include, but are not limited to, designing with colour properties variables, colour interaction (e.g., after image, value shift, chroma shift), colour harmony and contrast, direct observation of natural colour schemes, colour communication and symbolism.

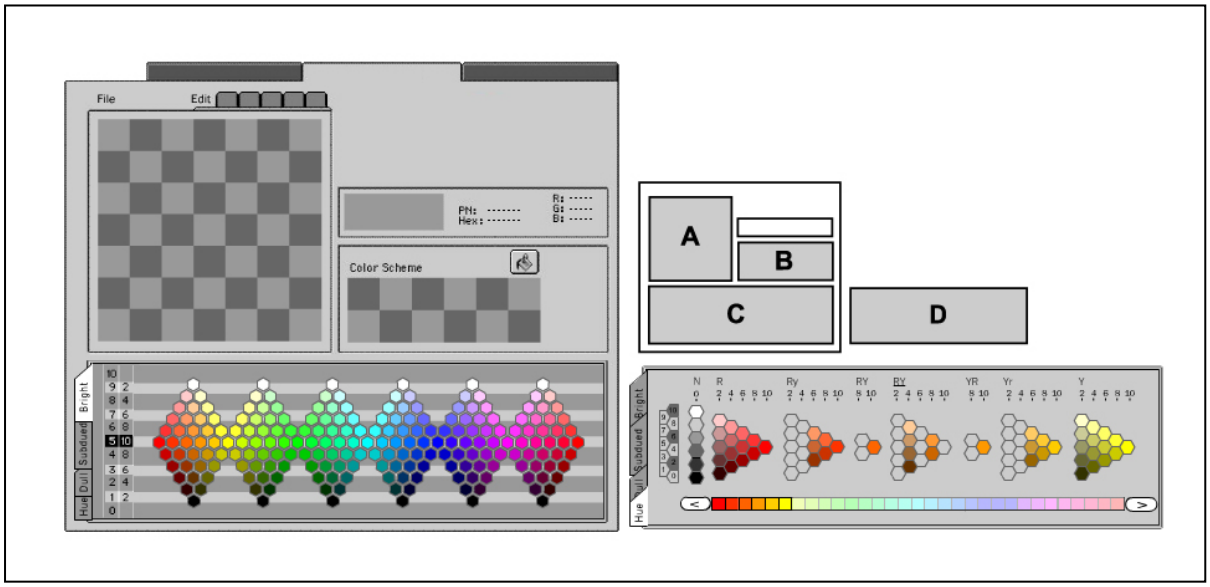

Figure 1: Software interface comprised of *work area* (A); *colour scheme area* (B); and two *colour palettes*: RGB tone colour palette (C) and RGB hue colour palette (D). Copyright © Petronio A. Bendito.

The software is divided into four main areas. Three are briefly described:

Work area: The work area (See Figure 1A) is comprised of an *adjustable grid mode* (shown in Figure 1) and a *paint mode* (not shown). The grid structure functions as a computer simulation of the teaching methods of Johannes Itten. As opposed to Itten's grid mode, the paint mode allows colour studies using a more organic, gestural approach. It is in this area where students experiment and simulate various colour theories and design principles.

Colour Scheme area: In the colour scheme area (See Figure 1B) colours can be stored and reused. There are two modes in this area. In *colour selection mode*, colours are stored for future use. In *paint mode* stored colours are made available for use in the work area. However, at any given time colours can also be selected directly from the colour palettes area (See Figure 1C and 1D).

Colour Palettes area: The colour palettes area (See Figure 1C and 1D) was designed to facilitate colour selection based on perceived relationships. In this area 216 RGB colours are organized based on hue and tone relationships. The tone palette was inspired on Kobayashi's tone system.[10] In the *tone palette* (partially shown in Figure 1C), colours are presented in three main groups—Bright, Dull, and Subdued—that show analogous colour blending structures. Inspired by Ostwald's colour system[11], in the *hue palette* (partially shown in Figure 1D), colours are organized

based on individual hue families (e.g., red, yellow) with focus on pure colour, tints and shades relationships. No evidence of colour blending structure is found in the hue palette. In both palettes, RGB colour families (hues) are displayed in an analogous sequence.

The software here described has been implemented for classroom purposes, and has aided students to produce perceptual studies of colour design strategies based on the writings of Chevreul, Itten, Birren (See Figure 2), Albers, and Kobayashi. It has also helped students to develop their sense of colour gradation by observing nature (See Figure 3).

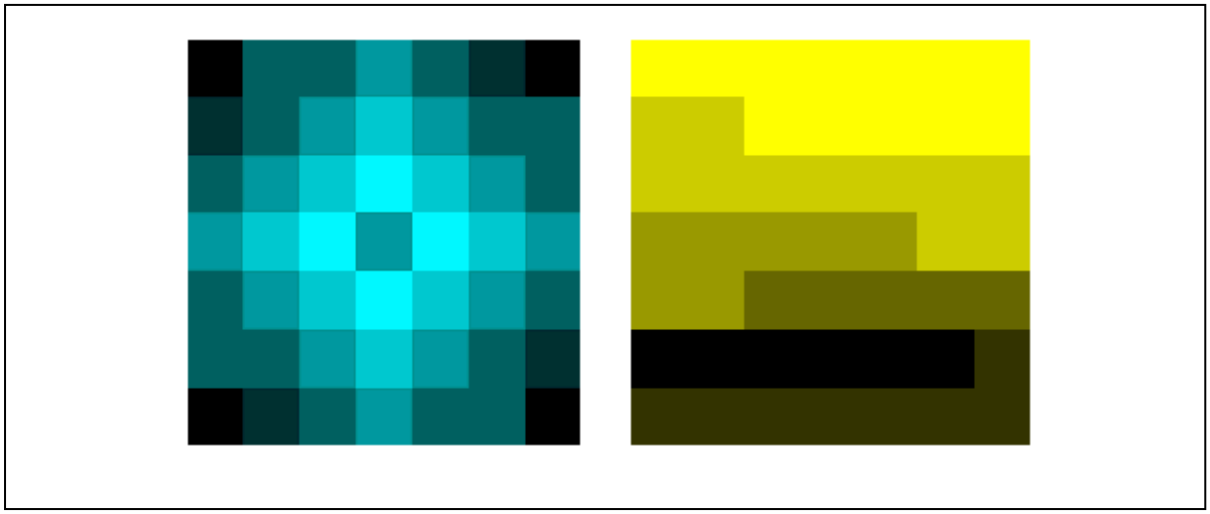

Figure 2: Interpretation of Birren's principle of *colour, shade and black* harmony.

Figure 3: Observing gradation and blending structures from nature.

3. CONCLUSION

Colour for artists and designers has long being taught using traditional media such as paint and coloured paper. While the medium in use may determine some direction for the curriculum, the principles that build the foundation of colour design are mostly independent of the medium in use. Based on that assumption, this developmental research[12] project focuses on the design and production of a computer-based tool to develop students' cognitive and perceptual skills in dealing with colour design. When the core of a specific curriculum (in this case colour design) is based on the development of 'perception' and 'understanding,' computer technology may be an effective tool in

aiding the process. Although using traditional methods, such as paint and coloured paper, may contribute to increased appreciation of colour-related techniques, from a cognitive standpoint they are not essential (i.e., as a problem-solving communication design strategy).

In this paper it is advocated that an important aspect of colour design education is to develop, via hands- and minds-on activities, students' colour perception abilities, colour design problem-solving skills, and the understanding of the impact that colour has on visual communication strategies. Essentially, colour design education is about colour literacy[13]—a concept I adapt from visual literacy—and should empower students to both encode and decode colour-enhanced messages.

References

1. J. A. Hope & M. Walch. *The color compendium*. Van Nostrand Reinhold. (1990).
2. F. Mahnke. *Color, environment, and human response*. John Wiley and Sons, Inc. (1996).
3. M. Driscoll. *Web-Based Training*. Jossey-Bass Pfeiffer. (1998).
4. P. Bendito. "From Paint to Bytes: A Web-enhanced Approach to Teaching Color Theory." In R. E. Griffin, J. Lee, & V. S. Williams (Eds.). *Visual Literacy in Message Design: Selected Reading*. International Visual Literacy Association. (2002).
5. L. Holtzschue. *Understanding Color* (2nd Ed). John-Wiley and Sons, Inc. (2002).
6. http://www.visibone.com/about.html
7. L. Weinman and B. Heavin. *Coloring Web graphics 2.* New Riders Pub. (1997).
8. B. Seels and Z. Glasgow. *Making Instructional Design Decisions* (2nd Ed). Prentice-Hall Inc. (1998).
9. J. Whiteley and J. Roberts. Josef Albers' "Interaction of Color": From Print to Interactive Multimedia. *Academic Computing*. 4, 4, 6-11. (1990).
10. S. Kobayashi. *Colorist*. Kodansha International. (1998).
11. W. Ostwald and F. Birren. *The color primer; a basic treatise on the color system of Wilhelm Ostwald*. Van Nostrand Reinhold Co. (1996).
12. Richey, et al. Developmental research: studies of instructional design and development. In Jonassen, D. (Ed), *The Handbook of Research for Educational Communications and Technology* (2nd ed*)*. Lawrence Erlbaum. 1099-1130. (2004).
13. P. Messaris. *Visual Literacy: Image, Mind & Reality.* Westview Press. (1994).
14. J. Albers. *Interaction of color*. Yale University Press. (1963).
15. J. Itten & F. Birren. *The elements of color*. Van Nostrand Reinhold Co. (1970).