Colour Selection Strategies in Colour Design

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ABSTRACT

Our evolving hypothesis is that a colour-picker interface designed to challenge the novice user will better connect with their creative abilities and help develop their understanding of the interrelated digital colour challenges. An interface approach underpinned by a philosophy of *engaging-in-use* rather than *ease-of-use* may help to better rationalize a new user's colour-selection process, thus improving their initial productivity and creativity within the digital design environment. This study challenges the established HCI (Human Computer Interaction) convention that consistently prescribes to a user-interface-strategy embracing *ease-of-use.* It considers if this ideal is necessarily the right approach for creative software application, assessing colour-pickers as the primary example. Interesting results are emerging from experimental work with an early prototype colour-picker tool that exploits our ongoing research into intuitive understanding of colour. The focus of this work is the creative colour selection process and not colour management *per se,* however it is recognised that the relationship between these two design and technical processes is not always mutually exclusive.

1. INTRODUCTION

The use of digital design can lead to increased creative productivity and improved communication. Software products are invariably introduced as intuitive and easy-to-use, highlighting the opportunities for experimentation, refinement and the overall increased creative productivity. These claims lend themselves particularly well to the example of colour development (what could be easier than simply picking a colour from the monitor screen?). While a software package overall may have a relatively steep learning-curve, the colour functionality offered can be easily accessed; familiar point-and-click interfaces facilitate a wide range of colour choice from the full monitor gamut and, in principle, the opportunity to enhance creativity. Yet new users often experience frustration and disappointment when their colour expectations are not delivered. Whilst the offered coloration processes are certainly accessible at an accelerated rate, when compared to the traditional craft-based colour techniques, it is readily observed that inexperienced users seldom demonstrate a similar level of aesthetic judgment as when engaging with the more familiar physical colorants, inks and paints etc., nor do they understand the mismatch between electronic display and hardcopy.

2. REVIEW

The concept that intuitive understanding is a primary qualifier for an *ease-of-use* experience is a well-established principle. In the field of digital colour interaction and colour-picker interface design Hue-based arrangements configured with Chroma and Lightness scales (or the comparable Saturation and Value etc.) are thought to best fulfil this usability requirement. These colour attributes are considered more perceptive/natural as they relate to the concepts of human vision and perception; Young and Helmholtz Trichromatic theory (Fairchild 2005), Opponent-based models are deemed intuitive on the same basis. Interestingly however, an early investigation into user performance with different colour-picker models

was conducted by Schwarz and colleagues (Schwarz & Beatty 1987). Their objective was to certify the hypothesis that the hardware-oriented RGB system is not as user friendly for inexperienced users as the more intuitive HSV colour-picker model based on perceptual colour order systems, namely the Munsell and NCS systems. With regards to this general question the results were inconclusive. However, Schwarz identified a two-phase learning strategy, the convergence stage and the refinement stage; RGB would appear to be more intuitive at the earlier stage of targeting colour areas while the Hue model was more accurate, and therefore intuitive, while fine tuning colour selection whist learning the systems. The Schwarz work also demonstrated that there was little statistical difference in the convergence learning analysis between several colour models, including HSV and an Opponent structure, strongly suggesting that the inexperienced subjects had no existing schemas or indeed intuitive understanding for any of the colour models.

Although recognized for its rigour and uniqueness the lack of visual feedback in the Schwarz & Beatty study was noted by Douglas and Kirkpatrick (1996). Their hypothesis is that visual feedback from the user interface is the most important aspect in relation to the usability of a colour model. Their experiment was also designed to compare the performance of RGB and Hue-based colour models with the objective of determining which is the most natural and intuitive to an inexperienced user. Again, outcomes were assessed by comparing colour-matching performance in terms of speed and accuracy. One of the suggested conclusions of this study was that generally the users have little understanding of either the RGB or HSV colour model. In other words, neither of them is intuitive. The improvements in accuracy that are attributed to increased feedback in the interface are explained by the user adoption of simple learning strategies such as hill climbing. Thus a simple process of trial and error in which the addition of visual feedback helped the user better predict the next move as opposed to intuitively coordinate and manipulate the three axes in the colour model to achieve the desired goal.

This brief review of relevantly scarce assessments of standard colour-picker arrangements suggests that although some colour models may exhibit qualifiers synonymous with an *ease-of-use* approach it does not necessarily make them intuitive. Thus, although Hue configurations may be preferable to RGB, Smith draws attention to awkwardness in the interacting relationships between colour attributes of his own widely implemented HSV model (Smith & Lyon 1996). Lawson (2006) strongly advocates that interface designers must break away from being led by the technology, and avoid solutions that are only truly comprehendible by other experts.

3. EXPERIMENTAL

An experiment was carried out to investigate whether students' creative colour choices would be influenced if they were exposed to a colour-matching task that demonstrated the relationship between on-screen colour and hard copy colour. Figure 1 (left) shows an Adobe Photoshop environment where students selected colours using the conventional Photoshop GUI for six shades for a range of Womens Wear (Spring 2012). Prior to the task half of the students were first asked to match colours on a print (viewed in a light booth) using a bespoke colour-matching environment on screen (Figure 1; right).

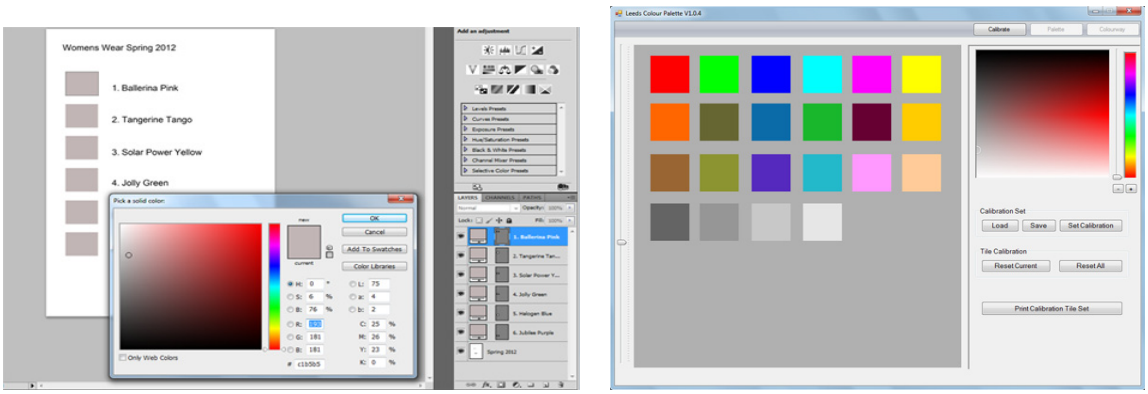

Figure 1: The standard Photoshop colour GUI (left) and the bespoke colour-matching envionment that half of the students were asked to use prior to completing the Photoshop task.

A total of 12 students participated; 6 undertook the matching experiment first and a further 6 (the control group) just did the Photoshop task without participating in the matching experiment. The Photoshop was to produce a seasonal colour palette based on their individual interpretation of six seasonal Pantone colour names (1. Ballerina Pink 2. Tangerine Tango 3. Solar Power Yellow 4. Jolly Green 5. Halogen Blue 6. Jubilee Purple). Although actual Pantone shade forecasts for 2012 the colours were selected for their evocative naming and not for any purpose relating to colour accuracy. An integral part of the task instructions include the requirement that the colour palettes produced would be printed on a specific printer. All participants were textiles design students from the University of Leeds (School of Design) and were familiar with the selected device through regular use.

Each of the two groups used PhotoShop CS5 to produce their colour interpretations. The first group completed the task as a standalone exercise, the computer monitor screen first been calibrated and set up in laboratory conditions to negate the affect on ambient light. Before creating their palettes the second group where required to first complete an accurate colour match exercise.

4. RESULTS AND DISCUSSION

Figure 2 shows the main results from the study. The CIELAB values of the colours selected are shown. The left figures show the results for the control group that undertook the standalone Photoshop task and the right figures show similar results for the test group that first undertook the colour-matching exercise. There is some evidence that the test group chose less saturated colours for the fashion palette than did the control group which supports the hypothesis that the students' creative process has been influenced by exposure to the colour-matching task.

4. CONCLUSIONS

This work is part of an on-going study to develop a new intuitive colour-picker tool. There is some evidence in this work that engagement with the colour-matching task (and hence the relationship between on-screen and print colour) helped the students to make more rational colour selections in their creative task that were within the gamut of the printer being used.

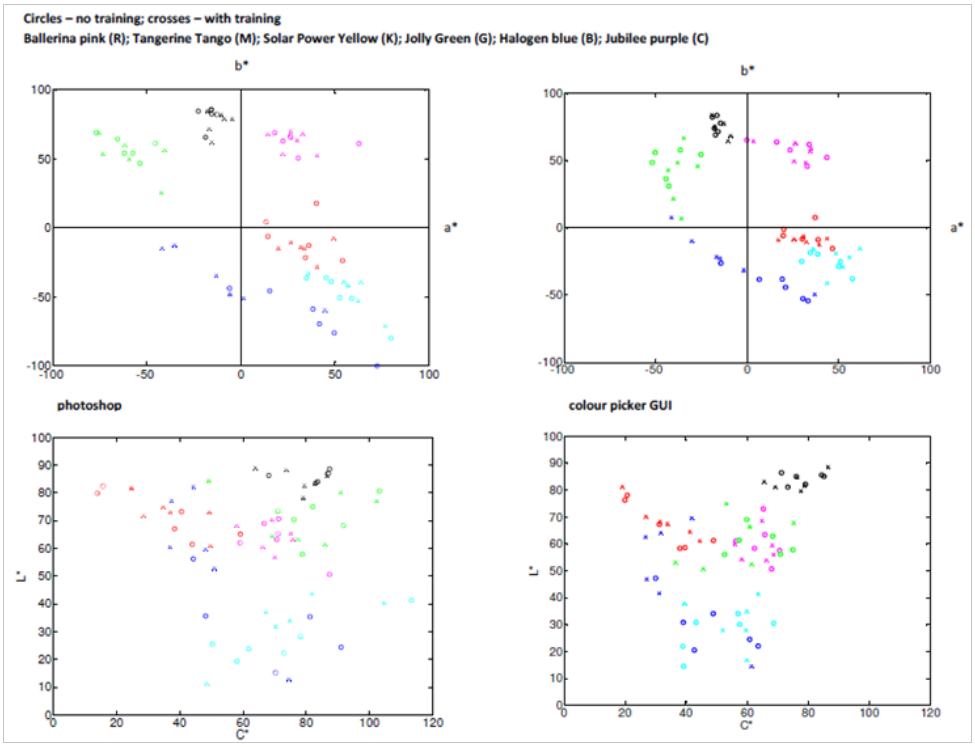

Figure 2: CIELAB results for the colours chosen by the control group (left) and the test group (right) for each of the six colour name.

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