Colour preferences for traditional Korean colours

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Colour perception and preference have often been considered to be culturally linked. In this study, samples of young Korean and UK consumers have been tested to examine their colour preferences and also what they considered to be successful fashion colours. The traditional Korean colours (in various degrees of saturation) have been used for the test and, in the case of the Korean participants, they were also asked which colours they considered to the more traditional. Though there were some differences between the young Korean and young UK participants, the degree of similarly in choice and preference was quite marked. It is suggested that this may be due to exposure to global media and internet products in the modern environment. Also it was found that the reliability of both test groups was high.

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Introduction

In today's modern consumer-driven society, culturally shared meanings and practices are produced, reproduced and transformed in the market through the symbolic processes and procedures of production and consumption [1]. The accelerating convergence of economic and cultural activities is resulting in the emergence of different urban and regional dichotomies and the opening of new opportunities for countries to raise levels of income, employment and social well-being [2]. To produce a commercially successful cultural product is gradually getting important in modern life. Successful cultural products are referred to as modernised cultural products with both cultural meanings and commercial values which allow them to fit into the contemporary markets. For example, Hyun and Bae indicated that traditional textile products are often found to contain cultural and historical values that reflect the corresponding cultural identity and national image [3].

Colour is one of the most important components in design and marketing, and is related to culture and religion [4]. According to Olins, colour is an important component of many corporate and brand building cues along with names, symbols, logos and rites of passage [5]. Madden *et al.* investigated the effects of culture on meanings associated with marketing cues such as colour and found that they are critical for international marketing strategies [6]. The study of colour meanings and preferences by Madden *et al.* concluded that colour was an integral part of all design processes and can be an effective means of creating and sustaining brand and corporate images in customers' minds [6]. Brand identity with cultural meaning has value when it is communicated correctly to the appropriate audience, and the views of customers are determined by what they see and hear about the brand through the media [7].

Designers have indeed started to reassess the cultural values in the design process. By analysing the role of colour design in commercial, economic, symbolic and social terms we can gain a better understanding of its current and likely future value in economy and culture [8].

This paper investigates the general meaning of colour preferences, culture and Korean traditional colours. This study aims to determine and compare the preferred, traditional and fashion colour choices of young Korean consumers and preferred and fashion colour choices of young UK consumers. The results will provide information that will aid designers and marketing managers make better informed decisions.

Background

Colour preference

Preference, pleasantness and appeal all suggest subjective properties. Although preference is to some extent specific to individuals, there are many questions surrounding the complexity of the issue [9]. Individual differences are a fact of life. Similarities and differences between people are often found in the area of 'taste'; the preference for particular shapes, textures, patterns and colours that may differ from one person to another [10]. The extent to which colour preferences reflect personal taste, reflect culture, are universal or biological, and are influenced by fashion trends at the time are all unanswered issues [9].

> "…*Favourite and least liked colours, which are non-materially and aesthetically intended, are perceived inwardly, independent of real objects. These colours could possibly throw some light on specific personality traits or phylogeny experiences. Colours chosen in the context of their material use, on the other hand, are a public statement to society and are subject to social and cultural influences. These colours are not chosen primarily for their intrinsic beauty, but because they have a certain, socially recognised significance.*" [10]

Despite these variables, colour preference is an important factor in marketing and product design [11]. The end product of the perceptual process is influenced by individual experiences, needs, values, and other personal attributes. Further, response to colour can be highly affective, for colour is essentially an experience [12].

Studies on colour preference have been investigated by many researchers. Grieve [12] suggested that there are universal colour preferences among adults and this view is consistent with previous studies by Birren [13] and Buckalew *et al.* [14]. Studies of preference using a range of uniform colour patches, such as those by Tangkijviwat and Shinoda [11], Bulkalew *et al.* [14], Silver *et al.* [15], and

Wiegersma and Van der Elst [16] all indicated that blue is the most preferred colour and yellow least preferred in general across cultures. These studies were performed with a number of different cultures including Japan, England, Netherlands and America. Camgöz *et al.* [9] and Eysenck [17] also explored the extent to which preference for levels of saturation and brightness is evident, suggestion that maximum saturations and brightness are associated with perceptions of pleasantness of colour. There is substantial individual variation, however, and recently an ecological valence theory could provide a basis for understanding these [18]. Oberascher showed that the regionally different preferences for certain colours were influenced by cultural factors such as religion, politics, economy, technology and traditionalism vs. modernism [19]. Colour associations are also not always universal and appear related to age, cognition or culturally specific experiences [11, 12, 20].

If the meaning associated with a colour or combination of colours is different across cultures, marketers may benefit from pursuing a customised strategy with respect to the colours associated with their total market offering (for example, product design, branding, packaging etc). However, when colour meanings are similar across markets, a standardised approach may be more economically and strategically beneficial [5]. An identity of product as messaged by colours can form the opportunity for the development of similar preferences for consumer target markets globally across geographical boundaries [21].

Culture and traditional Korean colours

Culture is a system of learned behaviour patterns that is constantly reproduced by human communication using a certain set of symbols [22]. Geertz analysed the meaning of culture as a symbol of society in his research [23]. In 2001, the concept of culture is expressed by Hofstede as:

> *"patterned ways of thinking, feeling and reacting, acquired and transmitted mainly by symbols, constituting the distinctive achievements of human groups, including their embodiments in artefacts; the essential core of culture consists of traditional (i.e. historically derived and selected) ideas and especially their attached values."* [24]

Korean traditional colour symbolism is based upon the five elements and the five basic colours are blue, white, red, black and yellow. Traditionally, blue symbolises creativity, immortality and hope; white symbolises chastity, truth, innocence and death; red symbolises the sun, fire, production, creation, passion and love; black symbolises existence; yellow symbolises light and essence of vitality [25]. The five traditional Korean colours are prominent in *bojagi* design (see Figure 1).

Figure 1: 'Obangnang' – an example of bojagi textile product made in the five traditional Korean colours (image reproduced from Seok Juseon Memorial Museum [26]).

These five colours reflect the traditional principle of yin and yang, male and female, positive and negative and light and dark, symbolic of a harmonious world in the East Asian cosmology. As shown in Figure 2 these five colours also correspond to the four points of the compass and the centre (blue-the east, white-the west, red-the south, black-the north, yellow-the centre); the five elements of the weather (cold, warmth, wind, dryness and humidity); and the five blessings (longevity, wealth, success, health and luck) [27].

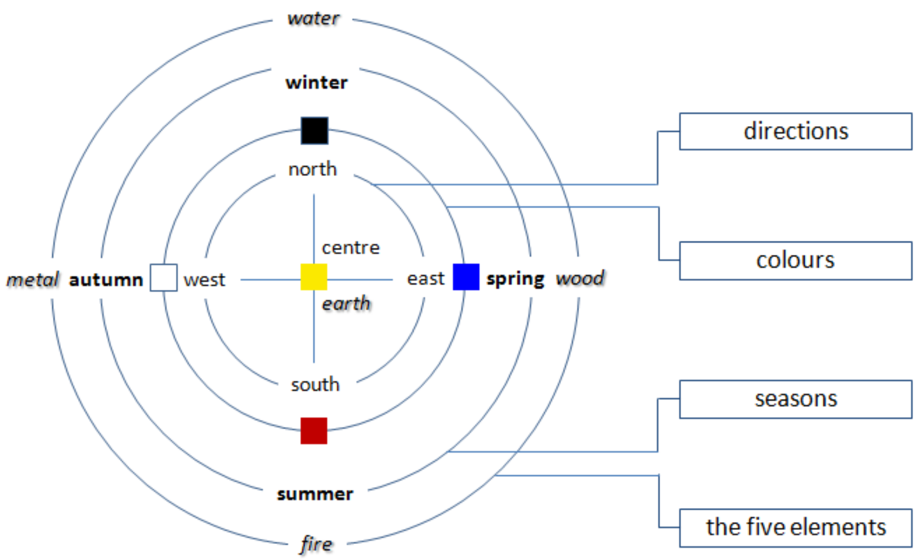

Figure 2: The five traditional Korean colours and their relationship with nature.

Rationale for the research

This work is part of a broader study to investigate cultural reinvention for product design with particular emphasis on Korean culture. Cultural reinvention means to present something in a new form or a new image embodied with cultural meanings but based on an existing cultural product [28]. Specifically, the *bojagi* (a traditional Korean textile product) is being studied. As part of this broader study, it is useful to consider whether younger Korean consumers recognise the five traditional colours as being traditional and also whether they regard these colours as being fashionable and/or preferred. Therefore, samples of young Korean and UK (for comparison) consumers have been tested to examine their colour preferences and also what they considered to be successful fashion colours using the traditional Korean colours (in various degrees of saturation and hue nuance). In the case of the Korean participants, they were also asked which colours they considered to be more traditional. An interesting side question that may be answered by this research is that of precisely which colours (for example, for red, exactly which hue and which saturation) is most associated by young Korean consumers as being traditional.

Colour specification

In this study a system of colour specification was used to enable objective and numeric data about colour to be collected. The CIE (Commission Internationale de l'Éclairage) system offers a precise means of specifying a colour stimulus under a set of viewing conditions; the CIELAB colour space is a useful representation of colours that correlates with perceptual attributes and is an international standard for colour specification [29].

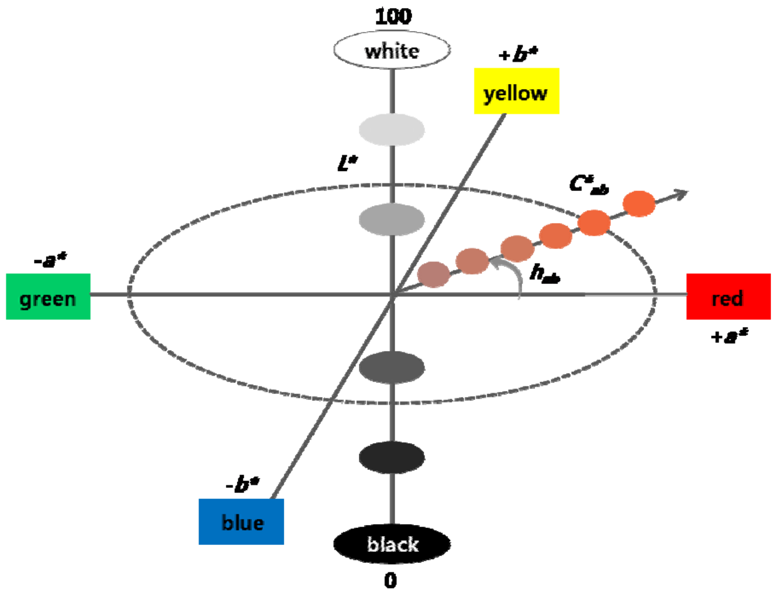

Figure 3: A schematic representation of the CIELAB colour space.

The CIELAB system defines each colour by three numbers (L^*, a^* and b^*) that specify the position of the colour in a three-dimensional space (see Figure 3). The vertical axis (defined by L^*) relates to the lightness of the colour and usually ranges from 0 (black) to 100 (white). The other two axes (defined by a^* and b^*) are opponent colour axes that approximately represent red-green (a^*) and yellow-blue (b^*). Whereas the Cartesian coordinates a^* and b^* are adequate for colour specification, it is sometimes preferable to use C^* and h_{ab}, the polar coordinates [30] as illustrated in Figure 3. C^* represents the chroma of the colour whereas h_{ab} represents the hue angle; a^* and b^* confound chroma and hue.

Study details

A total of 120 colour patches were printed (24 each of red, blue, yellow, white and black) using an HP8550 laser-jet printer with Kodak premium photo paper. The patches were arranged on five sheets with each sheet containing patches of one of the five traditional hues. The colours on each sheet were arranged randomly but were clustered in CIELAB space around a centre whose colour coordinates were selected based on a traditional Korean textile product called an *obangnang* (silk pouches that are a type of *bojagi*) [31]. The 24 patches were designated around these traditional colours, being variously lighter, darker, stronger, weaker, warmer or cooler though subject to limitations of the gamut of the printer in some cases. The printer was only able to produce approximate representations of the target colours (because of limitations of colour management) but still sufficiently close to the target colours for the purposes of the experiment. Figure 4 shows the CIELAB colours (for illuminant D65 and the 1964 CIE standard observer) of the actual patches (the actual $L^*a^*b^*$ values were obtained from measurements using a Minolta CM2600d reflectance spectrophotometer) and specifically, the green, red and blue symbols represent the yellow, red and blue samples respectively (the black crosses represent the white samples and the black circles represent the black samples). In fact, five replicates of each sheet were printed so as to speed up the collection of the psychophysical data. Each of the five sheets was separately measured and the variation between sheets was found to be small. Figure 4 shows the colour coordinates averaged over the five sheets.

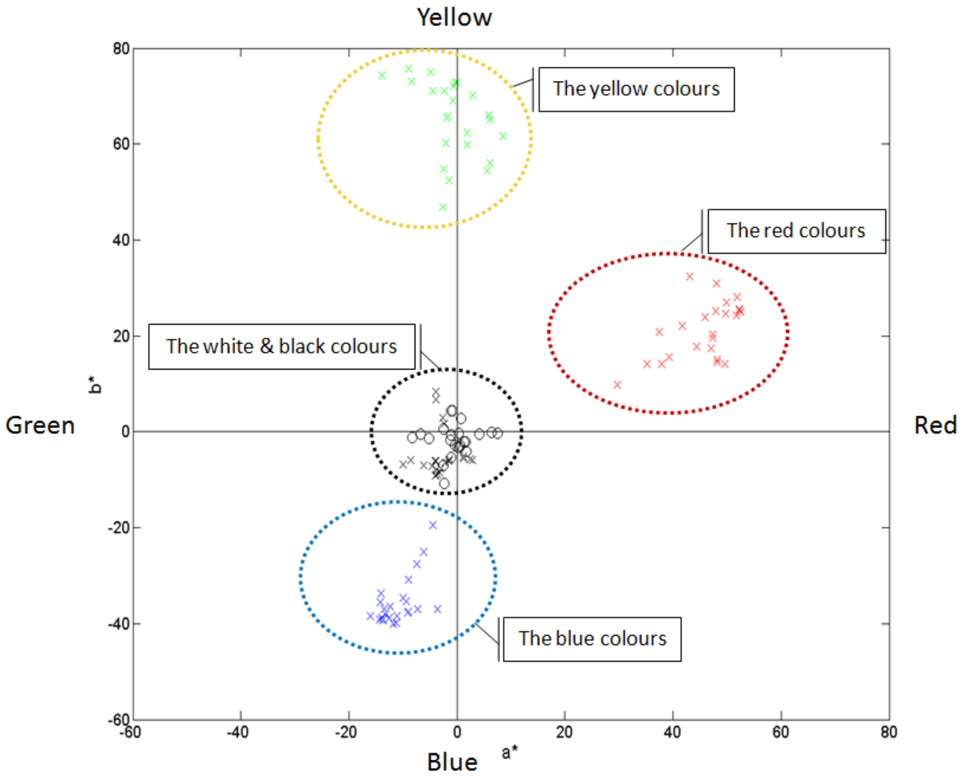

Figure 4: CIELAB coordinates of the 120 patches used in phase 1 of the experiment (the green, red and blue symbols represent the yellow, red and blue samples respectively; the black crosses represent the white samples and the black circles represent the black samples).

A study was carried out using 40 Korean observers (mainly recruited from Changwon National University) and 40 UK observers (mainly recruited from University of Leeds). Before the study, all observers were given a test for colour blindness and they are all deemed to have normal colour vision. Observers were presented in turn with one of five sheets (containing red, blue, yellow, white or black colours) and asked to pick the colour (1) they preferred; (2) that they thought was closest to the Korean traditional colour; (3) and which they thought was most appropriate for fashion products. For UK observers only questions (1) and (3) were posed. Therefore, for each sheet, Korean observers made three separate selections that were recorded by the experimenter (UK observers made two separate selections). Most observers had some professional experience with design or clothing, and the demographic characteristics of the observers are summarised in Table 1.

	Korea	UK
Total number	40	40
Gender proportion (%): female-male	95.0-5.0	62.5-37.5
Age range	18-38	19-39
Mean age	23.6	22.2

Table 1: Observer attributes.

The language of the experimental study was chosen according to the observers' native language (Korean or English). The order of presentation (red, blue, yellow, white and black colours) was randomly selected for each observer. In order to assess intra-observer variability a second set of printed samples (25 sheets: 5 replicates of each of the 5 colours) was prepared and observers were asked to repeat their assessments, following an interval of 2 hours, using samples from this second set of printed sheets. The reason for having a second set of printed sheets (to assess repeatability) was that the same colours were used but positioned in a different random order so that observers would not be able to remember which patch they selected the first time and simply base their second selections on the remembered position. In the following analyses the first selections made by each observer will be referred to as phase 1 and the second selections will be referred to as phase 2. The analyses were carried out using the MATLAB programming language.

Results

First, the reliability of the judgements made by the observers must be considered. For each observer and for each colour choice the colour difference between the selection made in phase 1 and the selection made in phase 2 was calculated. This colour difference is simply the Euclidean distance between the points in CIELAB space that represent the selections. Thus, if an observer makes exactly the same selection in phase 1 and phase 2 then this intra-observer colour difference will be zero; the higher the colour difference the less reliable the judgements are. The colour differences were averaged over each group of 40 observers and the average colour differences are displayed in Table 2.

	Korean			UK	
	preferred	traditional	fashion	preferred	fashion
red	5.18	7.03	8.22	5.50	9.16
blue	4.57	4.93	6.63	5.62	8.44
yellow	4.27	7.31	9.53	7.11	9.64
black	4.27	5.16	5.18	4.52	5.79
white	2.31	4.38	5.58	4.63	6.72

Table 2: Mean colour differences between selections for phases 1 and 2 averaged for each observer group and colour choice.

It is difficult to compare the mean colour differences across the different colours because the CIELAB colour space is not visually uniform; that is, the relationship between distances in CIELAB space and perceptual colour differences varies from one colour to the next [30]. However, it is interesting, for each colour, to look at the reliability of judgements between the two groups of observers and also between the different colour choices (that is looking across the rows in Table 2). In general, the reliability of an observer's judgement of what is preferred is high and the reliability of what is fashionable is low. This can be concluded because the colour difference between repeats judgements are much lower for the preferred colour than for the fashionable colour (this is true for UK and Korean observers and also for all five colours). In other words, observers seem to exhibit more certainty about what they like than they do about what is fashionable. To support this analysis the data were subjected to a t-test (homoscedastic two-tailed) that revealed statistically reliable differences for the Korean observers of preferred red v fashion red (p = 0.027), preferred blue v fashion blue (p = 0.027), preferred yellow v fashion yellow ($p < 0.001$), and preferred white v fashion white (p = 0.011). For Korean observers there were also statistically significant differences between preferred yellow v traditional yellow (p = 0.001) and preferred white v traditional white (p = 0.020).

No such statistically reliable differences were in fact found for the UK observers. This could suggest that in general the notion of preferred colour is more precisely defined for Korean observers or that the notion of fashionable colour is less precisely defined for Korean observers; the data in Table 2 tend to support the former notion.

The above analysis is concerned solely with reliability of judgements. It is also interesting to consider whether, for each set of observers, the adjectives fashionable, traditional and preferred affect the judgements that are made. We therefore need to consider the average colour values for each set of adjectives and for each set of observers. Table 3 shows the average colour coordinates that were obtained for the responses from the Korean observers and Table 4 shows the equivalent data for the UK observers.

	preferred			traditional			fashion		
	L^*	C^*	h_{ab}	L^*	C^*	h_{ab}	L^*	C^*	h_{ab}
red	47.52	50.70	23.63	46.02	47.80	23.57	46.11	47.95	22.47
blue	52.70	37.32	254.30	49.34	38.14	253.91	51.96	37.17	253.54
yellow	82.82	66.71	93.25	79.62	66.96	89.11	81.18	65.47	91.38
black	33.40	1.87	247.69	33.07	1.54	245.92	33.83	2.58	250.02
white	91.78	4.79	249.22	90.86	5.04	242.21	90.18	5.60	234.75

Table 3: CIELAB colour coordinates of the preferred, traditional and fashion colours for the Korean observers.

	preferred			fashion		
	L^*	C^*	h_{ab}	L^*	C^*	h_{ab}
red	47.94	51.23	23.41	45.89	47.08	23.94
blue	52.71	37.41	252.43	53.13	36.33	252.41
yellow	81.28	66.73	91.20	80.90	65.44	90.94
black	33.29	2.63	242.85	33.51	2.66	252.04
white	89.66	6.32	247.09	89.61	5.91	247.60

Table 4: CIELAB colour coordinates of the preferred and fashion colours for the UK observers.

The data in Table 3 are represented in Figure 5. From Figure 5 it can be deduced that, for the Korean observers, the preferred red is more saturated than the fashion and traditional red. In addition, the traditional yellow is reddish and the preferred yellow is greenish compared with the fashion yellow. The UK data in Table 4 are represented in Figure 6. From Figure 6 it can be deduced that, for the UK observers, the preferred red is also more saturated than the fashion red. It is interesting to investigate how large these differences are. The colour difference between the Korean preferred red and the traditional and fashion red is 3.27 and 3.24 CIELAB units respectively. CIELAB values over about 1 unit are normally considered to be visible and significant. However, CIELAB is a visually non-uniform colour space; the same numbers expressed in CMC (2:1) units are 1.33 and 1.43 respectively, both of which one would expect to be visually noticeable [30]. In a similar way, if we consider the Korean yellow, the preferred yellow was greener and the traditional yellow was redder when compared with the fashion yellow. The CIELAB colour differences were 2.98 (preferred v fashionable), 3.40 (traditional v fashionable) and 5.80 (preferred v traditional); the CMC (2:1) values were 1.42, 1.71 and 2.97 respectively. All of these colour differences would be expected to be visually noticeable.

The agreement between the UK and Korean data is striking. However, there are also differences. The greatest difference between UK and Korean preferences seems to be for the white colours; both sets of observers prefer a bluish white but both the preferred and fashion UK whites are bluer than the Korean preferred and fashion whites. There is a long history in European society of preferring bluish whites. From the middle of the 19th century people have added natural blue dyestuffs when washing white clothes, for example. These blue dyestuffs (for example, Reckitt's blue) were replaced in the middle of the 20th century by man-made fluorescent brightening agents (FBA) in commercial washing powders [32]. In Korean society there is not such a long tradition of counter-acting the natural yellowness of many white materials with blue dyestuffs and FBAs and this may account for differences in whiteness preferences [33].

We note that the gender balance was a little different between the two populations (the Korean population had a greater proportion of female participants). In some studies of colour preference and judgement an effect of gender is reported although in some other studies no effect of gender is found. Therefore the results reported in this work are subject to the caveat that the different gender balances could have skewed somewhat the results.

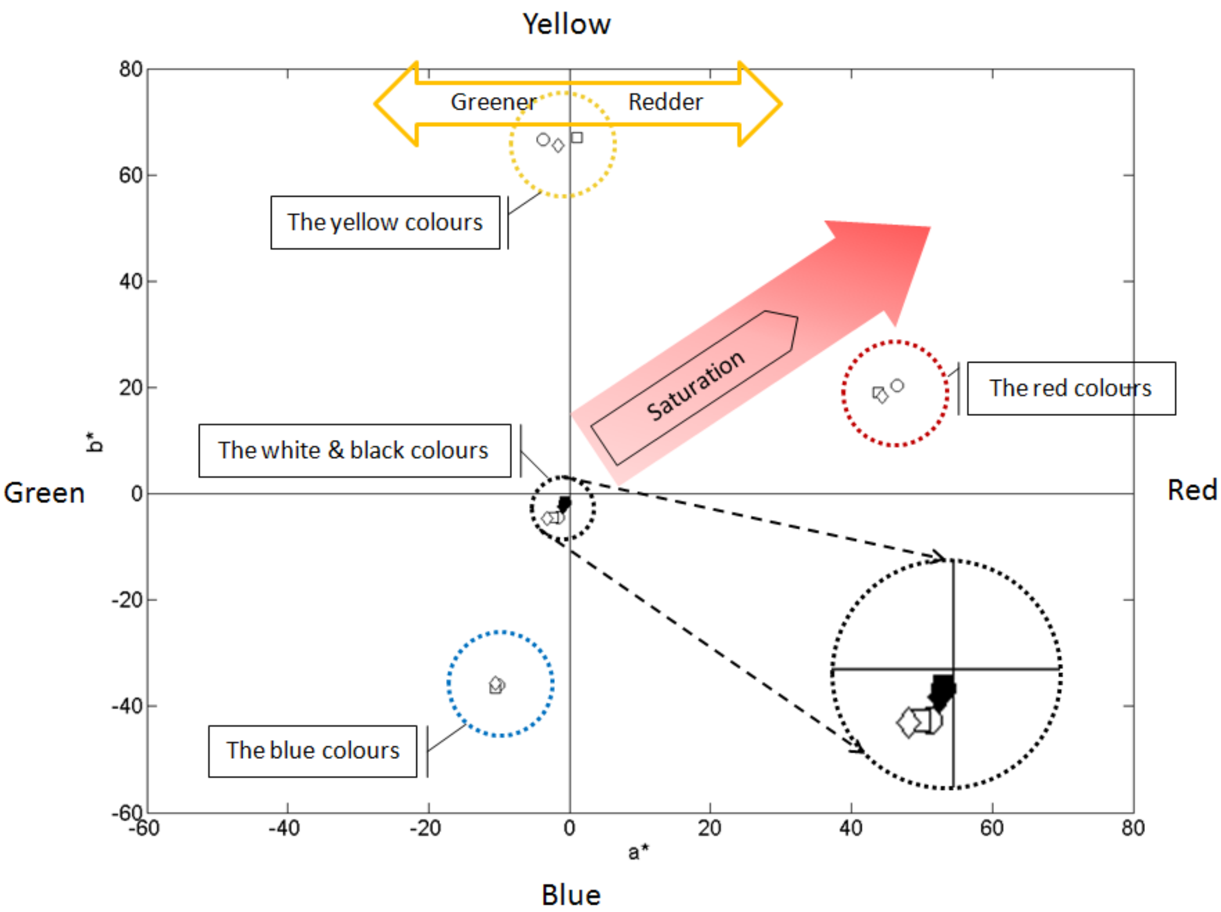

Figure 5: Digital Graphical representation of preferred (circles), traditional (squares) and fashion (diamond) colours in CIELAB space (the black colours are denoted by filled symbols) for Korean observers.

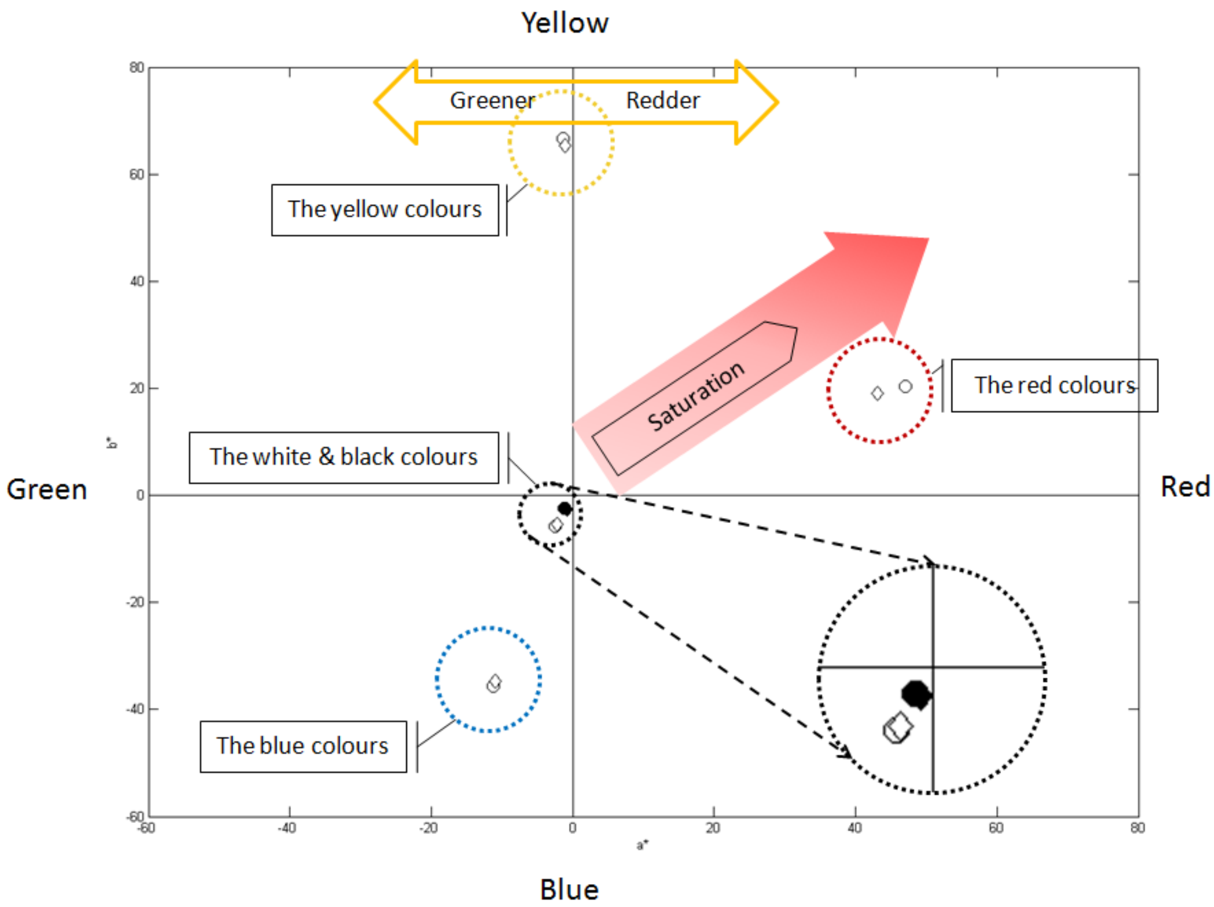

Figure 6: Graphical representation of preferred (circles) and fashion (diamond) colours in CIELAB space (the black colours are denoted by filled symbols) for UK observers.

Conclusions

This paper has investigated and identified the differences and similarities in the colour choices of young Korean consumers for preferred, fashion and traditional categories and young UK consumers for preferred and fashion categories. The study involving Korean and UK participants revealed that observers seem to exhibit more certainty about what they liked than they do about what is fashionable and this trend is the same for both Korean and UK observers. Furthermore from the analysis of the data it could be concluded that firstly, the preferred red is more saturated than the fashion and traditional red for Korean observers. Additionally, the traditional yellow is reddish and the preferred yellow is greenish compared with the fashion yellow. Similarly, for the UK observers, the preferred red is also more saturated than the fashion red. In the case of white colours, both sets of observers prefer a bluish white. Overall, the colour choices and preferences among target consumers in young Koreans and young UK residents appear to be similar.

Among the sample population, the evidence supports the inference that similarities are partly the result of a global convergence in patterns of young consumer preference, interdependencies in business and the rapid expansion of communications technology [21]. This global convergence of preferences can be seen as people around the world are selecting and wearing similar types and styles of clothing, paying to see many of the same films, watching typically the same type of programmes on television and playing the same digital games on computers. From a consumer behaviour perspective, product experiences are determined according to their perceived desirability. These perceptions today are being established and reinforced to a great extent through engagement with globally merging media – print, radio, television, and of course, the internet.

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