Personal Colour Analysis, Consumer Colour Preferences and Colour Forecasting for the Fashion and Textile Industries

Tracy Diane Cassidy

Department of Clothing Design & Technology, Hollings Faculty, Manchester Metropolitan University, Old Hall Lane, Manchester, UK
Email: t.cassidy@mmu.ac.uk

The current colour forecasting process used predominantly by the fashion and textile industries has been found to be underperforming. Consequently, an improved system is proposed that eliminates the anticipation of consumer acceptance in favour of consumer colour preference data. In this study the fundamental principles of personal colour analysis systems and colour data have been studied as a foundation for the development of an effective consumer colour preference model. In order to test this hypothesis a survey was conducted to establish links between the systems' colour palette types and personal colour preferences. The personal colour analysis systems all claimed to be based on the three dimensions of colour, hue, saturation and value, though the study found that these were rarely applied to the individual colour palette types. A fourth system was developed using the three dimensions of colour in all palette types, referred to as the HSV system, and used in the analysis stage along with three extant personal colour analysis systems to establish colour preferences links. Findings suggest that the HSV system was more useful than the personal colour analysis systems as a potential market data collection tool for the colour forecasting process, though further refinement of the system and rigorous testing is required. Research continues to identify optimum sources of preference data for inclusion in the improved system model.

Introduction

Even though colour forecasting is very much considered to be one of the major driving forces of the fashion and textile industry by those involved, little information exists about its methodology and even less in-depth information is currently available about this complex and intuitive process. Colour forecasting is a fundamental part of a collective process known as fashion forecasting or trend prediction. Individuals or teams attempt to accurately forecast the colours, fabrics and styles of fashion product that consumers will purchase in the near future, approximately two years ahead [1]. The initial investigation aimed to demystify and clarify the process, though there was never any intention to dismiss the part that intuition and inspiration play. Soft systems methodology (SSM) [2] was used to model the current process and to develop an improved system model [3].

The improved system model includes a market research stage in order to collect consumer colour preference data rather than anticipating consumer acceptance as in the current model. It is claimed that forecasters aim for 80% accuracy [4], yet through consumer surveys, the current process was found to be only 51% efficient [1]. This would suggest that anticipating consumer colour preferences could essentially be contributing to low high street sales.

Colour is reputed to be the first aspect of a product that consumers are drawn to and also for many designers it is one of the first of the fundamental elements of the design process to be considered [5]. Colour forecasting is a prerequisite of trend prediction and colour itself can be used to great effect to create freshness in repeated styles and product ranges and as a marketing tool through mood creation, colour communication and fashionable colour names [6]. Currently, a seasonal colour story and forecasting information from national and international colour meetings are disseminated, creating a colour consensus that is compiled into packages and marketed globally [7]. Individual forecasting companies interpret the colour stories from the colour meetings to create directional information for their clients, who in turn use this information to tailor their product colour ranges to meet the desires and aspirations of their customers.

Retailers have a direct link with the consumer and have become increasingly proactive in refining their marketing efforts, which are firmly grounded within business philosophies [8]. A fundamental aspect of marketing is defining the target customer within the marketplace. Consequently, understanding consumers through their behaviour, decision-making processes, perceptions, motivations, etc. offers the industry the potential to produce and market highly acceptable consumer products [9,10]. With increasing competition and marketing efforts becoming more sophisticated and target-market specific, companies surveyed from the fashion and textile industry showed a strong interest in the improved forecasting model, which proposes the inclusion of accurate consumer colour preference data. This would not only improve the efficiency of the colour forecasting procedure but would also potentially offer companies the ability to predict more accurately the likely consumer acceptance of their proposed colour ranges.

In many formal and informal discussions of the colour forecasting models a common suggestion for the inclusion of consumer colour preference data has been the use of data related to personal colour analysis systems. Colour and style analysis and image building is a relatively new concept dating back to the early 1980s, established predominately in the USA and growing in popularity. At the very least there is growth in awareness of the concept throughout the Western world and this is also evident in the East. The personal colour analysis systems categorise colours into groups based on the fundamental characteristics of colour for the enhancement of personal colouring through the choices of colours the individual wears. If a link can be identified between these groups of colours and personal colour preferences, then why 'reinvent the wheel' in developing another model? The question is 'do personal colour preferences fit neatly into the categories that these systems use?' The three systems selected for this enquiry are probably the most popular or at least the more known but differ in the grouping of colour types. The underlying principles of these systems are explored in relation to colour preference data to test the hypothesis.

Aims and Objectives

The aim of this paper is to explore the potential use of the principles that underpin personal colour analysis systems in the development of a colour preference model in order to:

1. Define the characteristics of colour used by three personal colour analysis systems that underpin their individual colour types
2. Evaluate links between the three systems' colour types and with personal colour preferences
3. Evaluate the potential use of personal colour analysis system types as a foundation for a colour preference data collection system for the colour forecasting process.

Methodology

Secondary resource data was provided by the three personal colour analysis systems selected. In order to understand the principles underlying the systems the semantic descriptions from each were used and their colour samples, which were measured using the Pantone Colour Cue tool. The semantic descriptions contain keywords used to describe the colours of the palettes for each type. Each word was verified using the *Oxford English Dictionary* in order to associate hue, saturation and value precisely.

A survey of 49 respondents was conducted using a questionnaire and a set of 90 printed colour samples, including bright/pure colours, tints, tones and shades, black, white and a range of greys. Respondents were asked to indicate their preferences for each colour using a Likert scale where 1 was the lowest preference rating and 5 was the highest. Various tables of information were developed to assist the analysis stage, which led to the development of a more logical approach to establish palette types using the three dimensions of colour.

Personal Colour Analysis Systems

Personal colour analysis data was selected due to the growth of colour and style analysis, image building and fashion styling concepts and consultancies. Through media exposure, consumers in general are becoming far better educated in recognising styles and colours that work best for them as individuals and are more sensitive to their own personal preferences [11]. It has also been recognised that the more mature fashion-conscious consumer has a strong sense of self-awareness and therefore has developed strong individualistic requirements that are very challenging to the industry to recognise and meet [12]. Marketing efforts are ever more centred on specific target customers, and trend forecasting is becoming an integral part in the marketing effort in addition to its more traditional place in design and product development. Therefore the industry, particularly the retail sector, has shown an interest in a colour forecasting system that can be tailored to their target market's needs. The traditional model for colour forecasting is outlined in Figure 1 [13], while the proposed new model is summarised in Figure 2 [14].

There is a general consensus among those reporting on fashion forecasting that four themes are commonly produced for each trading season based on the characteristics of the four seasons model used by some personal colour analysts [15]. Ironically, forecasters tend toward four different but often complementary colour stories for their seasonal trend packages. It would appear evident on the high street that the information users, such as designers and buyers, move toward only one of these four themes. If the population's colour preferences were to fit into one of the four basic palette types of the four seasons model (or similar model), retailers would in effect be meeting the needs of approximately one quarter of their potential target market at any one time [1].

The four seasons model is fundamentally based on colour temperature or bias, dependent on the undertone. Colours with a warm bias have predominantly yellow undertones and are referred to by Everett Brown as being Key 2 colours. Key 1 colours have predominantly blue undertones and therefore are referred to as being cool [16]. The same colour biases have also been recognised in the personal colouring of the human skin, hair and eyes [17]. The three systems selected claim to use the three colour characteristics: colour temperature, saturation and value as the foundation of their colour groupings or palette types.

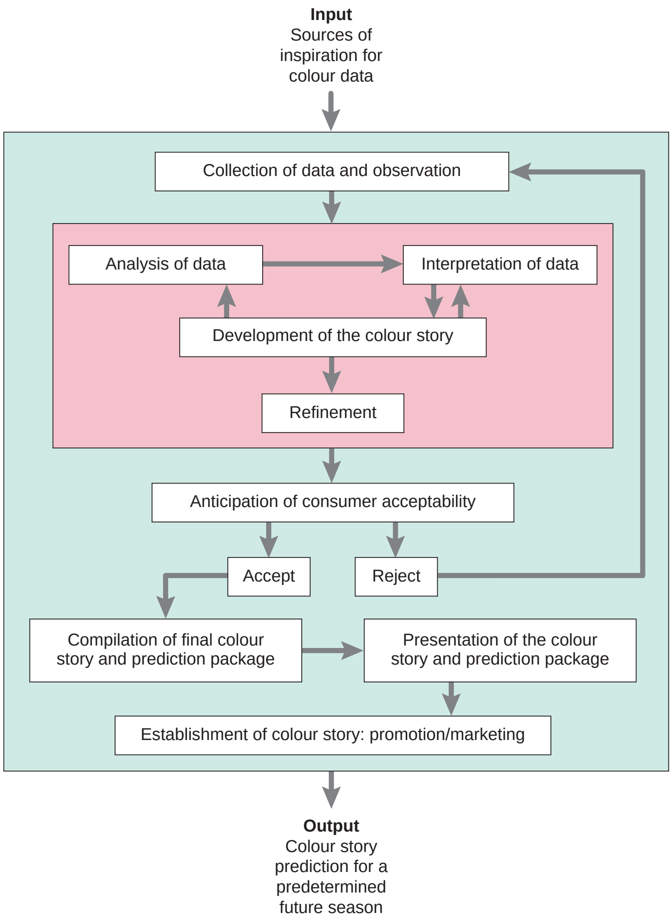

Figure 1 Current colour forecasting process model [13]

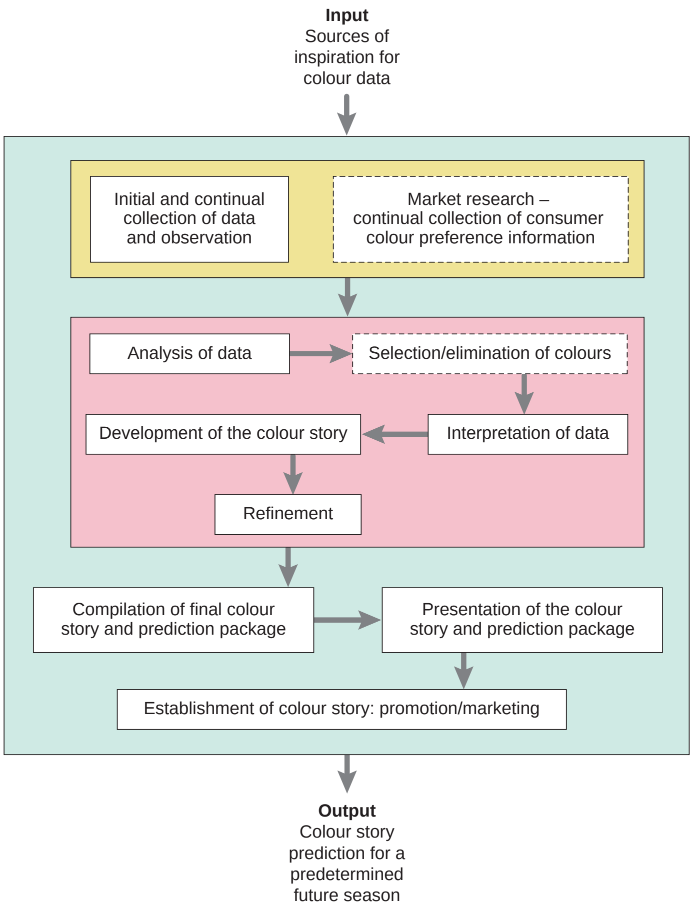

Figure 2 Improved colour forecasting process model [14]

Underlying Principles

The three better-known systems used in this study are those of Mary Spillane of the Colour Me Beautiful (CMB) organisation [18], and the authors and consultants Angela Wright [19] and Barbara Jacques [20]. The CMB and Wright systems are based on the four seasons model. These four groups in each season are generally viewed in simplistic terms: winter palettes are bright, cool and contrasting; spring palettes are predominantly tints that are warm and clear; summer palettes are tonal, cool and muted; and autumn palettes are mostly warm and rich shades. Both systems claim to have been based on the three dimensions of colour: hue, saturation and value. The Jacques system uses a different approach but still claims to be based on the same three colour dimensions. The CMB system has been refined by using three different sub-sets known as types or palette types within each of the four seasonal groups, making a total of twelve palette types. Each system uses a set of key words to describe the palette colours; these words were verified using the *Oxford English Dictionary* in order to associate them correctly with hue, saturation and value. Tables 1, 2 and 3 show the key words used in the systems and the meaning of the words in relation to hue, saturation and value.

The CMB model shown in Table 2 uses the terms rich and deep in the colour palette type descriptions: both refer predominantly to high saturation and are also both associated with depth of colour or darkness. Therefore they have been used to determine levels of saturation and value or luminosity.

Even though the text in each case clearly states that each system was developed using the three colour characteristics, hue, saturation and value, most of the colour palette types are based on only two of the three, leaving one of the three colour characteristics open to interpretation and therefore any value can be applied.

The colour samples from the three selected systems were measured using the Pantone Colour Cue tool. As the colour measurement tool used does not have an HSV option, the RGB values were taken and entered into the colour box facility in Microsoft Word, which gives both RGB and an automatic conversion to HSV values. As the questionnaires were produced in Microsoft Word, it made sense to continue with this one software package for the entire exercise.

Table 1 The Angela Wright system

Palette type	Key words description	Meaning	Overall HSV
Spring	Warm	Hue: Warm	Hue: Warm
	Light	Value: Light	Saturation: Any
	Delicate	Saturation: Low (muted)	Value: Light
	Clear	Saturation: High (clear)	
	Tints	Value: High (light)	
Summer	Cool	Hue: Cool	Hue: Cool
	Delicate	Saturation: Low (muted)	Saturation: Low
	Tones	Saturation: Low (muted)	Value: Any (– Pure)
	Subtle	Saturation: Low (muted)	
Autumn	Warm	Hue: Warm	Hue: Warm
	Deep (saturation)	Saturation: High (clear)	Saturation: High
	Deep (value)	Value: Dark	Value: Dark
	Intense	Saturation: High (clear)	
	Shades	Value: Low (dark)	
	Rich (saturation)	Saturation: High (clear)	
	Rich (value)	Value: Dark	
Winter	Cool	Hue: Cool	Hue: Cool
	Intense	Saturation : High (clear)	Saturation: High
	Strong	Saturation: High (clear)	Value: Pure
	Bright	Saturation: Pure	

All HSV numerical values in this software programme have a range of 0 to 255. Hue refers to the name of a colour [21] and while colour temperature is not one of the three dimensions of colour, it is a quality of hue that is used by the three personal colour analysis systems tested and is recognised to be the primary fundamental principle that forms the foundation of personal colouring [22]. Colour temperature can be subdivided into warm (hue numbers 0 to 118: red through orange and yellow to yellow-green) and cool (hue numbers 119 to 255: green, cyan through blue and violet to magenta). This is a subjective classification based on general perceptions of colour used in colour theories [23]. The point at which lower saturation

Table 2 The Colour Me Beautiful (CMB) system

Palette type	Key words	Meaning	Overall HSV
Clear Spring	Clear Warm Some Bright	Saturation: High Hue: Warm Saturation: Pure	Hue: Warm Saturation: High Value: Light (+ Pure)
Warm Spring	Golden Clear Warm	Hue: Warm Saturation: High Hue: Warm	Hue: Warm Saturation: High Value: Any
Light Spring	Soft Delicate Warm Light	Saturation: Low Saturation: Low Hue: Warm Value: Light	Hue: Warm Saturation: Low Value: Light
Light Summer	Soft Delicate Light Cool	Saturation: Low Saturation: Low Value: Light Hue: Cool	Hue: Cool Saturation: Low Value: Light
Cool Summer	Cool Soft	Hue: Cool Saturation: Low	Hue: Cool Saturation: Low Value: Any (– Pure)
Soft Summer	Muted Dusty Soft Cool	Saturation: Low Saturation: Low Saturation: Low Hue: Cool	Hue: Cool Saturation: Low Value: Any (– Pure)
Soft Autumn	Rich (saturation) Rich (value) Warm Soft Muted	Saturation: High Value: Dark Hue: Warm Saturation: Low Saturation: Low	Hue: Warm Saturation: Any Value: Dark
Warm Autumn	Golden Rich (saturation) Rich (value) Warm	Hue: Warm Saturation: High Value: Dark Hue: Warm	Hue: Warm Saturation: High Value: Dark
Deep Autumn	Vivid Warm Deep (saturation) Deep (value)	Saturation: High Hue: Warm Saturation: High Value: Dark	Hue: Warm Saturation: High Value: Dark
Deep Winter	Deep (saturation) Deep (value) Cool Soft	Saturation: High Value: Dark Hue: Cool Saturation: Low	Hue: Cool Saturation: Any Value: Dark
Cool Winter	Clear Cool Some bright	Saturation: High Hue: Cool Saturation: Pure	Hue: Cool Saturation: High Value: Any (+ Pure)
Clear Winter	Clear Cool Some bright	Saturation: High Hue: Cool Saturation: Pure	Hue: Cool Saturation: High Value: Any (+ Pure)

Table 3 The Barbara Jacques system

Palette type	Meaning	Overall HSV
Light/Muted	Value: Light Saturation: Low	Hue: Any Saturation: Low Value: Light
Muted/Light	Saturation: Low Value: Light	Hue: Any Saturation: Low Value: Light
Light/Bright	Value: Light Saturation: High	Hue: Any Saturation: High Value: Light
Bright/Light	Saturation: High Value: Light	Hue: Any Saturation: High Value: Light
Dark/Muted	Value: Dark Saturation: Low	Hue: Any Saturation: Low Value: Dark
Muted/Dark	Saturation: Low Value: Dark	Hue: Any Saturation: Low Value: Dark
Dark/Bright	Value: Dark Saturation: High	Hue: Any Saturation: High Value: Dark
Bright/Dark	Saturation: High Value: Dark	Hue: Any Saturation: High Value: Dark
Warm/Dark	Hue: Warm Value: Dark	Hue: Warm Saturation: Any Value: Dark
Warm/Light	Hue: Warm Value: Light	Hue: Warm Saturation: Any Value: Light
Cool/Dark	Hue: Cool Value: Dark	Hue: Cool Saturation: Any Value: Dark
Cool/Light	Hue: Cool Value: Light	Hue: Cool Saturation: Any Value: Light

affects clarity of hue was determined to be 190. Where the saturation level is 190 and above, the colour is considered to be of high saturation and a value of 189 and below is of low saturation. These values were decided upon purely for the purposes of the present study, and are therefore subjective and at this stage do not take different levels of saturation into account. The default of the software for pure colour is a luminosity value of 128. Hues with luminosity values of 129 to 255 result in a 'tint' and values of 127 to 0 results in a 'shade'. Tables 4, 5 and 6 summarise these rules as applied to the palette types of the three systems.

The Wright model describes the winter palette as bright, having a purity of colour with no muted colours. In Table 2 the value for winter type is stated as 'pure' ($V = 128$). The summer palette is described as having only muted colours and no bright or pure colours at all ($V < 128$ or > 128). Similarly, in the CMB model the clear spring palette consists of light colours but includes pure colours hence ($V = 128–255$), clear winter and cool winter can be any value including pure colours; hence ($V = 0–255$) and cool summer and soft summer palettes can be any value but exclude pure colours hence ($V < 128$ or > 128) (Table 5).

Table 4 Angela Wright system with HSV values

Palette type	Overall HSV	HSV values
Spring	Hue: Warm Saturation: Any Value: Light	*H* = 0–118 *S* = 0–255 *V* = 129–255
Summer	Hue: Cool Saturation: Low Value: Any	*H* = 119–255 *S* = 0–189 *V* = 0–127, 129–255
Autumn	Hue: Warm Saturation: High Value: Dark	*H* = 0–118 *S* = 190–255 *V* = 0–127
Winter	Hue: Cool Saturation: Low Value: Pure	*H* = 119–255 *S* = 0–189 *V* = 128

Table 5 Colour Me Beautiful (CMB) system with HSV values

Palette type	Overall HSV	HSV values
Clear Spring	Hue: Warm Saturation: High Value: Light (+ Pure)	*H* = 0–118 *S* = 190–255 *V* = 128–255
Warm Spring	Hue: Warm Saturation: High Value: Any	*H* = 0–118 *S* = 190–255 *V* = 0–255
Light Spring	Hue: Warm Saturation: Low Value: Light	*H* = 0–118 *S* = 0–189 *V* = 129–255
Light Summer	Hue: Cool Saturation: Low Value: Light	*H* = 119–255 *S* = 0–189 *V* = 129–255
Cool Summer	Hue: Cool Saturation: Low Value: Any (– 128)	*H* = 119–255 *S* = 0–189 *V* = 0–127, 129– 255
Soft Summer	Hue: Cool Saturation: Low Value: Any (– 128)	*H* = 119–255 *S* = 0–189 *V* = 0–127, 129–255
Soft Autumn	Hue: Warm Saturation: Any Value: Dark	*H* = 0–118 *S* = 0–255 *V* = 0–127
Warm Autumn	Hue: Warm Saturation: High Value: Dark	*H* = 0–118 *S* = 190–255 *V* = 0–127
Deep Autumn	Hue: Warm Saturation: High Value: Dark	*H* = 0–118 *S* = 190–255 *V* = 0–127
Deep Winter	Hue: Cool Saturation: Any Value: Dark	*H* = 119–255 *S* = 0–255 *V* = 0–127
Cool Winter	Hue: Cool Saturation: High Value: Any (+ 128)	*H* = 119–255 *S* = 190–255 *V* = 0–255
Clear Winter	Hue: Cool Saturation: High Value: Any (+ 128)	*H* = 119–255 *S* = 190–255 *V* = 0–255

Table 6 Barbara Jacques system with HSV values

Palette type	Overall HSV	HSV values
Light/Muted	Hue: Any Saturation: Low Value: Light	*H* = 0–255 *S* = 0–189 *V* = 129–255
Muted/Light	Hue: Any Saturation: Low Value: Light	*H* = 0–255 *S* = 0–189 *V* = 129–255
Light/Bright	Hue: Any Saturation: High Value: Light	*H* = 0–255 *S* = 190–255 *V* = 0–127
Bright/Light	Hue: Any Saturation: High Value: Light	*H* = 0–255 *S* = 190–255 *V* = 0–127
Dark/Muted	Hue: Any Saturation: Low Value: Dark	*H* = 0–255 *S* = 0–189 *V* = 0–127
Muted/Dark	Hue: Any Saturation: Low Value: Dark	*H* = 0–255 *S* = 0–189 *V* = 0–127
Dark/Bright	Hue: Any Saturation: High Value: Dark	*H* = 0–255 *S* = 190–255 *V* = 0–127
Bright/Dark	Hue: Any Saturation: High Value: Dark	*H* = 0–255 *S* = 190–255 *V* = 0–127
Warm/Dark	Hue: Warm Saturation: Any Value: Dark	*H* = 0–118 *S* = 0–255 *V* = 0–127
Warm/Light	Hue: Warm Saturation: Any Value: Light	*H* = 0–118 *S* = 0–255 *V* = 129–255
Cool/Dark	Hue: Cool Saturation: Any Value: Dark	*H* = 119–255 *S* = 0–255 *V* = 0–127
Cool/Light	Hue: Cool Saturation: Any Value: Light	*H* = 119–255 *S* = 0–255 *V* = 129–255

The Wright system comprised 16 colours in each of the four palettes, totalling 64 colours measured. The CMB system comprised 28 colours in each of the 12 palette types, totalling 304 colours and the Jacques system comprised 24 colours in each of the 12 palette types, totalling 264 colours measured. However, the actual colour samples measured for each colour palette type revealed that only 37.5% of the samples measured in the Wright system fit the description of the palette type. Likewise, only 28.3% of the samples measured in the CMB system fit the description of the palette type and 70.1% in the Jacques system. This is most likely due to the descriptions being associated with personal colouring than with suitable colours even though the texts recommend colours that have the same characteristics as the personal colouring type, and therefore complementary to the complexion. However, it is inevitable that some of the colours included in the palettes will be contrasting, in addition to those that are complementary, in order to liven up the palette. Also the premise of these systems is that the colours in the palette are selected to complement the skin tones, hair and eye colouring and are therefore recommended to be used in garments that are nearer the face to enhance personal colouring, thus possibly limiting the range of colours used by each system. The quality of the printed samples measured may also yield discrepancies. For these reasons the actual colour samples provided for the colour palettes are no longer considered important and the emphasis is very much on the three characteristics hue, saturation and value.

Relationships between Systems and the Improved Model

Tables 1 to 6 show differences between the systems, even though they have all been developed using the basic characteristics of hue, saturation and value. In order to establish links between the colour palette types and colour preferences it would appear logical to group together the different types from the systems as this would serve to make comparisons easier in order to identify links. The three systems have used the three dimensions of colour, though have not always applied all three to each of the palette types. It is suggested that a system using all three dimensions for all palette types would be a more effective approach and therefore a simple model has been developed and will be referred to as the HSV system. When applying the three dimensions of colour there are eight possible combinations as follows:

1. Warm, high saturation, dark
2. Warm, high saturation, light
3. Warm, low saturation, dark
4. Warm, low saturation, light
5. Cool, high saturation, dark
6. Cool, high saturation, light
7. Cool, low saturation, dark
8. Cool, low saturation, light.

These eight combinations are therefore the foundation of the HSV system. Table 7 shows this system with HSV values as previously applied to the three systems shown in Tables 4, 5 and 6. At this stage $V = 128$ is omitted as it is the value of a pure colour and is neither light nor dark. The palette types of the three systems relate to the eight combinations of the HSV system as shown in Table 8.

Table 7 HSV system and associated values

Suggested palette type	*H*	*S*	*V*
1. Warm, high saturation, dark	0–118	190–255	0–127
2. Warm, high saturation, light	0–118	190–255	129–255
3. Warm, low saturation, dark	0–118	0–189	0–127
4. Warm, low saturation, light	0–118	0–189	129–255
5. Cool, high saturation, dark	119–255	190–255	0–127
6. Cool, high saturation, light	119–255	190–255	129–255
7. Cool, low saturation, dark	119–255	0–189	0–127
8. Cool, low saturation, light	119–255	0–189	129–255

Table 8 Relationship between HSV system and commercial systems

System	Palette type	Corresponding type	Comment
Wright	Spring	4	
	Summer	7 and 8	Value can be light or dark
	Autumn	1	
	Winter	5 and 6	Value can be light or dark. However, saturation can also be pure for winter type. As stated at this stage the system has no provision for pure colours as *V* = 128 is not yet included in the system.
Colour Me Beautiful	Clear Spring Warm Spring	1 and 2	Contains some pure colours.
	Light Spring	4	
	Light Summer	8	
	Cool Summer Soft Summer	7 and 8	Colours may be light or dark
	Soft Autumn	1 and 3	Saturation may be high (clear) or low (muted)
	Warm Autumn Deep Autumn	1	
	Deep Winter	5 and 7	Saturation can be high or low
	Cool Winter Clear Winter	7 and 8	Colours can be light or dark
Jacques	Light/Muted Muted/Light	4 and 8	Hue can be warm or cool
	Light/Bright Bright/Light	2 and 6	Hue can be warm or cool, and colours can also be pure
	Dark/Muted Muted/Dark	3 and 7	Hue can be warm or cool
	Dark/Bright Bright/Dark	1 and 5	Hue can be warm or cool, and colours can also be pure
	Warm/Dark	1 and 3	Saturation can be high or low
	Warm/Light	2 and 4	Saturation can be high or low
	Cool/Dark	5 and 7	Saturation can be high or low
	Cool/Light	6 and 8	Saturation can be high or low

Personal Colour Preferences in Relation to Systems

A survey was undertaken using a set of 90 colour samples and 49 respondents to explore links between personal colour preferences and the systems types. The sample included six bright/pure hues, 29 tints, 32 shades, 21 tones and black and white. Of the tones, eight were light, 11 dark and two mid-tones. The mid-tones present a problem with the HSV system as $V = 128$ like a pure colour, even though the saturation value is below 189 (in both cases $S = 129$). In order to accommodate pure colours and mid-tones, both having $V = 128$, two sub-types have been inserted into the system. Type A accommodates pure colours and type B mid-tones, both are to be used as an appendage to any of the relevant types. Type A can accompany types 1, 2, 5 or 6 as their palette colours are of high saturation and can therefore be pure or bright if $V = 128$. Type B can accompany types 3, 4, 7 or 8 as the colours are muted (low saturation) and can therefore be mid-tones if $V = 128$. Table 9 shows the refined system and the total number of colour samples for each combination used in the survey.

Scores of 1 on the Likert scale used in the survey yields preferences shown in Table 10. Scores of 1 and 2 were considered as being unfavourable or disliked, a score of 3 was considered

Table 9 Refined HSV system

Suggested palette type	*H*	*S*	*V*	No of samples
1. Warm, high saturation, dark	0–118	190–255	0–127	18
2. Warm, high saturation, light	0–118	190–255	129–255	14
3. Warm, low saturation, dark	0–118	0–189	0–127	5
4. Warm, low saturation, light	0–118	0–189	129–255	2
5. Cool, high saturation, dark	119–255	190–255	0–127	14
6. Cool, high saturation, light	119–255	190–255	129–255	15
7. Cool, low saturation, dark	119–255	0–189	0–127	6
8. Cool, low saturation, light	119–255	0–189	129–255	8
A. Bright – Pure			128	6
B. Mid-tones			128	2

Table 10 Likert scale scores

Likert scale scores	Rating (%)
1	0–20
2	21–40
3	41–60
4	61–80
5	81–100

to be a fairly well liked colour, while colour preference scores of 4 and 5 were considered to be the most desired colours. Only preference scores of 3, 4 and 5 have been used in the analysis.

As previously stated, the present colour forecasting model was found to be only 51% efficient, while forecasters aim for 80% accuracy. Therefore respondents' preferences of 51–79% for the colours of a palette type would be an improvement on the current model's success rate, and preferences of 80–100% would improve the colour forecasting system beyond current expectations.

Applying respondents' colour preferences to the Wright model revealed 81.6% of preferences did not relate to any of the four system's palette types. Also summer and winter types comprised two of the HSV types (7 and 8, and 5 and 6 respectively) as value is not specified. Of the total number of respondents preferring these types only 25.2% had a preference for both, i.e. light and dark variations. Similarly, eight of the 12 palette types of the CMB system relate to two HSV types, as either value or saturation was not specified, and only 24.4% of respondents had high preferences for both extremes. All 12 palette types of the Jacques system relate to two HSV types, since one of the three dimensions of colour remains unspecified. Again only 28.2% of respondents having preferences for these types had high preferences for both extremes of value, saturation or undertone (warm/cool). This would appear to support the need to differentiate between these two extremes when evaluating personal colour preferences as in the HSV system. Both the CMB and Jacques systems accommodated all colour preferences except for mid-tones. It has to be assumed that these colours would be regarded as being either light or dark tones depending on the hue or undertone.

Table 11 shows the respondents' colour preferences according to the HSV system. It must be remembered that only two colour samples were used in the survey for each type 4 and type B

Table 11 Respondents' colour preferences according to the HSV system

Types	Preference level (%)
3, 5, 6	57.1
7	49.0
1, 2, 8, A (pure colours)	28.6
B (mid-tones)	6.1
4	4.1

and therefore the results may be biased. When analysing the higher preferences (80–100%) it was found 40.1% of respondents had a high preference for only one of the types, and 28.6% for two types, while 3, 4 and 5 types were preferred by 6.1%, 4.1% and 2% respectively. Some 18.4% of the respondents showed no such high preferences, although half of these respondents yielded preference rates ranging from 71.4 to 78.6%, which could be considered as being quite high. When considering preference levels between 51 and 79%, 8.2% of respondents had preferences for only one palette type, 12.2% for two or five palette types, 24.5% for three palette types, and 32.7% for four palette types. Preferences for 6 and 7 palette types were 6.1% and 2% respectively and only one respondent showed no high preference for any palette type though three types yielded a preference rating of 50%, just 1% below the limit decided upon. This would appear to indicate that few individuals have strong preferences for only one palette type and not all colours will be liked within that particular palette type. Most individuals will have strong preferences for more than one palette type, though relationships between these for individuals requires further exploration using a more rigorous survey.

Conclusion

A survey comprising 49 respondents was undertaken using a sample of 90 colours in order to establish links between personal colour preferences and personal colour analysis models. The purpose of this research was not to undermine existing systems used in matching colour for fashion to personal colouring but to test the hypothesis that such systems could be used as a market research tool or source of colour data for inclusion in an improved colour forecasting model.

The underlying principles of the commercial systems are based on the three dimensions of colour, hue, saturation and value, from which the palette types were developed. However, it was found that while these three dimensions of colour form the basis of the systems, they do not form the foundations of the individual palette types. It is thought that this is due to the palettes being developed to enhance personal colouring and are compiled using only those colours deemed appropriate for wearing close to the face, thus restricting the palette colours. The findings of these systems when not relying on all three dimensions of colour in the individual colour palettes led to the development of a fourth system referred to as the HSV system, which uses hue, saturation and value in a logical manner.

The analysis of respondents' colour preferences suggested the Angela Wright system was ineffective as a foundation for a colour preference data system as the palette types were too few and too restricted to accommodate all colours. Similarly the Colour Me Beautiful and Barbara Jacques systems were also suggested to be inappropriate as they did not separate the three dimensions of colour sufficiently.

The results of the survey also suggest that while some individuals' colour preferences may fall into one particular palette type, most have high preferences for more than one type. Relationships between palette type preferences have not been included in the analysis of this survey because a more rigorous survey would be required to yield more accurate results on which to base the study.

The three systems used in this study do not provide a readily available source of colour data that could be used as market research data for inclusion in the colour forecasting model. However, with further refinements a system applying the underlying principles of hue, saturation and value as a foundation, as in the HSV approach outlined in this study, offers potential to improve the current colour forecasting system.

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