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The psychological meaning of colour:

A focus on gender and SET representations in youth magazines

Abstract

MOTIVATION is a project that looks at the factors that influence the images of science and technology of young people. Within the framework of the project MOTIVATION, content analysis of youth print media is done. This paper focuses on a specific part of these analyses, namely the colours that are used in pictures in which SET (science, engineering and technology) is represented. Colours can have an effect on an individual's feelings and moods. Every colour carries its own meanings and has effects on the subconscious of the viewer. Therefore it is interesting how colours are used in pictures that are showing SET and how they are being combined with the presentation of the sexes. Before presenting the outcome of the analysis, a brief understanding about the phenomenon of colours shall be conducted. The results of the analysis are showing a genderedness through colours in images where SET are pictured.

1. Introduction

1.1. The project MOTIVATION

MOTIVATION is a project that involves the European countries of Germany (Coordinator), France, Slovakia, Netherlands, Spain, Sweden and Austria. The aim of the project is to investigate and exchange information about factors that influence the images of science and technology of young people.[1] As the main influences on the images of young people, peer groups, teachers, study and job advisors and the media are in the focus of the project. Under gender perspective, different methods such as focus groups, interviews, workshops and case studies are used to gather information about the causes of the declining interest of adolescents in science, engineering and technology.

One of seven work packages of MOTIVATION, work package two (WP2), whose leader is Dr.[in] Anita Thaler from Austria, is dealing with "Youth, gender and SET in media" with a focus on popular print and non-print mass media. Content analyses of youth magazines and soap operas are conducted to gain a better insight in representations of SET in media and its contribution to a stereotyped image of SET in young peoples' minds. The analyses are concentrating on the representation of SET in general and the images of SET with a gender focus in particular. The illustration of colours in the SET pictures is one part of the analysis.

1.2. Colours in history, science and culture

Throughout history, colours have always been used to fulfil symbolic and aesthetic functions and have always been associated with religious symbols. For example, in the fifth century BC, the Greeks referred to the antithesis between black and white and introduced a scheme of primary colours (white, black and red). In the Medieval and Renaissance, colours represented the four elements of nature with a mystical interpretation. Scarlet (later red) was connoted with fire and denoted with charity, white (later black) was the earth, denoted chastity and purity, the air was blue, stated with heaven, and purple (later white) stood for water and martyrdom (Gage 2004).

The knowledge that colour results from the breaking of white light dates from Newton in the 18th century. He was the first one who established a colour wheel and described a chromatic spectrum. Goethe´s "Theory of colours" ["Zur Farbenlehre"], that was published 1810, relates to Newton´s knowledge. He partly criticises Newton´s approach, putting up a scientific scripture containing a didactic, a polemic and a historical part on various colour phenomenons. His work was one of the first

attempts to categorise and analyse colours under different points of view and to give a psychological insight in the meaning of colours. From Goethe´s research also emerged his colour wheel for the symbolisation of the human mind and psyche.

The scientific description how colours are compound goes back to Munsell (1905) and Ostwald (1911). In Munsells´ 1915 published "Colour Atlas" he tried to construct a system, in which the intervals between each colour and its neighbour should be sensed as equal. He differentiated the colour of objects of light sources according to three factors:

- hue or tint: refers to what we have so far been calling colour and is determined by the wavelength of light

- saturation or chroma: refers to the apparent purity of the colour and is associated with the complexity of the light wave and

- brightness or value (for a coloured object) measures the relationship between the colours with light

Every colour is characterised through a three-way block, which is symbolised through these three factors.

Instead of the three Musell-parameters, Ostwald chose the three variables of the concentration of colour, concentration of white and concentration of black to describe colours. He extended those through the concept of the "saturated colour". Every colour pigment can thus be defined through a mixture of "saturated colour" of the specific tone and a concentration of white and black. It is now held that there are three primary colours (red, blue and green) and it is the interaction of the three attributes (hue, brightness and saturation) that create various colours (Aslam 2006).

1.3. The meaning of colours

1.3.1. Cultural differences

Colours can symbolise elements (red and orange for fire, brown for earth, blue for the sky, green for water), space (light blue represents the vertical dimension) or time and timeless (white and black).

It is evidence-based that preferences and meaning of colours are different in various cultures. In his paper, Aslam made up a cross-cultural spectrum of meanings and associations of colour in marketing. For example, black stands for grief and sorrow in Western cultures and for dullness and stupidity in India. In Western cultures, white means virginity and infinity, but mourning or death in East Asia. Blue is associated with cold and evil in East Asia, with death in Iran and with purity in India. In Nigeria, red means unlucky, whereas lucky in China. And purple is connoted with love in China and South Korea, with anger and envy in Mexico and with sin and fear in Japan.

In his study, Choungourian (1968) found out that red was liked most among a sample of US Americans, green was most popular for the Lebanese sample, and blue-green was preferred most frequently from samples of Iran and Kuwait people. It can be seen that preferences are in fact diverse. Grieve (1991) tried to find out where these differences come from. In her study, subjects who were asked about the influence on their colour associations named traditional beliefs such as religious practices, parental beliefs and cultural practices to be the main factors.

As meanings of and associations with colours differ between countries, colours can also stand for National symbols. And it can be said that every person will have different emotions related to the colours of the national flag of a specific country.

As the present study is referring to the understanding of colours in Western Society, the meanings of the analysed colours are taken as:

white	ye./or.	red	green	blue	pink	purple	brown	black
purity, virginity, kindness.	joy, happiness, enthusiasm, creativity.	+ love, energy, fertility, warmth. - anger, aggression, blood, war.	nature, fertility, life, balance, harmony, stability.	+ colour of the mind, calm, satisfaction, desire, lenity. - cold, lie.	beauty, universal love, happy.	colour of feminism. + magic, royality, nobility, spirituality. - conceited-ness, insecurity.	mature, wild, principled, traditional.	death, elegance.

Figure 1: List of meanings of colour for Western Countries

1.3.2. Colours, gender and age

Besides cultural differences, preferences for colours also vary depending on age as well as on gender. Regarding gender, findings of studies differ. Blue seems to be a very liked colour of all sexes, yellow is in general liked the least and women have a tendency towards red tones (red, pink, purple) in comparison to men (Lee & Barnes 1990).

From the various and partly contradictory meanings of colours, depending on the culture, one can assume that the meanings of colours are socialised and learned. One function of colour is carrying gender-related information and often reflecting traditional gender stereotypes (Boyatzis & Varghese 1993). Pink for girls, blue for boys is not only an adage, but a throughout used application to distinguish environments and objects of (unborn) babies and children (Pomerlau et al. 1999). Boyatzis & Varghese found out that children´s emotional associations with colours differ depending on age and sex. Boys in general have a more positive association with dark colours than girls. In younger

children, colour-emotion schemes are not as complex and tightened, which can be seen in the fact that the emotional reaction to bright colours becomes increasingly positive with age. The authors suggest that colour-related emotions depend on the child´s experience with the specific colour. They cite gender socialisation as one of the sources of colour experience, which is underlined by the results. When asked for their favourite colour, girls (50%) preferred pink, followed by purple, and boys (26%) stated blue, followed by red.

It must be said that colour associations and meanings do not only vary between cultures, genders and ages, but also between every single individual. Symbolism of colour influences preferences and can cause certain individual reactions (Lichtlé 2007), both physiological and psychological-emotional ones. Emotional qualities are often associated with particular colours and personality traits are being connected with colours, for example; extroverts prefer warm colours, introverts instead prefer cold colours (Crozier 1996; after a quote from Götz & Götz 1975). Max Lüscher brought up a colour test ["The Lüscher Colour Test", 1969] with which he sought to reveal conscious and unconscious psychological and mental structures of a person. Due to lacking test validity and reliability the test never gained ground in scientific research.

2. Magazine analysis

Thinking of colours as a socialised phenomenon, it is hypothesised that colours are intentionally used to accompany representations of SET and gender in youth magazines and thus effect a gendering of SET representations. Therefore the term "colour code" was used in the analysis.

It is expected that girls are more likely to be presented with brighter colours and colours, which are associated with feminine attributes, especially pink, red and purple. Men are expected to be presented more often in combination with darker colours and those that are liked with masculine attributes like blue, brown and black.

To illustrate the hypothesis, some examples are shown as followed.

Gender coloured pictures from "BRAVO" magazine

2.1. Methodology

For the magazine analysis, youth magazines were selected that are most frequently read by the teenage population in that particular country. Every picture up from a certain size (minimum of 7x10cm) that showed any kind of SET-representation has been analysed. All together, from the five countries Austria, France, Germany, the Netherlands and Slovakia, the outcome was a total of 1016 analysed pictures.

The results from this paper are based on the analyses of "BRAVO" magazine. "BRAVO" is a German youth magazine, that is - beside one other Austrian journal - the most read magazine in Austria. The total number of analysed images from "BRAVO" was 491, from which 316 I analysed myself. The remaining 175 pictures trace back to the work of Jennifer Dahmen, Germany. All analysed magazines were issued between September and December 2008.

Besides other information that had been gathered for the overall analysis, the results rely on the following information:

– In which part of the magazine the pictures had been presented- whether it was in a journalistic article or if the picture was an advertisement (either for a SET product or for another product).

–   Which technical field was the representation (music-technologies, cell phones/hand-helds, computer, camera/TVs, video games/toys, vehicles).

–   Whether the pictures represented persons or not.

–   The different colours that had been used in the pictures were recorded: white, yellow/orange, red, pink, purple, green, blue/turquoise, brown and black/grey. Every dominant colour in each picture had been noted. Thus multiple colours could be named for a single image.

2.1.1. Statistical analysis

To answer the hypotheses, qualitative and quantitative analyses were conducted. Quantitative calculations were conducted by the Statistical Package for the Social Sciences, version 16.0. Chi-square tests on a level of significance $p < .05$ were conducted, pre-conditions checked and fulfilled. Contingency tables were used to describe the structural relationship among colours and other variables. All results are presented in percentages.

3. Results

3.1. Colour code - gender

A general difference in the usage of colours between sexes can be seen. Females are more likely to be shown with red, green pink and purple. Men are more often shown with blue, brown than women. There is not a big difference in the occurrence of the sexes with the colours white, yellow/orange and black.

gender	white	ye./or.	red	green	blue	pink	purple	brown	black
females (259)	35.5	20.1	26.6	23.2	19.7	22.0	13.1	8.9	53.7
males (248)	30.2	20.2	18.5	19.4	29.0	13.3	8.5	13.7	54.0

percentage (%)

Figure 2: Colour code - gender

3. 2. Colour code - part of the magazine - gender

Colours are used differentially in journalistic parts and advertisements. Statistical significant differences between the two different parts of the magazines are marked *. Yellow, green, blue, pink, brown and black are used in a different frequency in journalistic parts, compared to advertisements.

For journalist pictures blue, brown, black are used more often than in advertisements. Yellow/orange, green and pink are used more frequently for ads than journalist parts.

part of the magazine	white	ye./or.	red	green	blue	pink	purple	brown	black
		*		*	*	*		*	*
journalist (372)	33.2	17.9	20.4	19.0	27.8	17.7	12.5	12.5	55.7
advertisement (117)	37.2	33.8	17.9	31.0	19.3	35.9	17.9	4.8	32.7

percentage, *statistical significance p<.05

Figure 3: Colour code - part of the magazine - gender

With women, red, green, yellow and pink are shown more often in advertisements than in pictures with journalistic content. Blue, black and brown are more often used to represent women in journalist than in advertisement parts of the magazine. The very same can be seen for men. Beyond that, it is more frequent with men in advertisements than in journalist pictures to use yellow green and purple.

In comparison to women, men are more frequently shown with purple in advertisements. Red and pink are much more often used with women than with men (in both parts of the magazine). In advertisements, green is also utilised much more often with women than with men.

	part of the magazine	white	ye./or.	red	green	blue	pink	purple	brown	black
f	journalist part (220)	35.5	17.7	27.7	19.1	20.9	20.0	12.7	10.0	58.2
	advertisment (49)	35.9	33.3	52.6	46.2	12.8	33.3	15.4	2.3	28.2
m	journalist part (210)	29.2	18.2	19.0	17.1	30.5	11.0	6.2	15.2	57.6
	advertisment (40)	35.0	30.0	15.0	30.0	20.0	4.0	20.0	5.0	32.5

percentage (%)

Figure 4: Colour code – gender – part of the magazine

3.3. Colour code- technical field- gender

A look on the various technical fields and the occurrence of gender and colours brings up a large number of results. Generally, black is the favoured colour for representations of technological artefacts, with the exception of green for video games/toys and pictures showing women and blue for the same technical category with men.

The second popular colours differ between the sexes. For music it is red for women and white for men, cell phones are likely to be shown with pink for both sexes. With men yellow/orange is used as

frequent as pink for cell phones. Red is a popular colour to represent computers with women and men (it is used in the same frequency as black for men with computers). White is the second used colour for both sexes when representing cameras/TVs. White is also very frequently used for pictures with vehicles and women and together with video games and men. Blue is the second most common colour when men are shown with vehicles.

A comparison between the frequencies of colours and gender within the category of technical fields shows mainly interesting results with regard to the colours red, pink and purple. Red is a very frequently used colour in both sexes, whereas with computers it is even more often used with men. Pink and purple are used with females and males in selected fields, with attention to pink that can be sometimes found even more often with males than with females.

	technical field	white	ye./or.	red	green	blue	pink	purple	brown	black
f	music technology (99)	31.3	17.2	34.3	15.2	13.1	23.2	18.2	8.1	62.6
	cellphone (49)	24.2	28.6	18.4	32.7	28.6	33.3	8.2	6.1	38.8
	computer (9)	33.3	22.2	44.4	22.2	22.2	44.4	22.2	0.0	55.6
	camera/TV (5)	44.4	29.6	29.6	14.8	22.2	7.4	29.6	7.4	44.4
	videogame/toy (20)	15.0	20.0	0.0	60.0	20.0	0.0	20.0	20.0	20.0
	vehicle (45)	44.4	11.1	15.6	13.3	26.7	8.9	6.7	13.3	66.7
m	music technology (95)	25.3	18.9	21.1	14.7	24.2	8.4	6.3	14.7	69.5
	cellphone (91)	18.8	34.4	9.4	25.0	28.1	34.4	9.4	6.2	37.5
	computer (18)	33.3	33.3	50.0	16.7	16.7	16.7	8.3	8.3	50.0
	camera/TV (24)	41.7	25.0	37.5	16.7	20.8	0.0	25.0	12.5	44.4
	videogame/toy (9)	44.4	22.2	0.0	33.3	44.4	11.1	11.1	22.2	22.2
	vehicle (59)	35.6	6.8	8.5	15.3	39.0	15.3	5.1	16.9	59.3

percentage (%)

Figure 5: Colour code – gender – technical field

3. 4. Colour code - comparison "BRAVO" - "BRAVO girl[2]"

"BRAVO girl" is the companion of "BRAVO" and contains girl topics. To see whether there exists a difference in the usage of colours between the two magazines "BRAVO" and "BRAVO girl" a comparison was enquired.

It can be noted that pink and purple are much more often used in "BRAVO girl".

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[2] Thanks to Jennifer Dahmen - magazine analysis Germany

magazine name	white	ye./or.	red	green	blue	pink	purple	brown	black
BRAVO	34.0	22.0	19.6	21.8	24.2	20.6	10.8	10.2	50.5
BRAVO Girl	34.5	20.7	20.7	23.0	33.3	31.0	31.0	12.6	43.7

percentage (%)

Figure 6: Colour code – "BRAVO" – "BRAVO girl"

4. Final conclusion and discussion

A look at the results shows that colours are used differently for women and men. To have a closer look onto gender differences, I refer basically to those colours which are in our „gender-interest". As expected, red and pink are represented more often with women, whereas blue is used more frequently when men are presented. Purple comes up with both sexes in journalistic parts as well as in advertisements, in the latter case it seems that purple is more often used for men. Green is a colour that occurs very often with women in advertisements.

Comparing the occurrence of red, pink and purple for females versus males, it appears that advertisements are more gendered through colours than are journalist parts of the magazine. This would correspond to the fact that at lot of research on the meanings and impact of colours is done by the marketing and advertising department. Lee and Lee (1990) in their paper on "Using colour preferences in magazine advertising" "(...) suggest a need for new research into colour preferences according to gender (...)". They aim to find out which colours are preferred by females and males to make advertisements more effective and profitable.

In respect to the technical fields, red, pink and purple are pictured with females and males in selected fields in an equal manner, whereas pink sometimes is used more with males than females. The fact that red is used very often in selected technical fields, especially with computers and cameras/TVs may be due to arising attraction especially to those technical attributes. These results must be seen with reservations due to the small cell size of some of the technical fields. A closer look onto selected pictures is needed to have a better insight if this assumption is genuine.

The fact that purple and pink are used very often for males can be seen as an indication that is it tried to make these pictures more feminine in a certain way. Referring to those colours it must also be kept in mind that they are very fashionable at the moment. Especially purple is a common colour in every industry and is widely spread. To see if the effect of gendering pictures showing men through those as feminine considered colours is strengthened because of the present "purple-vogue", another look after a certain time would be necessary.

The final conclusion is that there exists a genderedness of pictures through colours. Hence the implication for journalists and publishers of youth magazines should be to use colours in a gender-

neutral and balanced way, as well for SET as for non-SET pictures. Even if the pictures themselves often to not imply characteristic gender colours, backgrounds and surroundings of pictures are gendered. This should be reconsidered and kept in mind when the image of SET needs to be changed and not carried in a stereotypical way.

To have an impact on the marketing sector as well, this advice should also be applied to advertising makers. Although advertisements do - in comparison to journalist images - hold the smaller amount of overall pictures in youth magazines, they have a large influence on the consciousness of the viewers. I insinuate that through advertisements it is even more intended to strengthen a subconscious association between gender and gender typical colours. Therefore the implication is aimed for all who have part in illustrating young people's magazines.

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